SOCIAL AND ECONOMIC ELEMENTS

Abstract: Many communities and people in Colorado depend upon the Forests and Grassland for their economic and social way of life. Social and economic analyses are conducted to discover what effect the agency has on local communities and the people using the natural resources. The human element is an important part of ecosystem management, and people are considered in resource decisions made in the *Forest Plan.* The social and economic impact analysis examines the consequences of different land management decisions on the people and communities surrounding the Forest.

Economic effects analyzed include changes in direct, indirect, and induced employment, total income, and payments to county governments. Social effects include changes in lifestyles; attitudes, beliefs, and values; population and land use; and community identity.

The principal effects on the social environment are often related to the degree of change from current or historic output levels and/or the character of the Forests and Grassland. Alternatives proposing the largest changes appear to have greater potential impacts. Alternatives C, I, A, and to a lesser degree B, tend to maintain the economic aspects of the social structure in the area; patterns of work are supported or enhanced by resource supplies provided by the Forest in these alternatives. Alternatives H and E that project reduced outputs of timber tend to decrease jobs based on this traditional Forest use.

Other Forest Service decisions can influence the social well-being of Forest-dependent communities. Generally, individuals, groups, or communities that view or use the Forests and Grassland from an amenity standpoint are positively impacted by Alternatives H, B and to a lesser degree E, and negatively affected by Alternatives C, I and A.

Population increases will not differ among alternatives. The reasons people come to the area include prospects for employment, the natural setting, and the lifestyle. Even though Alternatives H and E project reduced outputs of commodities, there is not a direct correlation between national and Forest/Grassland related employment and population. People who lose their jobs tend to remain in the area.

The Forests and Grassland contribute to the economy both as an employer and as an agency with an economic impact on recreation, and to a much lesser degree, timber. Recreation is the largest contributor to the local economy, with contributions ranging from 85 percent (Alternative A) to 92 percent (Alternative E) of total income generated by all alternatives. Each of the alternatives contributes differently to the local economy. Alternatives C, I, E, and A, in that order, contribute the most overall. The income and employment generated under Alternatives B and H are lower than the other alternatives, primarily from the reduction in timber and developed recreation opportunities.

The alternatives contribute funds to the counties within the Forest's boundaries through the 25-percent fund and the Payment In Lieu of Taxes (PILT) program. The largest payments through the 25-percent funds in Alternatives C, A, and I, in that order, are a result of increased revenues from Forest Service activities. Weld County will also receive increased revenues in Alternatives B and E from increased oil and gas leasing activities. In Alternatives B, E and H, Clear Creek and Grand counties may see a drop in the 25- percent funds resulting from reduced outputs. Weld County will see a drop in Alternative H resulting from reduced levels of oil and gas leasing and grazing activities. Total PILT payments are not expected to vary among alternatives for Boulder, Gilpin and Larimer counties since PILT payments offset the 25 percent payments.

LEGAL FRAMEWORK

Impact analyses and economic efficiency in environmental documentation for *Forest Plan* revision are based primarily upon three laws and associated regulations: *National Environmental Policy Act (NEPA)*, *National Forest Management Act (NFMA)*, and the *1990 Farm-Bill*, Sections 2371-2374. NEPA requires disclosure of effects on the human environment, specifically identifying the social and economic considerations. NFMA requires consideration of economic benefits and costs, specifically identifying cost-efficient alternatives, impacts on present net value, and impacts on local employment. The Farm Bill focuses on the national concern for the economic well-being of rural communities, especially as they may be dependent upon goods and services derived from National Forests and Grasslands.

INTRODUCTION

Social and economic analyses are conducted by the Forest Service to discover what effect the agency has on local communities and the people using the natural resources. The human element is an important part of ecosystem management, and people are considered in resource decisions made in the *Forest Plan*. The social and economic effects of each alternative are determined and compared along with other factors when evaluating the proposed alternatives.

A social impact is a change in social and cultural conditions which results directly or indirectly from a Forest Service action. One objective of the analysis is to identify potential public needs and concerns that resource managers need to consider in their decision making. Another objective is to inform agency decision makers and the public of potential social effects that may occur.

Economic impacts occur when Forest Service actions directly or indirectly change the type of goods and services offered, the employment base, or the population. Employment-base changes can occur by either creating or eliminating jobs or by shifting jobs between major sectors.

SOCIAL ENVIRONMENT

INTRODUCTION

The social environment comprises the people living in and adjacent to the Arapaho and Roosevelt National Forests and the Pawnee National Grassland. Forest and Grassland resources play an important social role for these people and for people in the Rocky Mountain area generally. The goods, services, and uses available from or on the Forests and Grassland represent major components in the lives of many people.

Sawmill operations in some of the communities provide job opportunities. Range permittees rely on the availability of suitable forage for grazing livestock. Outfitters and guides for various wildlife and recreation-related uses make all or part of their living from National Forest resources. Water originating on NFS lands serves agricultural, industrial, business, and residential uses. A few individuals rely on the sale of firewood to make a living or to supplement other income.

Many local communities rely on the employment and income generated from the use of Forest resources. The quality of people's lives is enhanced by the physical environment associated with the Forests and Grassland. All of these goods, services, and uses have value to the people who live in the area. Changes in the quantity or quality of these attributes can affect their lives.

For example, continued economic development in the mountains and along the Front Range will depend on the availability and cost of water. Unless water of adequate quality and quantity remains available at reasonable rates, commercial and residential development will be increasingly difficult or impossible to continue.

Many of the public issues and demands considered in the development of the *Forest Plan* derive from interest groups within the human environment. The *Forest Plan* has potential to impact the local economy, community lifestyles, stability/cohesion and cultural values. Tensions in the local social-political environment can become heightened as timber-dependent groups advocate to have decisions made in their interest, while environmental groups attempt to insure their interests are protected and possibly expanded. Consequently, how forest lands will be managed is of great concern to all interest or social groups in the area. These groups include long-time and part-time (second home) residents, local business and industry people, recreationists, and intermix/former urban residents. Each group is discussed later in this section.

AFFECTED ENVIRONMENT

PAWNEE NATIONAL GRASSLAND

The Pawnee National Grassland is located in Weld County within the Platte River Basin. The completion of the Union Pacific Railroad in 1868 made this area the first extensive region in the Great Plains to be settled and permanently populated. The railroads were the colonizing agents, with early settlements straddling the railroad through the plains of Nebraska and Colorado. Growth today is concentrated laterally along the Platte River which is the commercial and transportation corridor.

Historically, the population was rural, centered around life on family-owned ranches. In the past 30 years, the population has become more urban-oriented. Towns such as Greeley and Sterling, Colorado, and Ogallala, Nebraska, are steadily growing in size, as are the services available to the people living on their farms and ranches or in small towns such as Keota.

The Platte River Valley is still dominated by an agricultural economy: in the northwest, ranching and wheat farming are anchored at Cheyenne; in the central and western areas, sugar beet, feed crop, and cattle operations are centered at Greeley, Sterling, and Scottsbluff; and around Ogallala irrigated farming predominates

ARAPAHO AND ROOSEVELT NATIONAL FORESTS

The Forest lies within Larimer, Boulder, Gilpin, Clear Creek, Park, Jefferson, and Grand Counties and encompasses several communities within its boundaries. Just east of the Forest lies the area known collectively as the Front Range, which includes the major cities of Boulder, Fort Collins, Colorado Springs, and the Denver metropolitan area. The diversity of job opportunities and the many colleges in the area makes the Front Range a high immigration area. The Forest is considered an Urban National Forest since it lies within a one-hour drive of one million or more people who live in the Front Range cities.

Development along the Front Range was paralleled by development of private land within the National Forest boundary, first for vacation homes, then for an increasing number of year-round residences. Mountain subdivision development is rapidly increasing the populations of small mountain communities and creating new communities.

The Front Range metropolitan corridor attracts numerous people because of its proximity to the recreation resources and natural beauty of the Rocky Mountains, much of it available on public land. A high demand is placed on the nearby forest resources for recreational uses. Conflicts have become more prevalent between mountain residents and visiting recreation users.

The winter sports, real estate, and supporting businesses within this area orient their operations to a national market, which further increases the demand for recreational uses of the Forest. High prices at recreation resorts and facilities reflect the high demand. The seasonal natures of the jobs

tend to keep wages low. These lower paying jobs disrupt local populations and employment patterns when nonlocals obtain the jobs and create a need for more community services.

RACIAL DIVERSITY

The people living in and around the Arapaho and Roosevelt National Forests and Pawnee National Grassland are mainly of Anglo-European descent. The following table, taken from 1990 U.S. Census figures, lists the racial mix for the area.

Table 3.150 Racial Diversity in Counties of the ARNF and PNG

County	White	Hispanic	Black	American Indian	Asian or Pacific Islander	Other	Total
Boulder	201,617	15,195	1,879	1,092	5,359	197	225,339
Clear Creek	7,280	254	17	26	39	3	7,619
Gilpin	2,900	109	14	34	13	1	3,070
Grand	7,641	243	16	28	37	1	7,966
Larimer	169,213	12,227	1,043	844	2,679	130	186,136
Weld	101,977	27,502	509	593	1,063	177	131,821

The Front Range area contains the greatest concentration of minority populations within the planning area. Weld, Boulder and Larimer counties, respectively, have the highest concentrations of minorities, primarily Spanish-speaking and Asian or Pacific Islander populations.

SOCIAL GROUPS

Few generalizations can be made about the mountain and grassland communities within the Arapaho and Roosevelt National Forests and the Pawnee National Grassland. They are as diverse as the people who live there. Some of the communities often appear as microcosms of urban areas and mirror the surrounding cities. It should not be expected that all residents will have the same or even similar points of view on various issues. There are, however, some recognizable groups that can be expected to react in the same general manner to various policies and decisions made by the Forest Service.

For the ARNF and the PNG, five social groups have been identified as likely to be affected by management direction specified in the alternatives. The groupings were developed from a variety of sources, including examination of Forest land-use trends on this Forest and similar urban Forests, public input during the scoping process, use surveys, and census data. The groups are not mutually exclusive but comprise readily identifiable and useful categories for analysis

purposes. Although categorization may produce some incorrect stereotyping, the following characteristics apply generally to the groups.

Long-time residents include families with traditionally rural-conservative philosophies more closely tied to the timber, mining or leasing, and grazing uses of the Forests and Grassland. Generally, this group favors recreational uses such as fishing and hunting. Residents rely on the Forest for fuelwood to supplement their incomes or heat their homes. They depend in part on the Forest Service for wildland fire management and the protection of life and property from wildfire. Mountain communities receive some of their water supply from NFS lands. The transportation system becomes an issue of concern when traffic congests local roads and major access routes on peak weekends and holidays. Trespass on private land occurs frequently.

Part-time residents and second home owners reside permanently in predominately urban areas, but live in this area part time. Many of these families live on land adjacent to or within National Forest boundaries. They are generally concerned about recreation opportunities and their continued ability to find the solitude and open space they have come to expect in the mountain environment. Many are relatively affluent, and family income is not closely tied to Forest commodities. "Natural" values encouraged them to purchase second homes, and commodity uses, such as timber harvesting near their homes, often conflict with their interests.

Local business people are generally mountain community residents and are very similar to full-time residents in their dependency on National Forest programs and products. Attracted by the promise of increased business due to the influx of new residents, business people come into the mountain communities. They may have opinions regarding the quality of life in the mountains that are quite different from those of long-time residents.

The business community in the mountain area is linked indirectly to forest resources. Many businesses are recreation/tourist related, and could not continue to function without the constant movement of people through the communities. Many local businesses rely on the forest environment to attract recreationists.

Business people in general are concerned with the adequacy of the existing transportation system and the availability of water. Protection from wildland fire is also important, as business people depend on the security of their businesses for their income and way of life.

Regional recreationists are mostly people who live in the Denver-Boulder and Front Range metropolitan areas and recreate in the Forests and Grassland. They use the recreation facilities for a wide variety of activities and want the forest environment managed so that it will continue to afford the type of experience they have come to expect over the years. These users are more interested in the amenity values of the ARNF and PNG than in commodity production. They desire facilities for both dispersed and developed recreation.

Intermix and former urban residents are vitally concerned with the Forest's management activities. Development along the Front Range has increased dramatically and as a result, residential areas have been built in close proximity to flammable forest vegetation. Residents of

these areas are concerned with and affected by the Forest's fire management program. Access may also present a problem to intermix communities as Forest users trespass over private land in order to gain entry to the Forest. (See the National Forest-Residential Intermix Section.)

Many of the new residents in these areas are former urban residents who have moved from the urban areas to find a quiet, more rural atmosphere. In some cases, they may still commute to an urban environment to work or use technology to work from their homes. They tend to use roads to and recreate near their homes; in general, they favor amenity uses over commodity uses.

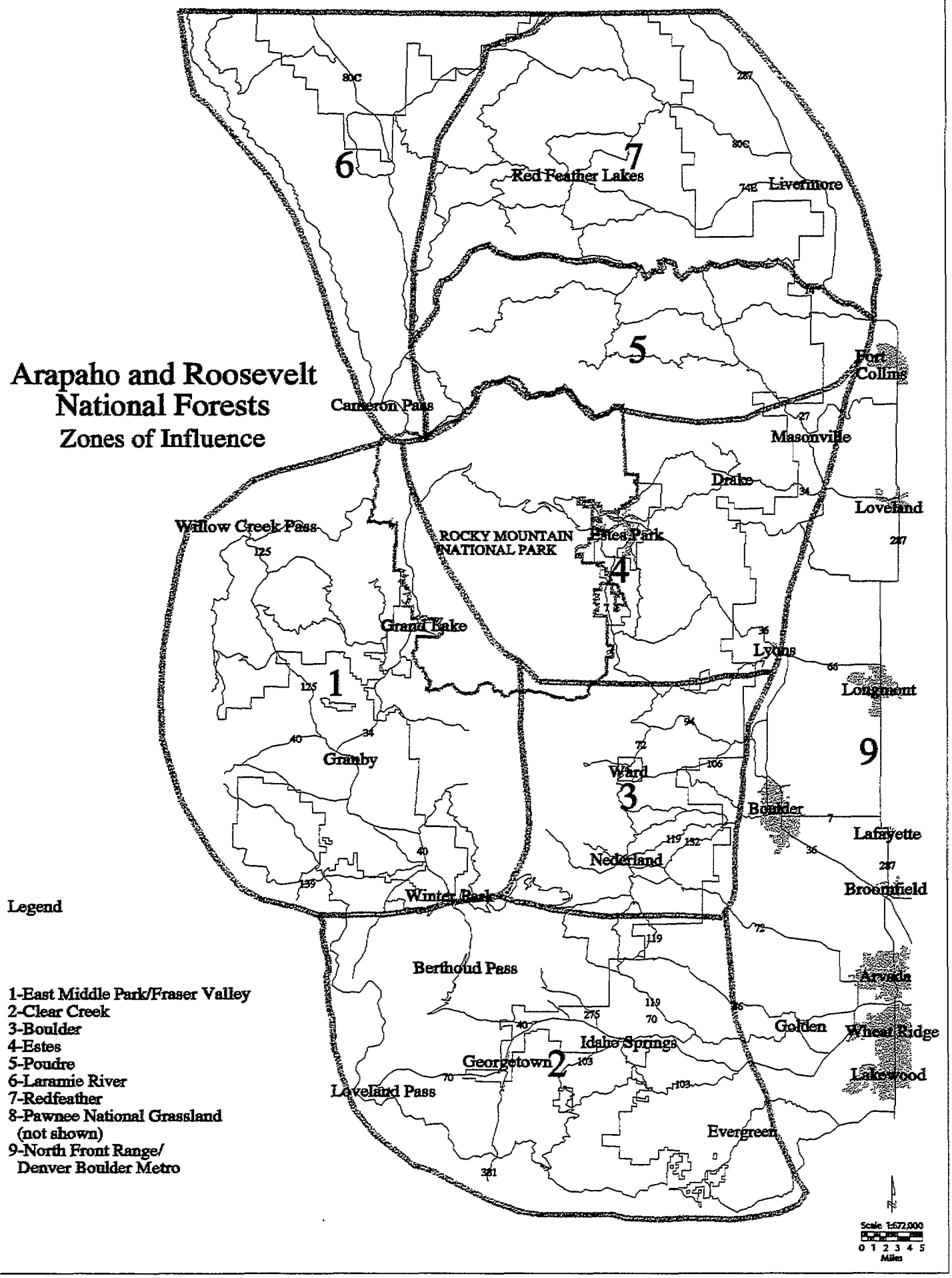
SOCIAL VARIABLES

The impacts of the *Forest Plan* alternatives on social groups are measured and analyzed by four variables: population and land use; lifestyle; attitudes, beliefs, and values; and social organization. Population and land use variables address effects on population characteristics and distribution, and on the pattern of land uses within an area. "Lifestyle" includes style and perceived "quality of life" for individuals or groups. Attitudes, beliefs and values encompass perceptions about governing agencies, feelings of dependency for basic needs and feelings of certainty or uncertainty about the future. Social organization includes elements of community cohesion and stability.

ZONES OF INFLUENCE

For purposes of the analysis of the social environment, the Forest and its surrounding area have been divided into nine "zones of influence" as shown in Figure 3.31. One of the zones is on the Grassland. The nine zones serve as a framework for assessing current social and economic conditions. Because social environments often do not coincide with political boundaries such as counties, the zones are geographic areas characterized by particular patterns of lifestyles, economic conditions, developments and social trends. The zones vary in size and are larger than individual towns and communities.

Figure 3.32


Arapaho and Roosevelt
National Forests
Zones of Influence
Legend
1-East Middle Park/Fraser Valley
2-Clear Creek
3-Boulder
4-Estes
5-Poudre
6-Laramie River
7-Redfeather
8-Pawnee National Grassland
(not shown)
9-North Front Range/
Denver Boulder Metro
6
7
5
4
1
3
2
9
Red Feather Lakes
Livermore
Fort Collins
Cameron Pass
Masonville
Drake
Loveland
Willow Creek Pass
ROCKY MOUNTAIN
NATIONAL PARK
Estes Park
Grand Lake
Lyons
Longmont
Granby
Ward
Boulder
Lafayette
Nederland
Broomfield
Winter Park
Berthoud Pass
Arvada
Golden
Wheat Ridge
Idaho Springs
Georgetown
Lakewood
Loveland Pass
Evergreen
Scale 1:572,000
0 1 2 3 4 5
Miles

SOCIAL EFFECTS AND CONSEQUENCES

EFFECTS COMMON TO ALL ALTERNATIVES

None of the alternatives will influence racial diversity nor will they substantially change the attitudes and lifestyles of a culture. It is assumed that the social groups include minorities, women, the disabled, the elderly, those for whom English is a second language, and a variety of ethnic origins. Generally, minority groups are not known to be affected differently as special groups than they would be as part of one of the social groups discussed.

The Arapaho and Roosevelt National Forests and Pawnee National Grassland are committed to equal treatment of all individuals and social groups in providing services, opportunities, and jobs. None of the alternatives considered for the Forests or Grassland are expected to have discriminating effects.

Increases in population along the Front Range have a negative effect on air quality which affects the quality of life for many individuals. Since vehicular emissions are generally the major source of pollutants, Forest management activities are not expected to negatively affect air quality. Even with increased use of the Forest, the number of vehicles should not be large enough to produce a level of pollutants that would measurably lower air quality, except on a localized basis.

Law enforcement needs will continue to grow commensurate with the population growth. Resource and property damage are likely to increase. There will be an impact on both Forest Service and law enforcement agencies that have responsibility inside National Forest and Grassland boundaries. Because of the anticipated growth in population, the need for routine patrolling for both educational and enforcement purposes is likely to increase in all alternatives.

ZONE 1: FRASER VALLEY AND EAST MIDDLE PARK

The Fraser Valley and East Middle Park zone is entirely on the Sulphur Ranger District within Grand County. It is bounded on the north and east by the Continental Divide and Rocky Mountain National Park, on the south by the Continental Divide, and on the west by Byers Canyon along Highway 40 and the Vasquez Mountains.

Population and Land Use. Early settlement in this zone was in the form of small, primarily family-owned ranches which developed in the broad valley bottom lands. This zone is generally surrounded by NFS lands and most early residents depended directly or indirectly on the resources of these public lands. Water for irrigation and timber for local uses were the only other major resource uses until the early 1900s. At this time the railroad was built through the area, increasing the demand for timber for its own construction and improving access to major markets such as Denver. Both the timber and cattle industries expanded.

Although built in 1937, the Winter Park Ski Area did not become a major influence until the region-wide ski boom in the 1960s. Now it is one of the driving forces in the development of the valley. Expansion of Winter Park has both increased the population and changed the settlement pattern of the zone. There has been an increase in demand for second homes and condominiums which has led to the subdivision of ranches and to greater housing density.

East Middle Park is part of a larger geographic area known as Middle Park. Because of its early transition to a recreation-based economy, East Middle Park has become socially distinct from the remainder of Middle Park, which has struggled to retain its agricultural orientation. With the closure of the Louisiana-Pacific waferboard plant in Kremmling in 1992 and increasing subdivision of ranches, the economy of Middle Park is, however, also moving toward the recreation industry and away from timber and agriculture.

The early development of ski areas in the Fraser Valley had a minimal impact on East Middle Park. Of greater importance was the Colorado-Big Thompson water project which expanded the recreation potential of the Grand Lake area and provided jobs in the construction and operation of the project. Subsequent expansions of the ski and tourist industry in the Fraser Valley *have* affected East Middle Park, particularly around the town of Granby, where many individuals employed in the Fraser Valley now reside.

Although tourist-related activities provide the majority of jobs and income, they occupy relatively little of the land area. Most of the private land is still devoted to ranching. The trend, however, indicates increasing pressures to subdivide these ranches or to convert them to recreational lands.

The main uses of Forest Service lands are for recreation, but timber harvest still provides employment opportunities in the zone. Other timber products available are firewood, Christmas trees, and transplants for commercial and personal use.

Lifestyle. The Fraser Valley and East Middle Park Zone has changed from a rural agricultural economy to one centered on a seasonal (summer/winter) tourist economy. Previously people earned their incomes from land-based occupations such as ranching or logging or from support services such as government or retail trade. Now most jobs are tied to operating or providing support services to tourist-related activities. Many jobs are seasonal and attract a large transient population.

Attitudes, Beliefs, and Values. The majority of people in this zone believe that additional growth for their area is good. They would particularly emphasize the expansion of summer and winter recreational activities to achieve a stable year-round economy. A minority of people would prefer to stabilize growth at current levels. As growth accelerates, more people believe that stabilizing growth is desirable. Long-time residents have the attitude that resource utilization for timber and grazing is appropriate and compatible with their lifestyles, providing it does not detract from the recreational attraction of the area. Many recently arrived residents as well as part-time residents do not want to see any logging activities, especially clearcutting.

Social Organization. This zone is one of the more diverse zones on the Forest, with all social groups being equally represented. Long-time residents and local business people are economically linked to forest outputs. Louisiana-Pacific (LP), Bighorn Lumber, R. L. Hammer Timber and Lumber, and Winter Logging are considered "top" purchasers in the ARNF timbershed (Rideout and Stone 1992) and of these, LP and Winter Logging have operated within this zone. Other local businesses directly dependent on the Forest are those that offer recreation opportunities such as winter skiing and snowmobiling; marina operations on Shadow Mountain Lake and Lake Granby; outfitting and guiding services for hunting, fishing, jeep touring, and horseback riding; and mountain bike events. Water developments are also important to ranchers, irrigation and ditch companies, and water suppliers.

This zone is attractive to the social groups who use the Forest primarily for recreation (former urban residents, regional recreationists, and second home owners) due to the diverse year-round recreation opportunities, open space, unmodified scenery and solitude.

Community stability and cohesion are fairly strong between those who live and/or own businesses in the area. Long-time residents and business are equally concerned about environmental protection as the other groups. Issues that tend to polarize groups in this zone are roadless area management and timber harvesting activities. Over the years, people in this zone have become less accepting of timber harvesting and do not favor timber sales in undeveloped areas of the Forest. People also differ as to where motorized/mechanized activities should be allowed, especially in the James Peak area west of the Continental Divide.

Direct and Indirect Effects on Zone 1

Because of the social and economic diversity in this zone, the social groups probably will not change due to effects of alternatives. Alternatives that prescribe the lowest timber harvest and lowest opportunities for motorized recreation would possibly cause a reduction in the size and influence of the groups dependent upon these uses of the Forest.

The greatest potential for changes in values and attitudes lie with Alternatives C and H. For example, in Alternative H, the recommendation of Wilderness might tend to antagonize those dependent on existing uses of commodity resources (timber, livestock, oil and gas industries) and of motorized and mechanized (mountain bikes) recreation. In Alternative C, more acreage managed for timber, oil and gas leasing, and motorized recreation would polarize those favoring amenity values over commodities.

This zone has the potential to be the most adversely affected by reductions in timber harvest in Alternatives H, E, and B. The timber industry is proportionately more important here (and in Zone 7) than in the more urban areas of the Front Range east of the Continental Divide. The Arapaho and Roosevelt National Forests have, however, been a relatively minor supplier of timber, with its role declining over the past decade. The major purchasers in the timbershed are primarily dependent on the Medicine Bow, White River, and the Routt National Forests for their survival.

Timber harvest levels would increase under Alternatives C and I, thus improving the stability of local timber industries. The levels projected in these alternatives and in Alternative A will only provide for smaller local purchaser demand. Benefits from increased harvest levels would be noticeable to large purchasers like Winter Logging but larger suppliers like Louisiana-Pacific would be largely unaffected.

Smaller purchasers are most affected by the timber harvest level projected under Alternative B. Smaller local purchasers who have been relatively dependent on the ARNF should do well. The harvest level is not high enough to make any major changes in the structure of top timbershed purchasers like Louisiana-Pacific or Bighorn Lumber. Under this alternative, the purchasers in this zone, primarily Winter Logging, would likely continue, but they would also be dependent on the sale level from the Routt National Forest.

Alternatives I, E, and C allow more motorized and mechanized recreation and would benefit the local businesses and recreationists who participate in four-wheeling, snowmobiling, and mountain biking. Local business people could experience increases in the demand for goods and services, as recreationists look to local community merchants for recreation associated equipment and facilities. Increased business activity could result in additional job availability in local communities. Those benefits are expected to extend to other businesses within the zone. Increased motorized opportunities could result in increased conflicts between long-time residents and recreationists with regard to traffic congestion, influx of large numbers of people into the communities, trespassing on private land, and reduced opportunities for solitude.

Alternative B would improve the quality of the recreational experience by providing a variety of developed and dispersed opportunities, including mechanized recreation opportunities in the James Peak area and expansion of the Indian Peaks Wilderness. Business people dependent on the recreation/tourist trade should maintain or increase business. Existing uses will probably not be affected by Wilderness expansion.

Alternative A has the least effect on most of the social groups because it allows for the same level of timber production, grazing, and recreational opportunities as in the past. However, the recreationists and part-time residents would be negatively affected because more people would use the same number of Forest Service recreation sites. New economic growth to supplement Forest Service facilities could occur. This is especially true for downhill skiing opportunities in the Devils Thumb area for Alternatives A and I.

Cumulative Effects on Zone 1

The timber management policies of the Routt, White River, and Medicine Bow National Forests have the greatest potential to affect this zone. Even though the ARNF could provide small local timber purchasers with outputs that would provide a level of stability, declines over the timbershed could have an impact on the social groups dependent on forest products.

Trends in growth will likely continue, as the tourist-related industries draw dollars into the communities. As more and more people discover the attributes of this area (scenery, recreational attraction, small town values), more will desire to move here. The newcomers tend to be in the social groups that use the Forest's amenities and do not rely on commodities for employment.

This could cause conflicts with groups who want to see harvest levels increased and could result in litigation over timber harvest similar to that seen in recent years.

The cumulative level of oil and gas activity over the planning period would not dramatically change local community conditions. A major oil and gas discovery is not predicted under any *reasonably foreseeable development* scenario.

ZONE 2: CLEAR CREEK

This zone is located in the upper Clear Creek River basin which extends east from the Continental Divide to Squaw Pass and includes the area draining into North Clear Creek. The towns located here are Idaho Springs, Georgetown, Empire, Silver Plume, Central City, Black Hawk, and other smaller communities along the narrow mountain valleys. Generally, the private land is along the various creeks and rivers or where substantial mineral discoveries were made.

Population and Land Use. The Clear Creek zone was one of the original mining centers in the state. The settlement patterns of the area have followed the historical boom and bust cycles of mineral development. During the past 50 years, recreation has become important in this zone.

The expansion in population has led to an increase in the subdivision of private lands in this zone. Development and improvement of I-70 and other state highways and county roads have made it possible for people to live in the zone and commute to the Denver area to work. Tourist related facilities have also increased along the major road corridors, including Loveland Basin ski area along Interstate 70 and Berthoud Pass ski area along Highway 40. Much private land is still tied up in mining claims, although most are now inactive.

The mountain communities of Black Hawk and Central City established a limited-stakes gaming industry in 1992. There has been a rush to build new casinos, with a number of large projects being proposed and built. Meanwhile, a number of smaller casinos have gone out of business, not anticipating the heightened degree of competition. Although there have been problems among individual casinos, the industry as a whole has done well (McCallin et al. 1994).

Lifestyle. The main attraction for living in this zone is the opportunity to enjoy a rural mountain lifestyle close to a major metropolitan area. In addition to the people who work in Denver and commute from the zone, a number of residences are used as second homes. Tourist-related recreation facilities and the ski area of Loveland provide jobs which attract many seasonal employees. Berthoud Pass Ski Area provided jobs in the past when it was operating. Mining still provides employment opportunities, primarily at the Henderson Mine. National Forest lands

provide recreation opportunities and the visual backdrop for the area. People directly dependent economically on Forest resources are ski area employees.

Attitudes, Beliefs, and Values. The majority of residents in this zone support environmentally sustainable economic development. They wish to maintain the diversity and uniqueness of their communities while still capitalizing on the general public's desire for historic and natural resources. They place a high emphasis on maintaining the visual quality of the area. Improved telecommunications, a transportation system which maximizes the existing transportation infrastructure, and clean water are also important to residents.

Social Organization. A large number of people in this zone fall into the former urban resident and local business groups. At least 40 percent of the people living in this zone commuted to jobs outside the zone in 1990. The desire to attract new cottage industry, light manufacturing, and home-based telecommuter businesses will draw even more former urban residents into the area.

Groups directly dependent on the Forest are a few small timber purchasers, local businesses dependent on downhill skiing, and local residents desiring firewood. Several outfitter and guide businesses provide mountain bike touring, llama day trips, and a variety of classes for avalanche survival, photography, winter camping, and snowshoeing. Water developments are important to several of the communities in the zone, including Central City, Idaho Springs, to several mineral and ditch/reservoir companies, and to Public Service Company's hydroelectric facility at Georgetown. Regional recreationists and second home owners are drawn to this zone due to its proximity to the Denver metro area.

Community stability and cohesion are strong between those who live and/or own businesses in the area. Residents and businesses are as concerned about environmental protection as the groups who recreate in the zone. There are differences among the groups, especially in management areas like James Peak where wilderness designation may affect existing land uses at the upper limits of the Fall River drainage, the North Empire Mining District and the St. Marys recreation and residential community in particular.

Direct and Indirect Effects on Zone 2

The main factors affecting this zone are reductions in availability of forest products other than logs (POL), travel management decisions, and ski area development.

Increased timber harvest levels normally provide for increased availability of forest products other than logs (firewood, posts, and poles). Timber harvest levels would increase under Alternatives C and I, thus improving the stability of the POL market for smaller local purchasers and residents. These two groups are most affected by timber harvest levels projected under Alternatives B, E, and H. Alternative A has the least effect overall since it allows for the same level of opportunities for forest products as in the past.

The groups who favor motorized activities are likely to support Alternatives E, I, C, and A. Alternatives I and C generally emphasize forest products over recreational opportunities while emphasis in Alternative A is wildlife habitats. Under Alternatives B and H, those desiring more open space and solitude would have their desires satisfied because these alternatives would provide the most nonmotorized recreation. Alternative B emphasizes a greater variety of dispersed recreational opportunities than Alternative H. Alternative B does not include additional wilderness in this zone, so existing uses will continue.

The expansion of existing and/or development of new downhill skiing areas is permitted to varying degrees in Alternatives A, B, C, E, and I. The greatest amount of development is allowed for in Alternatives C and I, and the least amount in Alternative B. Alternative B allows for expansion of the Loveland Ski Area and the authorization of Berthoud Pass Ski Area. The following discussion of effects presumes that ski area development will be economically successful. (See the Existing and Potential Ski Area section of this chapter for a discussion of the effects of ski area developments that have not been successful.)

The construction or expansion of a ski area has many positive and negative effects. Ski area construction or expansion helps to meet the demand for downhill skiing. It can strongly stimulate the local economy by producing jobs. Many of these jobs occur in the winter when there are few other job opportunities. Development can improve cultural and social diversity. Health, transportation, and commercial facilities can also improve.

Ski area development may also lead to some population growth and increases in the cost of living. This often leads to economic displacement of local residents, senior citizens on fixed incomes, for example, who can no longer absorb increases in the cost of living in their own towns. As demand for construction workers increases, many workers migrate in from other areas, exacerbating the demand for and shortage of housing. Local governments feel the stress on such services as emergency services, law enforcement, transportation, social services, schools, hospitals, and other community services.

Stress on local government services would be reduced in Alternative H, as this alternative does not provide for ski area development or expansion other than what currently exists at Loveland Basin. Berthoud Pass is no longer authorized. (See the Existing and Potential Ski Area section of this chapter for a discussion of the Berthoud Pass Ski Area.)

Cumulative Effects on Zone 2

Growth and development are expected to continue regardless of the management direction in the revised *Forest Plan*. Actually, the growth that is occurring is more likely to influence the selected alternative rather than vice versa due to the pressures of urban intermix and the Denver Metro influence on Forest management objectives. Trends in growth will likely continue, although the area does not have a major industrial base to draw new dollars into the community.

The gaming industry will continue to play an important part in the social makeup of areas around Central City and Black Hawk. Associated tourism will also be a strong part of the economy of both these communities. The significance of the mining industry will depend on national and world economies. In any case, the character of this zone will continue to diversify yet still be focused on recreation and tourism.

Any new housing, resort developments, or major transportation improvements between I-70 and southern Gilpin County will affect the further growth of Central City, Black Hawk and surrounding communities. A large housing development would have reverberating effects on use of adjacent public lands as well as on attitudes of residents. The importance of natural resources in employment could decrease and the importance of amenity uses of resources could increase.

ZONE 3: BOULDER

The Boulder zone extends east from the Continental Divide to the foothills of the Front Range, as far north as Longs Peak and south into northern Gilpin County. It is generally the area drained by the upper St. Vrain River and Boulder Creek. It includes the small mountain communities of Nederland, Rollinsville, Ward, and Allenspark along the Peak-to-Peak Scenic Byway. The city of Boulder exerts a major influence on the area.

Population and Land Use. Mining activity in this zone stimulated the development of support services such as sawmills and ranches. Many acres in the Boulder Mountain area were cut over in the past. Mining, logging, and ranching were the mainstays of the economy in this zone until after World War II. At that time increases in population and improved transportation routes allowed more people to recreate and live in the mountains while working in the Denver-Boulder area. Approximately 10,500 people live within the NFS boundary in Boulder County.

The primary use of Forest lands is for dispersed recreation activities. A small amount of timber is commercially harvested primarily for fuelwood and special products. Some livestock grazing of public lands still occurs.

The real estate industry in the city of Boulder is healthy. However it is constrained by the City and County Open Space which surrounds Boulder. The Boulder City government has adopted many policies to control the amount of growth and types of development in its mountain lands. As a result, much of the residential activity taking place in the county is outside the city limits near and along Forest boundaries.

Lifestyles. Most people living in the zone were attracted by the rural mountain lifestyle situated close to a major metropolitan area. Many people live in the zone while commuting to jobs in the Denver-Boulder area. Tourist related support services provide some jobs. Few people in the area are economically dependent on consumptive use of National Forest resources. Those that are include recreation permittees (ski areas, recreation guides, etc.), loggers and ranchers.

Attitudes, Beliefs, and Values. This zone is experiencing the most dramatic change in attitudes of any of the zones. Long-time residents and ranchers tend to favor some commodity management of the Forest. Both groups are slowly being replaced by younger families and by former urban residents, both young and old. These new residents do not have the philosophy or traditional tie to the land and resource management.

A majority of the residents in this zone moved to the area for the rural mountain lifestyle which they value highly and seek to preserve. They will accept some forest management activities relating to recreation management and the treatment of insect- and disease-attacked areas. They closely relate to, and are concerned about, the management of the ecosystem and the effects recreation and resource extraction have on it. A minority, primarily long-time residents and local business, believe in using resources through mining, logging, ranching and water developments.

Social Organization. Regional recreationists and second home owners are drawn to this zone due to its proximity to the Denver-Boulder metro area. Many people in this zone are former urban residents who generally have a liberal philosophy and feel strongly about environmental protection of natural and human resources. Some are highly effective at mobilizing local and outside resources to engage specific local environmental issues, such as water utilization projects.

Development and use of water resources is an issue on which groups in this zone differ significantly in their expectations for forest management. A number of cities, towns, water districts, ditch companies, resorts, and long-time residents depend on water developments on NFS lands.

One issue on which most of the groups agree is that management and protection of resources within the intermix are important. The number of fires in this zone has increased, with the primary damage occurring to property on private lands within the Forest. Cooperation between private landowners and public agencies would help to increase community cohesion.

Of all the zones, community stability and cohesion is the weakest in the Boulder zone. Most groups will agree that homes in the intermix are starting to break up the open space and that this continued development and urbanization of the land threatens local ecological systems. Some groups are resistant to any change, others could tolerate changes if they fit into the existing lifestyle of the community.

Direct and Indirect Effects on Zone 3

Population growth in the Front Range communities is affecting this zone in several ways. It is increasing fire risk and introducing ecological disturbance as more people live in the mountains and along the Front Range. It is straining the capacities of limited developed sites and facilities. It is also causing conflicts between dispersed recreation users and adjacent homeowners and between nonmotorized and motorized recreationists.

Alternatives C and I provide for the greatest amount of timber management which could result in greater protection of lives, resources, and property, and thus benefit residents living in the intermix. Although wildfires are still likely to occur, their intensity would be lessened as a result of fuel reduction treatments. All alternatives except A will also manage more areas under the intermix prescription. One emphasis of the intermix prescription would be to manage fire and fuels in cooperation with state and county agencies as opposed to managing them mainly through cutting timber. Greater cooperation will increase community cohesion.

The protection and management of key ecological systems, both terrestrial and aquatic, is highest in Alternatives B and H. Wilderness designation is the management method used in Alternative H, and benefits recreationists seeking solitude and a more primitive forest experience. Alternative B uses a variety of methods which include wilderness designation, Habitat Core Areas, Research Natural Areas, and Special Interest Areas emphasizing ecological processes undisturbed by humans. Alternative E will also restrict water development in the wild and scenic river corridor of the North St. Vrain drainage.

Alternatives B and E offer higher developed opportunities than the other alternatives, with rehabilitation and/or expansion at the Brainard Lake and Peaceful Valley recreation areas. Downhill skiing is expanded at Eldora in Alternatives C, E, and I. This change is more likely to benefit regional recreationists and local business people the most. Increased developed recreational opportunities increases forest visitors which in turn increases social conflict and fire hazard.

Alternative B offers the greatest variety of different dispersed recreational opportunities with an increase in wilderness while still providing motorized access to existing areas of high use. The groups that enjoy motorized recreation activities are likely to be affected by Alternative B, but to a lesser degree than by Alternative H.

The private landowners, ranchers, and others may support continued Forest management, but might be expected to change their attitude if the management activity were to occur adjacent to them. There is a growing opposition to commodity production as more people move to the private lands within the Forest. However, Alternative B addresses key resource issues with similar emphasis, so it is expected that community cohesion would still be present but not in the degree found in the other alternatives.

Cumulative Effects on Zone 3

Like Zone 2, the growth and development in this zone is expected to continue regardless of the management direction in the revised *Forest Plan* with the selected alternative being more influenced by this growth rather than vice versa. This zone will continue to draw groups who tend to use the Forest's amenities and do not rely on commodities for employment. The attractiveness of the Forest for people will continue to increase. Conflicts between those groups who have sharply contrasting views on how the Forest should be managed is likely to continue.

ZONE 4: ESTES

Estes is oriented around the recreational activities occurring in Rocky Mountain National Park. The zone's boundaries extend east from the Continental Divide to the Front Range foothills, as far south as Meeker Park, and north along the Mummy Range and Bulwark and Green Ridges. The major town in the area is Estes Park, which is the gateway to Rocky Mountain National Park. Other smaller communities and subdivisions are dispersed along the Big Thompson River. The area is heavily influenced by Loveland, the main service center for this zone.

Population and Land Use. The Estes zone was developed for ranches to provide cattle to the mining areas. The Estes Park valley became an important resort area early in the century. After World War II, the area became important as an entrance to Rocky Mountain National Park and as a destination in itself. Additional summer homes were built in the area and along the Big Thompson River. This trend has continued and much of the private land has been subdivided, putting pressure on Forest land to provide recreational facilities and big-game winter range.

Lifestyle. This zone is highly attractive to people seeking a rural mountain lifestyle. This is particularly true of retirees who own summer homes in the area. The majority of jobs are related to tourist-related support services. Tourism occurs primarily in the summer; employment is seasonal and attracts a transient population. A smaller number of jobs are related to grazing and logging activities. Most residents are not economically dependent on the consumptive use of Forest resources. They use the Forest for recreation and for its scenic setting to their homes.

Attitudes, Beliefs, and Values. The residents of this zone have traditionally been older and more conservative than the residents of the Boulder zone. They share with them, however, a deep desire to preserve their lifestyle and surroundings. They approve of a moderate level of forest management, particularly activities to improve wildlife habitat or to control insect infections. They support some growth in the Estes Park area to improve the year-round economy.

Social Organization. This zone is most attractive to the social groups who use the Forest primarily for recreation and those seeking open space, unmodified scenery and solitude. A majority of the residents are retirees who generally favor more developed recreation facilities and better access. Most of the people in this area are less involved in ARNF activities since their occupancy of second homes is seasonal. Also, since the main attraction in this zone is Rocky Mountain National Park, regional recreationists are drawn in greater numbers to the Park than to the Forest.

Few of the long-time residents and local businesses are economically linked to Forest outputs, so community stability and cohesion are fairly strong. Outfitters and guides offer many nonmotorized recreational activities. Most people in this zone are concerned about environmental protection, especially near the Park boundary, and about wildlife habitat, for elk in particular. One issue about which groups disagree is motorized and nonmotorized travel, especially in the Hell Canyon, Pierson Park and Pole Hill areas.

Direct and Indirect Effects on Zone 4

With the exception of Alternative A, the differences in the other alternatives will not change the social groups in this area to any large degree. Tourist-oriented businesses and their employees will be the dominant group. The other alternatives are not expected to change that, even Alternative C with its highest level of timber harvest.

The few outfitters and guides associated with nonmotorized recreational use, and with key wildlife habitat and wildlife observation opportunities, could be negatively affected if existing use changes to allow, for example, increased motorized activities in Alternatives A, C, E, and I. The development of the Twin Sisters Ski Area under Alternative A would have similar effects as ski development in Zone 2.

The groups who favor motorized activities are likely to support Alternatives E, I, C, and A, which permit motorized travel in much of the Hell Canyon, Pierson Park and Pole Hill areas. Alternatives I and C generally emphasize forest products and forage production over recreational opportunities, while the emphasis in Alternative A is wildlife habitat. Alternative B allows for motorized activities in the Pierson Park and Pole Hill areas.

Because of the tourist-related nature of this zone, many of the attitudes relate to effects on tourism. The majority of tourists come to this area to see attractions that are basically unaffected by Forest management activities. Other than Alternative A, no alternative will so change the overall scenery of the Estes Valley that tourists will object. Most residents accept commodity uses and see the values they add to the economic and social diversity of the zone. Retirees usually are not directly affected by most management activities, unless their view or location is involved.

Cumulative Effects on Zone 4

The attractions of the Estes Park area are not likely to change nor is the demand for them by the visiting public likely to change. The town of Estes Park is fairly stable, provides an independent way of life as a small mountain town, and has a nearby attraction, Rocky Mountain National Park. No other factors seem to be present that could change the existing situation in this zone.

ZONE 5: POUDRE

This zone consists of the basin drained by the Cache la Poudre River. The boundaries extend from the headwaters of the river to Fort Collins, with the Mummy Range forming the southern boundary and the steep mountains along the river forming its northern boundary. The city of Fort Collins has a major influence on this zone.

Population and Land Use. This zone was primarily settled by ranchers along the river bottom and in the mountain meadows. A small amount of mining occurred in the upper valley but did not have a significant effect on development. Timber harvest took place to meet local needs and

to supply the railroads. Recreation resorts developed in the upper canyon early in the twentieth century. As transportation improved, more summer homes were built and the number of people commuting to jobs outside the zone increased.

Population increases in this zone have occurred in the eastern portion, predominately in the lower Poudre Canyon, Rist Canyon, and Buckhorn areas. Private lands in this area are rapidly being subdivided. The rest of the area is still oriented to developed and dispersed recreation, grazing, and some logging. Most land use changes are concentrated along the major access routes.

The Cache la Poudre River located in this zone is one of the most popular float rivers in Colorado. Its high seasonal flow, historical prominence, proximity to major population centers, world class fishing, and white water opportunities make it a popular recreation area. The Poudre River is known for its scenic beauty and recreational opportunities and contains outstanding opportunities for whitewater boating, fishing, and roaded natural recreation.

Most social services are supplied outside of this zone. Fire protection, law enforcement, and elementary education are the only needs met within the zone.

Lifestyle. People move into this zone to enjoy the rural mountain lifestyle. The Forest provides fuelwood, recreation, and a visual setting for private lands. Few people are economically dependent on the consumptive use of Forest resources. Many residents commute to Fort Collins or Loveland for employment. The balance are employed in recreation and grazing.

Attitudes, Beliefs, and Values. The people in this zone have a strong desire to maintain their existing lifestyles. The residents have a high concern that the development of storage/ hydroelectric dams could occur in the main channel of the Cache la Poudre River.

Social Organization. The quality of the Poudre River as a recreation and scenic area designated as "remarkable" draws social groups who use the Forest primarily for recreation. Recreation user groups most interested in management of this area are river floaters and anglers. Recreational user growth has been a subject of concern by many people since designation of the Poudre as a National Wild and Scenic River in late 1986. This designation has enhanced interest and recreation uses, especially for commercial and noncommercial river floaters.

Long-time residents and local business people are economically linked to forest outputs. Bighorn Lumber has operated within this zone, especially within the Crown Point area. Local businesses directly dependent on the Forest are those that offer recreation opportunities such as rafting, kayaking, hunting, horseback riding, and fishing. Water developments are also important to ranchers and water suppliers.

People in this zone are concerned about environmental protection, and especially of the resources that attract recreationists and second-home owners. All groups agree that protection of aquatic resources in the Cache la Poudre are important, but they do not agree on how much water is needed to protect those resources. Groups also disagree over nonmotorized and motorized activities, especially in the Buckhorn, Old Flowers Road, and Crystal Mountain areas.

Direct and Indirect Effects on Zone 5

A diversity of recreational opportunities is an important element in this zone. Alternatives E and B provide the greatest developed opportunities, and to a lesser extent, A with the development of Comanche Peak Ski Area. (See the Existing and Potential Ski Area section of this chapter for a discussion of the Comanche Peak Ski Area.) Alternative B offers the greatest variety of dispersed recreational opportunities, with both increased wilderness allocations and provision of motorized access to existing areas of high use. Local business people and recreationists should benefit from the enhancement of recreation activities associated with these alternatives.

The groups who favor motorized activities are likely to support Alternatives E, I, C, and A, respectively, where motorized activities will occur in much of the Buckhorn, Old Flowers Road, and Crystal Mountain areas. Alternatives I, C and A generally emphasize forest products and forage production over recreational opportunities, and will benefit groups dependent on timber and range commodities. Alternative B allows for motorized activities in the Buckhorn area and in portions of the Old Flowers Road and Crystal Mountain areas.

Continued growth of recreational opportunities along the Cache la Poudre River could result in increased conflicts between residents and recreationists with regard to traffic congestion, influx of large numbers of people into the canyon, trespassing on private lands, and reduced opportunities for solitude. The increased numbers of forest users might also increase crime, vandalism, and fire hazard. Adverse impacts on the rural mountain lifestyle valued by many full and part-time residents might result, mounting to a degradation of the quality of life for some. There might be polarization within communities between residents who favor and residents who oppose any change to community character.

River floaters will not be noticeably affected by the choice of management direction due to the seasonal nature of their activity. Changes to existing standards and guidelines to meet habitat standards could change the existing water flows in the Cache la Poudre River. As a consequence, maintenance of existing water projects could be more costly, depending on current facility locations and appendices. Anglers will benefit from increased water flows.

Cumulative Effects on Zone 5

Overall, the attractions of the Cache la Poudre River are not likely to change nor is the demand for them by the visiting public likely to change. Trends in growth are likely to continue, especially in areas within commuting range of Fort Collins and Loveland, as more and more people discover the attributes of this area (scenery, rural mountain lifestyle). More of the private lands will continue to become primary residences, but not as major subdivisions.

The newcomers tend to be in the social groups that use the Forest's amenities and do not favor timber harvesting or motorized activities near their homes. This could cause conflicts with groups who want to see stable timber outputs or motorized recreation activities increased.

ZONE 6: LARAMIE RIVER VALLEY

The upper Laramie River Valley was settled from the north through Wyoming, which was then the only access into this isolated mountain valley. Today, residents of the area are still oriented to Wyoming and especially to Laramie, the support center for the small ranching population. The zone's boundaries are well-defined geographic features--the Medicine Bow Mountains on the west, the headwaters of the Laramie River in the Chambers Lake area on the south, the Laramie Mountains to the east, and the Colorado state line on the north.

Population and Land Use. The settlement of this zone was typified by the establishment of family-owned ranches. Significant timber harvest took place to provide railroads with ties. Water storage and diversion projects occurred early in this century. Paving of the road up the Poudre Canyon and the designation of the Rawah Wilderness have increased recreational use. Some of the small family-owned ranches have been sold to corporations. Dominant land use on private lands is still ranching.

Lifestyle. Residents are dependent on Forest resources. Most jobs are associated with grazing or recreation. The rural agricultural lifestyle dominates; there are no towns within the zone.

Attitudes, Beliefs, and Values. The residents of this zone are generally conservative in nature and believe that the consumptive use of Forest resources is appropriate. There is a belief that the basic social and economic structure of the zone will be threatened by increases in population.

Social Organization. Community stability and cohesion is fairly stable since most of the people in this zone are long-time residents dependent on the Forest for grazing. Regional recreationists are attracted to the area for the solitude it provides. Hunting is one of the more important activities, with deer and elk found on the Forest and antelope in the valley on private and Bureau of Land Management lands.

Direct and Indirect Effects on Zone 6

The social group most affected in this zone is heavily oriented toward forage production and will not favor any alternative that reduces production. It will be difficult to avoid polarization of this group with those groups that favor amenity resources.

The greatest potential for changes in values and attitudes lies with Alternative H. In Alternative H, managing areas to maintain habitats which are shaped primarily through natural processes does not encourage livestock grazing. However, this alternative has the greatest potential to improve solitude and habitat capability which could increase nonmotorized opportunities to hunt deer and elk as populations respond to habitat conditions. Alternative B, and to a lesser extent A, improves habitat and allows for motorized opportunities as well.

The long-time residents are more than likely to support Alternatives I and C which emphasize forest products and forage production. Alternative E emphasizes recreation uses while providing for forage production which could also benefit those groups interested in solitude and hunting.

Cumulative Effects on Zone 6

There is no known activity that will change the rural agricultural lifestyle of this zone. The greatest unknown is how many of the small family-owned ranches might be sold to corporations which could then decide to divest themselves of these properties. When and to whom landholdings are sold could have an impact in this zone. However, it is unlikely that people commuting to Fort Collins or Laramie would relocate to this area.

The cumulative level of oil and gas activity over the planning period would make it unlikely that local community conditions would change dramatically as a result of oil and gas activity. A major oil and gas discovery is not predicted under the *reasonably foreseeable development* scenarios discussed in the Minerals and Geology Section.

ZONE 7: REDFEATHER

The residents of the Redfeather zone enjoy a rural, mountain setting close to the urbanized Front Range. The area is bordered on the south by the Cache la Poudre River, on the west by the Laramie Mountains, on the north by the Colorado state line, and on the east by Highway 287 which links the area to Fort Collins. The major settlement is Red Feather Lakes. Smaller agricultural communities like Livermore and individual ranches are also included in this zone.

Population and Land Use. Settlement of this zone was characterized by small, family-owned ranches started in the late 1800s. Logging for railroads occurred on a large part of the zone. In the early 1900s many irrigation and water storage projects were developed in the Red Feather Lakes area. These lakes formed the attraction for summer homes and recreational activities.

The major land use on private lands has traditionally been ranching. Many ranches have been subdivided and developed. In the last decade, two large subdivisions have been developed in the zone which has led to an increase in population. Tourist-related facilities are centered in the Red Feather Lakes Village. The main uses of Forest Service lands have been logging and grazing on the west side of the zone, recreation along the major roads and Red Feather Lakes area, and grazing and wildlife management on the east side.

Lifestyles. People in this zone seek a rural mountain lifestyle. Many residents are retired or commute outside the zone for work. The primary jobs in the zone relate to grazing, recreation, and logging. Residents are dependent on the National Forest for firewood and grazing livestock.

Attitudes, Beliefs, and Values. A majority of the residents in this zone moved to the area for the rural mountain lifestyle and are not dependent on Forest resources to make a living. They highly value their lifestyle and seek to preserve it. In addition to the people who work in Fort Collins and commute from the zone, a number of residences are used as second homes.

Most groups will accept some forest management activities relating to recreation management. A minority, primarily long-time residents and local business, believe in the utilization of resources through logging, ranching and water developments.

Social Organization. The quality of the Red Feather Lakes area as a "remarkable" recreation and scenic area draws social groups who use the Forest primarily for recreation. Businesses directly dependent on the Forest are outfitter and guide services that offer recreational opportunities such as hunting; horseback riding and horse drawn wagon rides; crosscountry skiing; and backcountry and four-wheel drive safety classes. Other local business people operate restaurants and grocery stores that depend on the tourist trade. Long-time residents and other business people economically linked to forest outputs are several timber purchasers and ranchers, and water suppliers. A large number of people in the eastern portion of the zone are former urban area residents who commute to Fort Collins for work.

Most people in this zone are concerned about environmental protection, and especially of the resources that attract recreationists, former urban residents, and second home owners. Most groups agree that management and protection of resources near residential areas is important. Roadless area management and timber harvesting activities tend, however, to polarize groups. Over the years, people in this zone have become less accepting of timber harvesting and do not favor timber sales in undeveloped areas of the Forest.

Direct and Indirect Effects on Zone 7

This zone has the potential to be adversely affected by reductions in timber harvest in Alternatives, H, E, and B. The timber industry is proportionately more important here (and in Zone 1) than in the more urban areas of the Front Range. See the effects discussion for Zone 1 for a more complete discussion of this issue.

Timber harvest levels would increase under Alternatives C and I, thus improving the stability of local timber industries. The levels projected in these alternatives and in Alternative A would only provide for smaller local purchaser demand. Other larger suppliers like Louisiana-Pacific would be largely unaffected. Smaller purchasers are most affected by the timber harvest level projected under Alternative B. Smaller local purchasers who have been relatively dependent on the ARNF are likely to continue operating.

Alternative H provides the greatest protection to roadless areas through wilderness recommendations. Alternative B protects roadless areas through Research National Area designation and by managing backcountry areas in a natural appearing landscape with no new road construction. Alternative E protects a smaller portion of the roadless areas and allows motorized recreation in a majority of the areas. The effect this has is that the groups associated with the timber industry could be negatively affected if jobs are lost. This group has some support from other groups since most people in this zone are surrounded by the Forest and recognize the importance timber management has in keeping the Forest healthy (for both scenic and wildlife values) and for greater protection of lives, resources, and property from wildfires.

Alternatives C, E, and I allow more motorized recreation and would benefit the local businesses and recreationists who participate in four-wheeling, snowmobiling, and hunting. Local business people could experience increases in the demand for goods and services. Increased business activity could result in additional job availability. However, increased motorized opportunities could result in increased conflicts between long-time residents and recreationists with regard to traffic congestion, influx of large numbers of people into the communities, trespassing on private land, and reduced opportunities for solitude.

One other group that could be noticeably affected by the choice of management direction are water developers. Alternatives B, H and E may restrict water development in the wild and recreational portions of the North Fork of the Cache la Poudre River.

Cumulative Effects on Zone 7

Overall, the attractions of the Red Feather Lakes area are not likely to change nor is the demand for them by the visiting public likely to change. Trends in growth are likely to continue, especially in areas within commuting range of Fort Collins. More of the private lands will continue to become primary residences, but not as major subdivisions. The newcomers tend to be in the social groups that use the Forest's amenities and do not rely on commodities for employment. This could cause conflicts between groups for and against reduced harvest levels which could result in litigation over timber harvest similar to that seen in recent years.

The timber management policies of the Routt and Medicine Bow National Forests have the potential to effect this zone. Even though the ARNF could provide small local timber purchasers with outputs that would provide a level of stability, declines over the timbershed could have an impact on the social groups dependent on forest products.

ZONE 8: PAWNEE

The zone includes the area in and around the Pawnee National Grassland extending north to the Colorado state line, east and south along I-76, and west to the urban development along I-25. Greeley and Sterling are the major agricultural support service centers. Small settlements and large ranches and farms are widely dispersed.

Population and Land Use. This area was settled in the mid-1800s in small, family-owned farms and ranches, and a few large, corporate-owned ranches. This pattern has remained, although the numbers of ranches and farms have decreased. Many of these farms and ranches were abandoned during the Dust Bowl period of the 1930s. The area around Greeley has also attracted agriculture, oil and gas companies, and light industry.

The primary use of northeastern Weld County is agriculture. Oil and gas companies and various service industries benefit from mineral development. Private mineral estate owners benefit from lease rentals and production royalties. Local governments also receive taxes from production.

Lifestyle. Rural residents in this zone primarily work on farms, ranches, and in agricultural support services. The small, family-owned ranches in the Pawnee and Crow Valley Grazing Associations are dependent on using the Pawnee National Grassland resources. The rest of the people utilize the Forest lands for recreation and mineral leasing. The zone also has a fairly large urban population in the towns of Greeley and Sterling. The jobs in these towns are in agricultural support services, light industry, and government.

Attitudes, Beliefs, and Values. The majority of residents have traditionally depended on working the land for a living. They believe the utilization of natural resources is appropriate.

Social Organization. Community stability and cohesion is strong since most of the people in this zone are long-time residents and are dependent on the Grassland for grazing. Local business people directly dependent on other Forest resources are people employed in the oil and gas industry. Regional recreationists are attracted to this zone due to its unique grassland setting and variety of recreational opportunities. Other local business people operate restaurants and grocery stores that depend on the tourist trade, which is somewhat seasonal, as use in the summer months is low due to hotter temperatures on the Plains.

There are differences between the groups. Recreationists do not favor oil and gas development and the ranchers do not favor Research Natural Area designations. Conflicts develop when groups from outside the community try to limit or prohibit existing uses of the Grassland.

Direct and Indirect Effects on Zone 8

Most social groups are heavily oriented toward commodity production and will not favor any alternative that reduces grazing or oil and gas production. Many of the residents see nothing wrong with the way the Grassland has been managed and feel there is no need for change. If commodity production is reduced, the residents could feel a sense of betrayal since they might see the Forest Service selling out to "outside groups." Loss of jobs here will likely cause bitterness, opposition to management activities, and conflicts with supporters of amenity values.

Alternative H which emphasizes amenity values through Research Natural Area designations and management direction that limits livestock grazing and leasing, could increase costs to grazing permittees and to the oil and gas industry. Additional costs to grazing would be associated with structural improvements and changes to existing grazing practices. Additional costs to oil and gas development would result from imposing supplemental lease stipulations.

Those people tied more to tourism than to ranching or oil and gas development may be able to accept reduced production levels more easily, although they also see compatibility between commodity and amenity uses.

Cumulative Effects on Zone 8

Despite some light growth, nothing will change the character of the communities within the Grassland. One exception would be the area surrounding Greeley where energy and

manufacturing draw new dollars into the community. No major longterm changes in population are expected to result from projected oil and gas activities.

The cumulative level of oil and gas activity over the planning period would be unlikely to change local community conditions dramatically. A major oil and gas discovery is not predicted under the *reasonably foreseeable development* scenarios.

ZONE 9: DENVER-BOULDER METROPOLITAN AND NORTH FRONT RANGE

This zone is the area includes the Denver-Boulder metro area and the area that parallels the mountains east of the Continental Divide from Longmont north to the Wyoming border and east to the city of Greeley.

Population and Land Use. The Denver area has always been the most populated section of the state. Beginning originally as a mining center, Denver developed into the major transportation and trading center of the Rocky Mountain region. The Boulder area also began as a mining and trading center. Since its founding, the University of Colorado has strongly influenced Boulder in terms of employment and culture. The whole zone has experienced explosive growth over the past 30 years. This growth has changed the land-use patterns around the cities from agricultural to residential uses. This trend will continue.

The North Front Range area was settled during the mid-nineteenth century by farmers and ranchers. The establishment of Colorado State University at Fort Collins led to the development of that city as the major center for the zone. The concentration on agriculture continued until the 1960s. At that time more industries began to move into the area. This trend continued with such major companies as Hewlett-Packard, Eastman Kodak, Teledyne, and Woodward Governor settling in the area. The area is also undergoing the same rapid growth as the Denver-Boulder Metropolitan zone. This has led to the conversion of adjacent farmland to housing subdivisions. The primary land use in the zone is nevertheless still farming and ranching.

Lifestyle. This zone is a highly attractive area. Mild climate, close proximity to mountains, and the moderate cost of living have combined to cause a large influx of businesses and people. With it have come the problems of rapid growth and the development of a major air pollution problem.

In the Denver-Boulder area, both incorporated and unincorporated suburbs have spread out into the counties surrounding Denver. Leapfrog patterns of development result in nonexistent, inferior, and/or expensive urban services; overlapping service and political jurisdictions; conflict between local facility plans for the same area; and sometimes the destruction of valuable environmental resources and buffers. Urban sprawl can be expected to continue in the future. Patterns of development in the mountains appear directed toward year-round homes for people who work in the metropolitan area.

The major difference between the Denver-Boulder area and the North Front Range area has been that the smaller size of the towns in the northern area has enabled some of them to maintain a

conservative, "small town" atmosphere despite the growth. Long-time residents who have seen the area grow feel, however, that the small town atmosphere is quickly disappearing.

The economy of this zone is not dependent on the consumptive use of Forest resources except for water. The zone is very dependent on the Forest Service lands for water production and for areas to transport and store water. The other major use of the Forest is for recreation. The close proximity of the mountains for year-round recreation contributes to the lure of this zone.

Attitudes, Beliefs, and Values. Most residents of this zone believe the primary value of the Forest lands is for recreation. They accept the gathering of fuelwood and the treatment of insect and disease attacks, but do not see the area as important commercially. Newer residents are more in favor of preserving the National Forest landscape in a natural appearing state.

The long-time residents of the North Front Range area are generally more conservative than those in the Denver-Boulder area. The majority of these residents were connected to agricultural jobs which were highly dependent on the transportation and storage of mountain water for irrigation. Local governments within this zone are also highly concerned that the quantity and quality of water is assured.

Social Organization. All social groups can be found within this zone, with a majority of the regional recreationists coming from here. The diversity of the zone makes community stability and cohesion difficult to attain. People tend to unite over certain issues and divide over others. This is particularly true for recreationists who prefer different kinds of recreation, for example, expanded ski areas, on the one hand, or expanded semiprimitive nonmotorized recreation areas on the other.

Direct and Indirect Effects on Zone 9

Alternatives E and B emphasize developed and dispersed recreation opportunities and would tend to benefit the zone's residents and visitors. These groups tend to use the Forest and Grassland amenities and do not rely on commodities for employment.

Cumulative Effects on Zone 9

So long as natural resource management preserves the scenic attractions of the ARNF and PNG, people in this zone will most likely accept a balanced approach to management that attempts to meet all the concerns identified in the planning process. However, balanced management that does not emphasize one element or use over another could generate conflicts between special interest groups who have sharply contrasting views on how the Forest should be managed and want their own interests favored.

Continued economic development in this zone will depend on the availability and cost of water. Without water of adequate quality and quantity available at reasonable rates, commercial and residential development will be increasingly difficult and costly.

ECONOMIC ENVIRONMENT

INTRODUCTION

The Forest lies within Larimer, Boulder, Gilpin, Clear Creek, Park, Jefferson, and Grand Counties; the Grassland lies within Weld. Six counties have the greatest potential to be affected economically and socially by Forest Service management. They are Clear Creek, Gilpin, Boulder, Larimer, Grand, and Weld. Collectively they are referred to as the influence area. Two counties in Wyoming have the potential to be affected by timber management activities on the Forest.

Clear Creek County lies west of Denver and contains the towns of Idaho Springs, Georgetown and Empire. Interstate 70 bisects the county and is one of the major east-west routes over the Continental Divide. Ski resorts and other year-round recreational and tourist attractions draw many visitors to the county. Mineral resources and mining have been factors of varying importance in the economy of the county since its establishment in the gold rush days. The service industry is by far the largest employer in Clear Creek County today.

Gilpin County was called "the richest square mile on earth" after gold was discovered along Chicago Creek in 1858, between the cities of Central City and Black Hawk. It is the smallest county in the area, sandwiched between Clear Creek and Boulder Counties. Central City was the business, trading, recreational and cultural hub for decades and its colorful history and historically significant buildings are keystones in the thriving tourist business. Occupations in Gilpin County are in the service industries that support tourism such as restaurants and casinos in Central City and Black Hawk.

Boulder County is north of Gilpin County and south of Larimer County. The principal cities are Boulder and Longmont; smaller communities like Nederland, Ward, Allenspark and Meeker Park are surrounded by NFS lands. Boulder County ranks first in the state in the number of advanced technology firms that reside there. Overall, the advanced technology industry employs 20 percent of the workforce. Towns like Allenspark and Meeker Park are oriented to tourism and provide seasonal lodging, restaurant, retail services and other tourism-related services.

The largest city in Larimer County is Fort Collins, followed by Loveland. The County extends as far north as the Wyoming border, and east to Weld County; a portion of Rocky Mountain National Park is on the southwest side. The service industry, manufacturing, and retail trade are the major employers with government employment also playing an important role.

Grand County is the only county potentially influenced by the Forest west of the Continental Divide. Grand County is a mountain park with fertile agricultural land. The Colorado River flows through the central part of the county. A little over half of the county is national forests, parks and monuments. It is located in the heart of one of the nation's leading vacation areas that includes Rocky Mountain National Park, the Arapaho National Recreation Area, the Arapaho National Forest, and Winter Park Ski Area. Accordingly, key features in the county's economic

development have been expansion of summer and winter resorts and provision of the accommodations and services demanded for them. Towns in the Fraser Valley include Fraser, Winter Park, and Tabernash. Granby, Hot Sulphur Springs and Grand Lake are in East Middle Park. Kremmling, the largest town in Grand County, lies to the west along the Colorado River.

The Pawnee National Grassland is located in the northern part of Weld County. Weld County is north of the Denver metropolitan area and is bordered by Wyoming on the north, Larimer County on the west, Logan and Morgan Counties on the east, and Adams county on the south. The principal city is Greeley, with many smaller communities like Ault, Briggsdale, and Raymer found near the Grassland. Agriculture, energy, government, and manufacturing are leading industries.

POPULATION

Colorado's population has steadily increased since 1980. The largest increases were experienced in the early 1980s with rates slowing down in the mid-1980s. In 1991 Colorado started experiencing its strongest growth since 1984. The population base for the areas in and around the Forests and Grassland is expected to continue to increase during the next 20 years. The following table shows recent and projected populations.

Table 3.151 County Populations for the ARNF and PNG[a]

County	1980	1990	July 1996	2010[b]	2020[b]
Boulder	189,625	225,339	258,804	309,456	337,214
Clear Creek	7,308	7,619	8,646	11,150	12,572
Gilpin	2,441	3,070	3,781	5,466	6,314
Grand	7,475	7,966	9,529	12,957	15,151
Larimer	149,184	186,136	220,106	288,427	324,386
Weld	123,438	131,821	151,108	191,811	218,751
TOTAL	479,471	561,951	651,974	819,267	914,388

[a] Sources: U.S. Department of Commerce, Bureau of the Census, July 1991; *1990 Census of Population and Housing, Summary Population and Housing Characteristics - Colorado*, Washington, D.C., U.S. Department of Commerce, Bureau of the Census, March 1983. *1980 Census of Population and Housing, Congressional Districts of the 98th Congress*, Colorado, Washington, D.C.

[b] Estimated projections, Colorado Division of Local Government, Demography Section, September, 1996, Denver, CO.

POPULATION AND ITS EFFECT ON LAND USE

Population growth in Colorado averaged 2.7 percent at a compound annual rate from 1991 to 1995. For two consecutive years (1992 to 1993), Colorado ranked third in the nation in population growth. In 1994 it ranked fourth. The Census Bureau estimated that 62,400 more people came to Colorado than left the state in 1994, after a 70,300 net in-migration level in 1993. Since 1990, Colorado's net in-migration of 173,500 people has been the highest three-year influx in 20 years. Population growth will slow from a 3.0 percent rate in 1993 to a 1.9 percent increase in 1997 and a 1.8 percent gain in 1998. The estimated average annual growth rate from 1996 to 2000 is 1.7 percent (McCallin et al. 1997).

Colorado's population increases are attributed to several factors, according to the Colorado Legislative Council. First, Colorado's economy has been strong in comparison with national economic activity. People move to an area in anticipation of job availability and the relative strength of the local economy thus attracted new residents (McCallin and Mauer 1994).

The second factor is called the "lone eagle" phenomenon and refers to people who move here because of the state's attractive lifestyle, and are able to work via a fax, modem, and computer anywhere they wish. Typically, these new residents are leaving coastal areas and have substantial net worth from the sale of their homes. Approximately one-third of the in-migrants came from California. Further advances in communications and technology will increase the number of future in-migrants to the state (McCallin and Mauer 1994).

As population increases, land development in and around the Forests and Grassland increases; thus, the demand for open space can be expected to increase. Residents may turn their attention to the National Forest for recreation and solitude in greater numbers and with increasing demands on Forest resources. Population in the foothill and mountain areas has increased substantially in recent years with the influx of new residents. Many move to these areas in an attempt to escape air pollution, high crime rates, congestion and other pressures of urban life.

It is difficult to predict what mountain communities will look like in the future, since population patterns are affected by other factors. Growth of a community may be limited by topography and surrounding National Forest land. Other mountain communities may be expected to increase in size as long as private land and water are available for development and support facilities.

EMPLOYMENT AND INCOME

Colorado's economy is expected to slow down in the near future from its rapid growth in the early 1990s. According to the Colorado Legislative Council, economic growth will remain buoyant and will continue on a solid path as the national economy remains strong. Strength in nonresidential construction, advanced technology, and financial services will continue to fuel growth during the next couple of years (McCallin et al. 1997).

Employment growth in Boulder has slowed slightly. Boulder's important advanced technology industry should benefit from the strong national economy. The area also benefits from a large concentration of research and development facilities. Growth will be constrained to some extent by city and county imposed limitations (McCallin et al. 1994).

One of the fastest growing counties in the state is Larimer, which during the 1980s had a population increase twice the statewide average. However, the growth rate in the 1980s was only half that of the 1970s. The area's advanced technology industry should also benefit along the same lines as in Boulder County (McCallin et al. 1994).

Another county showing strong growth based on a diverse economy is Weld County. Agriculture, energy, government, and manufacturing are all important factors. While agricultural growth has leveled off, strength in energy and manufacturing helped economic growth (McCallin et al. 1994).

Tourism has not been a strong factor in the economy, with the exception of the gaming and skiing industries (McCallin et al. 1994). Gilpin, Clear Creek and Grand Counties benefit the most, with limited stakes gambling at Central City and Black Hawk in Gilpin; Loveland Basin, Arapaho Basin and Summit County ski areas accessible from I-70 in Clear Creek; and Winter Park, Mary Jane and Idlewild ski areas in Grand. Winter Park ski area's first expansion since 1992 will add 435 acres of terrain and should be ready for the 1997-1998 ski season (McCallin et al. 1997).

EFFECTS ON EMPLOYMENT, INCOME, AND POPULATION

The effects of the alternatives on employment and personal income in the area around the Forest were estimated using an input-output model. The model was generated using IMPLAN PRO, a commercial input-output modeling software and database. IMPLAN PRO is used extensively throughout the U.S. in academic and business circles, and is generally regarded as the best secondary-data system available. Further information on IMPLAN PRO is available in Appendix B and the planning records.

The input-output analysis considers direct, indirect, and induced effects. Estimates presented below represent the sum of all direct, indirect, and induced employment and income changes resulting from the alternatives. Employment is expressed in jobs, which can be seasonal or year-round, full-time or part-time. The income measure used is Personal Income, expressed in 1996 dollars. The base year of the model is 1993. Even though the best information available to the Forest Service was used in developing these estimates, the reader should focus on the relative differences among alternatives rather than on the actual figures when considering economic effects.

EMPLOYMENT AND INCOME

Recreation Management. Visitor use was separated out by local and nonlocal use. Only the nonlocal portion of recreation use can be regarded as a foundation for job increases or decreases in a local economy. By using only the nonlocal portion, results can be compared with timber, range, and oil/gas outputs. Projections of recreation use by alternative are found in Table 3.152. This table also illustrates the effect expenditures by nonlocal recreationists have on the local economy. Income and employment generated from recreation programs are by far the largest contributor to income and employment (see Table 3.159 Total Effects by Alternative for Colorado). Recreation-related income ranges from 93 percent (Alternatives A and B) to 94 percent (Alternatives C, E, H, I) of total personal income at experienced budget levels in the area of influence. While these estimates are not community-specific, it is expected that with higher levels of tourism, communities like the following would experience most of these effects: Estes Park, Granby/Winter Park, Redfeather Lakes, and the area around Nederland. Current (1996) recreation use is about 5,550 MRVD (thousand recreation visitor days). The same level of use is expected with either the full or experienced budget level.

Table 3.152 Effects of Recreation Management by Alternative

Full and Experienced Budget Levels	Year	Alternative					
	1996	A	B	C	E	H	I
Employment	10,574	10,821	10,747	11,627	11,529	10,335	11,627
Income (Millions)	$207.8	$212.9	$211.6	$230.6	$228.8	$202.5	$230.6
MRVDs (Thousands)	5,550	5,609	5,591	5,792	5,769	5,498	5,792

The variation in alternatives for the effects of recreation management is due mostly to income and employment generated by ski areas. For example, recreation outputs for Alternatives A, C, E and I include four new ski areas. For purposes of the analysis, it was assumed that these areas would be built and operated during the planning period. Compared to jobs and income for 1996, all alternatives except Alternative H generate more jobs and personal income.

Timber Management. Most of the variation in income and employment in this category derives from differences in timber yields among the alternatives. Compared to the total income for both Colorado and Wyoming (see Table 3.160 Total Effects for Colorado and Wyoming), the timber program in the ARNF is not a big contributor to the economy. Alternatives A, C, and I include the highest timber harvest levels but contribute only 1 percent to the economy.

All alternatives project lower harvest levels than the 1984 *Forest Plan* and therefore show lower employment levels. The Allowable Sale Quantity (ASQ) for the 1984 *Plan* was approximately 30,000 MBF per year projected for 10 years. For the period of 1976 to 1994, the average annual harvest has been 14,647 MBF. The volume sold and cut declined steadily during the

implementation period of the existing Plan. Table 3.92 (FY 84-FY94 - Volume Sold and Cut) clearly displays this decline. In 1996 (the baseline year used in this analysis), the timber program on the ARNF generated 35 jobs and $800,000 in personal income which is less than Alternative B at 48 jobs and $1.2 million in income.

A majority of the sawtimber logs harvested on the Forest are processed by mills in Wyoming. Since mill towns are the hardest hit, economic impacts were estimated for Albany and Carbon counties in Wyoming. The impacts from sawtimber *logging* are reflected in the Colorado counties, along with a majority of the harvesting and processing of products other than logs. Impacts from sawtimber *processing* are reflected in the Wyoming counties. The sum of these effects is shown in Table 3.153. Separate effects by state for all resource outputs are shown in Tables 3.159 and 3.160.

Table 3.153 includes all jobs directly or indirectly related to the harvest level and the induced effects from dollars circulating through the economy. It also includes the sawtimber volume harvested per year for the first five decades of each alternative for comparison with the 1984 *Plan's* ASQ and historical volumes harvested. Each alternative will also yield an estimated quantity of personal-use fuelwood, other products from material not meeting utilization standards, and timber volume harvested for other vegetation management objectives. The total of these plus the total volume available for ASQ will contribute to the potential total timber sale program quantity (TSPQ) for the Forest. The average annual TSPQ for the first decade is also displayed in Table 3.153 for comparison purposes.

It is unlikely that funding levels will permit full implementation of any of the alternatives. The most significant reduction in timber production would likely occur in timber stand improvement activities, which over time could result in a lower ASQ. Full and experienced budget levels are displayed.

Table 3.153 Effects of Timber Management by Alternative, Colorado and Wyoming Counties

	Alternative					
Full Budget Level	**A**	**B**	**C**	**E**	**H**	**I**
Employment	156	68	167	28	16	134
Income (Millions)	$3.6	$1.6	$3.9	$0.7	$0.4	$3.1
Sawtimber Harvest (MBF)	16,000	6,300	17,300	2,100	1,100	13,700
TSPQ (MBF)	17,600	7,400	18,500	3,700	2,100	15,100

Experienced Budget Level	Alternative					
	A	**B**	**C**	**E**	**H**	**I**
Employment	134	48	145	16	6	110
Income (Millions)	$3.2	$1.2	$3.4	$0.4	$0.2	$2.7
Sawtimber Harvest (MBF)	14,500	4,600	15,800	1,500	600	12,100
TSPQ (MBF)	17,400	5,700	18,000	3,400	2,000	14,600

The timber management policies of other national forests, other agencies, and private landowners can combine to have effects on regional timber supplies. The most significant harvesting activity has occurred on the Routt National Forest to the north of the Sulphur District and on the west of the Redfeather District north of the Colorado State Forest. Harvesting activity has also occurred on the portion of the Arapaho National Forest administered by the Routt on the southwest side of the Sulphur District. Timber harvesting has also occurred on adjacent lands administered by the Bureau of Land Management, primarily in Grand County.

Approximately 90 percent of the sawtimber cut from the ARNF is processed in Wyoming mills. Due to its location, the mill at Saratoga receives less ARNF volume (40 percent) than the mill at Laramie (50 percent). Ten percent of the sawtimber is processed in Larimer County, Colorado. The Saratoga mill is heavily dependent on the Medicine Bow and to a lesser extent on the Routt National Forest for its volume (Rideout and Stone 1992). Mills most likely to survive reduced volumes are well located so as not to be dependent on any particular source of stumpage, like the mill in Laramie (Rideout and Stone 1992).

As pointed out in the Timber Production section of this chapter, the timbershed volume comes mostly from the Routt and Medicine Bow National Forests. Together, they contribute 70 to 80 percent of the supply and they heavily influence the structure of the industry in the timbershed (Rideout and Stone 1992). Because the ARNF plays a minor role in overall timbershed supply, it has little effect on overall industry structure (Rideout and Stone 1992).

Range Management. The ARNF has 44 grazing permittees and the PNG 104 permittees, which results in the majority of the range income and employment coming from the PNG. The number of jobs does not vary significantly among alternatives except for Alternative H. Full and experienced budget levels produce the same outputs.

Table 3.154 Effects of Range Management by Alternative

Full & Experienced Budget Levels	Year	Alternative					
	1996	A	B	C	E	H	I
Employment	45	57	56	57	56	50	57
Income (Millions)	$1.0	$1.3	$1.2	$1.3	$1.2	$1.1	$1.3

Compared to 1996, all alternatives generate more jobs and income. The data for 1996 are based on actual numbers of cattle grazing on the Forests and Grassland. This number varies each year based on the length of the season and other factors. The IMPLAN PRO employment numbers reflect jobs that are 100 percent supported by grazing activities on the Grassland and Forests, and accounts for the difference between the actual number of permittees and the total employment. Not all permittees are full time ranchers and the above numbers do not reflect jobs and income generated by grazing activities on private lands.

Oil and Gas Exploration and Extraction. Most of the oil and gas activities in this region occur on private land. Less than 1 percent occurs on NFS lands and, like range management, the majority of the effects are a result of the existing oil and gas leasing activities on the PNG. There is no significant difference among alternatives and all six compare equally to jobs and income generated in 1996.

Even though oil and gas returns to the Federal Treasury are significant (see the section on Payments to Local Governments), the income generated from oil and gas exploration on the ARNF and PNG is the smallest contributor to total personal income, amounting to less than 1 percent of total income generated by all alternatives (see Table 3.159). Full and experienced budget levels produce the same outputs.

Table 3.155 Effects of Oil and Gas Leasing by Alternative

Full & Experienced Budget Levels	Alternative					
	A	B	C	E	H	I
Employment	1	1	1	1	1	1
Income (Millions)	$0.03	$0.03	$0.03	$0.03	$0.02	$0.03

It is difficult to predict the effects of leasing activities due to the "boom-bust" nature of the industry and uncertainty about when and where exploration and development activities will occur. It is known that the industry can have extremely positive impacts on a community by bringing in employment, contributing to the local tax base, increasing housing availability, etc.

It can also have some extremely detrimental effects, particularly after building up a community during a "boom" cycle and then having to lay off workers during a "bust" cycle.

ARNF and PNG Expenditures and Administration. Forest and Grassland administration generates income in the local area through the expenditures of federal funds. Forest Service expenditures are for salaries and nonsalary items, such as office supplies, gasoline, equipment and service contracts. From these expenditures, various amounts of direct, indirect or induced effects occur in the local economy. Next to recreation, ARNF and PNG expenditures and administration generate more income to the local economy than timber or grazing. This income would vary directly with the ARNF-PNG budget; therefore, full and experienced budget levels produce different outputs, with income and employment being slightly lower under the experienced budget. Both full and experienced budget levels are displayed in Table 3.156.

Table 3.156 Effects of Forest Service Expenditures at Full and Experienced Budget Levels

Full Budget Level	Year	Alternative					
	1996	A	B	C	E	H	I
Employment	Not Applicable	559	528	498	517	447	486
Income (Millions)		$21.0	$19.8	$18.7	$19.4	$16.8	$18.3
Experienced Budget Level	**Year**	**Alternative**					
	1996	**A**	**B**	**C**	**E**	**H**	**I**
Employment	368	372	352	332	344	298	324
Income (Millions)	$13.8	$14.0	$13.2	$12.5	$12.9	$11.2	$12.2

As a result of Forest Service expenditures for administration of lands and programs, experienced budget levels generate a high of 372 jobs and $14 million in personal income in Alternative A. Recreation generates three times more jobs, while timber generates a third fewer. Jobs and income for 1996 are slightly less than proposed in Alternative A.

Revenue Sharing. The *Department of Agriculture Appropriation Act of 1908* and the *Bankhead-Jones Farm Tenant Act of 1937* provide that 25 percent of the revenues received from government-owned lands administered by the Forest Service shall be paid to states for the counties in which the land is situated and shall be used for schools, roads, both. The state of Colorado requires that at least 5 percent of these revenues be spent on schools and at least 5 percent on roads.

Revenues from the Forests are derived primarily from recreation special uses, recreation user fees, and timber. In 1996 on the Arapaho, collections from recreation accounted for 85 percent of the revenues, timber 12 percent, and the remaining uses 3 percent. On the Roosevelt, recreation accounted for 82 percent, timber 6 percent, and the remaining uses 12 percent. Collections from minerals accounted for 84 percent of the Grassland's total revenues in 1996,

grazing 11 percent, and the remaining uses 5 percent. The following table compares actual revenues generated and percent by program area for 1994 and 1996 with estimated revenues generated in the various alternatives.

Table 3.157 Percent Revenues by National Forest Fund (NFF) Types at Experienced Budget Levels

	Prior Year		Alternative					
NFF Types	**1994**	**1996**	**A**	**B**	**C**	**E**	**H**	**I**
Recreation	53%	67%	40%	61%	43%	74%	78%	48%
Range	2%	4%	2%	2%	1%	2%	3%	2%
Land Uses	2%	3%	1%	1%	1%	1%	2%	1%
Minerals	7%	18%	12%	16%	11%	16%	13%	12%
Timber	36%	8%	45%	20%	44%	6%	4%	38%
Total $ (Thousands)	$2,684	$1,553	$4,871	$3,594	$5,420	$3,635	$2,350	$4,859

Overall, the percentage of range and land use revenues does not differ significantly between prior years and the alternatives. The areas with the greatest variations are recreation, minerals and timber. Recreation revenues are highest in the alternatives with ski area development (Alternative E) and lower timber harvest levels (Alternative H). The minerals revenues show a significant increase from 1994 (7 percent) to 1996 (18 percent) due to increased oil and gas activities (Lilli Field secondary recovery production) on the PNG. The alternatives also show an increase (11 to 16 percent) over 1994 as possible revenues from oil and gas activities on the Sulphur District were included. The timber revenues show a significant drop in 1996 (8 percent) compared to 1994 (36 percent) due to limited timber under contract being cut that year. Timber revenues vary from a low of 4 percent of total revenues in Alternative H to a high of 45 percent in Alternative A. Since revenues from any one source are subject to unpredictable shortterm changes, the information in the above table should be used to show program area emphasis by alternative.

The revenues for oil and gas were estimated based on the *reasonably foreseeable development* scenarios (RFD) for oil and gas activities. The RFD is a best estimate of activities to determine possible effects on the ground, and for an industry is highly speculative. The revenues from oil and gas were included for the counties within the administrative boundary of the Arapaho National Forest and reflect a 50 percent return on receipts from Public Domain Lands, as opposed to 25 percent for other receipts. As an example, the annual revenues from 5 producing wells on the Sulphur District could total $1,800,000 based on an annual production of 100,000 barrels of oil at $18 per barrel. Of this total, 12.5 percent, or $225,000, is returned to the Federal

Treasury. At 50 percent of that amount returned to the counties, $112,500 would be the estimated return to the counties. This return is reflected in all alternatives except Alternative H.

The two producing wells predicted on the Redfeather District of the Roosevelt National Forest are for analysis of the effects on the ground only, as there is little history of past activities in the area. Possible production was not predicted and revenues were not included in the economic analysis for the counties within the administrative boundary of the Roosevelt.

Oil and gas revenues for the PNG were included in the analysis, as the RFD is based on decades of past activities. The geology of the Denver-Julesburg Basin is comparatively well understood and oil and gas production has also occurred for several decades. Returns to Weld County are at 25 percent since lands on the PNG are acquired lands rather than Public Domain lands (a distinction explained in the Minerals and Geology section). All alternatives reflect returns based on oil and gas leasing with a reduction in Alternative H.

The employment and income effects of local government expenditures of these revenues are shown in the following table by alternative and for years 1994 and 1996. Revenue sharing follows timber in its contribution to the total economy. Revenues vary directly with the ARNF-PNG outputs; therefore, full and experienced budget levels produce different outputs, with income and employment being slightly lower under the experienced budget. Both full and experienced budget levels are displayed.

Table 3.158 Effects of Revenue Sharing by Alternative

	Year		Alternative					
Full Budget Level	**1994**	**1996**	**A**	**B**	**C**	**E**	**H**	**I**
Employment	Not Applicable		43	32	47	32	20	43
Income (Millions)			$1.2	$0.9	$1.3	$0.9	$0.5	$1.2
Experienced Budget Level	**Year**		**Alternative**					
	1994	**1996**	**A**	**B**	**C**	**E**	**H**	**I**
Employment	22	12	40	30	45	30	18	40
Income (Millions)	$0.6	$0.3	$1.1	$0.8	$1.2	$0.8	$0.5	$1.1

As a result of estimated payments, experienced budget levels generate a high of 45 jobs and $1.2 million in personal income in Alternative C and a low of 18 jobs and $.5 million in personal income in Alternative H. Compared to actual 1996 payments, all alternatives generate more jobs and income. Compared to 1994 payments, all alternatives except H generate more jobs and income. Data for 1994 and 1996 are actual payments and can only be compared with experienced budget levels.

Alternatives A, B, C, E and I generate jobs and income from ski areas at Berthoud Pass and from new ski facilities at St.Marys, Squaw Pass and Devils Thumb. Eldora is expanded, also increasing revenues in Alternatives C, E and I. Loveland Ski Area revenues are constant, except in Alternative H where they decrease. Revenues from Winter Park and Mary Jane do not vary by alternative.

POPULATION

Changes in local employment can sometimes affect the local population. New job opportunities generally draw in new residents, but a reduction in jobs may not always cause residents to leave. People who lose their jobs may remain in the area for a variety of reasons, such as going to school or finding jobs in other industries. Local unemployment conditions and matching labor force skills with potential employers are important, but only partial factors when trying to determine whether residents will stay or leave. There may not be a strong correlation between changes in National Forest/Grassland-related employment and population flows in some areas and under some alternatives. Given this complexity, no estimates are provided for population changes due solely to changes in Forest Service resource management.

TOTAL EFFECTS ON EMPLOYMENT, INCOME AND POPULATION

The Forests and Grassland contribute to the economy both as an employer and as an agency with economic impacts on recreation and timber and, to a lesser extent, on oil and gas and livestock industries. The following table displays the total effects on income and employment from ARNF-PNG Forest Service activities on Colorado and Wyoming counties.

Table 3.159 Total Effects on Employment and Income by Alternative, Colorado

	Alternative					
Full Budget Level	**A**	**B**	**C**	**E**	**H**	**I**
Employment	11,525	11,378	12,276	12,145	10,858	12,251
Income (Millions $)	$237.3	$234.0	$252.9	$250.6	$221.1	$252.1
Experienced Budget Level	**Alternative**					
	A	**B**	**C**	**E**	**H**	**I**
Employment	11,323	11,193	12,096	11,963	10,703	12,076
Income (Millions)	$230.0	$227.1	$246.4	$243.9	$215.4	$245.8

Table 3.160 Total Effects on Employment and Income by Alternative, Colorado and Wyoming Combined

Full Budget Level	Alternative					
	A	**B**	**C**	**E**	**H**	**I**
Employment	11,637	11,433	12,397	12,163	10,868	12,347
Income (Millions)	$240.0	$235.2	$255.8	$251.0	$221.3	$254.5
Experienced Budget Level	**Alternative**					
	A	**B**	**C**	**E**	**H**	**I**
Employment	11,425	11,233	12,207	11,977	10,709	12,160
Income (Millions)	$232.4	$228.0	$249.1	$244.2	$215.5	$247.8

The difference between these two tables is in the jobs and income generated from the processing of sawtimber by mills in Wyoming. The largest increase is in Alternative C which generates an additional 111 jobs and $2.7 million in personal income in Wyoming (experienced budget levels). Overall, Alternative C generates more jobs and income at both budget levels, followed by Alternatives I, E, A, B and H.

Compared to the total employment within the area of influence (approximately 760,000 people employed), all of the Forest-related activities combined under Alternative C provide less than 2 percent of the employment in the area. The biggest category of Forest-related activities is recreation where the majority of the jobs are generated (11,627 in Alternative C or 1.5 percent of total area employment). Timber is less than .01 percent of total area employment.

PAYMENTS TO LOCAL GOVERNMENTS

Two types of payments are made to local governments that are influenced by National Forest management. The first is 25 percent of revenues. The second is the "Payment in Lieu of Taxes." The following table displays estimated 25 percent payments calculated on revenues as discussed above under revenue sharing. These are divided among seven counties: Boulder, Clear Creek, Gilpin, Grand, Larimer, Jefferson, and Park. A little more than 98 percent of the money returned goes to the five counties which make up the Forest's influence area: Grand, 38 percent; Clear Creek, 29 percent; Larimer, 23 percent; Boulder, 5 percent; and Gilpin, 3 percent. Less than 2 percent goes to the other two counties combined. On the PNG, the funds go entirely to Weld county. Table 3.161 displays revenue distribution to counties. The largest total payments are found in Alternatives C, A and I, followed by E, B and H.

Table 3.161 Estimated Annual Payments to Counties (Thousands of Dollars) Based on 25 Percent of Gross Revenue (Experienced Budget Level)

County	FY96 Payment	Alternative					
		A	B	C	E	H	I
Boulder	$13	$94	$51	$114	$61	$30	$97
Clear Creek	$218	$252	$224	$259	$203	$130	$242
Gilpin	$21	$35	$25	$39	$26	$15	$35
Grand	$297	$332	$294	$341	$267	$171	$319
Jefferson	$3	$5	$3	$6	$4	$2	$5
Larimer	$62	$437	$238	$533	$287	$140	$455
Park	$9	$10	$9	$10	$8	$5	$9
Weld	$82	$108	$110	$108	$110	$95	$108
TOTAL	$705	$1,273	$954	$1,410	$966	$588	$1,270

Under the *Payments in Lieu of Taxes Act of 1976 (PILT)*, the Bureau of Land Management makes payments to states on behalf of the counties that contain federal lands such as National Forests and Grasslands. Unlike the 25 percent fund payment, PILT may be used by the recipients for any purpose. Each county receives payment based on the acreage of federal lands within the county, population, and other receipts from federal land-management agencies in the prior fiscal year. In October of 1994, the PILT Act was amended to update the formulas and to provide annual inflationary adjustments. Table 3.162 displays PILT receipts to the counties for fiscal year 1995 and estimated PILT payment based on changes in Forest Service programs on the ARNF and PNG. Estimates are based on formulas, acreage, and populations in effect for fiscal year 1996.

Table 3.162 Estimated PILT Payments (Thousands of Dollars) Based on Changes in Forest Service Programs on the ARNF and PNG

County	Total FY95 Payment	Alternative					
		A	B	C	E	H	I
Boulder	$164	$84	$194	$27	$247	$52	$179
Clear Creek	$28	$27	$27	$27	$43	$116	$27
Gilpin	$28	$14	$35	$7	$46	$17	$31
Grand	$128	$128	$128	$128	$128	$128	$128

County	Total FY95 Payment	Alternative					
		A	B	C	E	H	I
Jefferson	$105	$102	$103	$100	$105	$102	$102
Larimer	$799	$424	$936	$129	$1,183	$275	$868
Park	$414	$413	$406	$411	$409	$414	$404
Weld	$118	$92	$90	$92	$90	$105	$92
Total	$1,784	$1,415	$1,894	$921	$2,251	$1,209	$1,831

PILT payments are based on 25 percent funds collected from other National Forests, so changes in their programs may also affect PILT payments. As the 25 percent payments go up, the following year PILT payments go down and vice versa for all counties except for Grand. Total PILT payments are not expected to vary among alternatives for Grand County. The analysis shows that Forest Service programs on the ARNF have little effect on payments to Jefferson and Park Counties. The major effect on both of these counties is more likely to come from changes in Forest Service programs on the Pike and San Isabel National Forests.

TOTAL EFFECTS

Table 3.163 shows Forest Service payments (25 percent and PILT) in the alternatives, compared to total county budgets. Payments are the largest percentage in Grand County at 4.7 percent and in Clear Creek at 3.6 percent. The remainder are less than one percent.

Table 3.163 Total County Budgets (Thousands of Dollars) Compared to Annual ARNF and PNG Contributions in the Lowest Alternative (Alternative H) and the Highest Alternative (Alternative C)

County	1994 Total Budget	Range of Alternatives: Estimated Payments
Boulder	$121,000	$82 to $141
Clear Creek	$7,940	$246 to $286
Gilpin	$2,600	$32 to $46
Grand	$9,947	$299 to $469
Larimer	$100,000	$415 to $662
Weld	$75,459	$200

CUMULATIVE EFFECTS

Cumulative effects are those resulting from the sum of all actions, public and private, occurring over time in the ARNF areas of influence. Four economic models were developed to estimate economic effects: one for Larimer and Weld Counties; one for Adams, Arapahoe, Boulder, Clear Creek, Denver, Douglas, Gilpin and Jefferson Counties; one for Grand County; and one for Albany and Carbon Counties in Wyoming. The Colorado State Demographer's Office has made projections to 2020 of total employment in Colorado counties.[1] The Forest Service has estimated employment for the Wyoming Counties based on data from the Wyoming Department of Administration and Information and the Bureau of Economic Analysis.[2]

Comparable projections for income are not available. Such projections include the sum of all actions that can be reasonably foreseen, including those in the public sector such as the Forest Service. These projections are shown in Table 3.164. Estimates of employment resulting from ARNF management (Alternative A, experienced budget level) for the next 10 years are shown for an estimated mid-point year of 2000.

As a consequence of all private and public actions, cumulative employment is expected to grow at a rate of 1.7 percent in the Denver area, 2.6 percent in the Larimer/Weld area, 3.2 percent in the Grand County area, and 0.9 percent in the Albany/Carbon area. Table 3.164 shows that Alternative A and the range of effects resulting from other alternatives make a very small contribution to the cumulative effects of all economic activity in the Denver and Larimer/Weld areas. In Grand County, over half of all jobs stem from the management and use of ARNF lands and just over 1 percent (82 jobs) may be affected depending upon the alternative. In concert with effects from other public and private actions, this may be important to some Grand County communities. In Albany and Carbon Counties, 0.3 percent of all jobs stem from timber harvest on the ARNF and nearly all of these jobs may be affected depending upon the alternative. While this total may not be cumulatively important to the area as a whole, it could be important to some communities in Carbon County.

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[1] Center for Business and Economic Forecasting, Inc. for the Colorado Division of Local Government, *Colorado Employment and Labor Force History & Projections, 1980-2020, for State, Regions and Counties*, September 1997.

[2] Wyoming Department of Administration and Information, Division of Economic Analysis, *Wyoming Population Estimates and Forecasts, 1990-2006*, December 1996. Bureau of Economic Analysis, *Regional Economic Information System, 1969-1995* (CD), September, 1997.

Table 3.164 Cumulative Employment Effects By Area (Jobs)

County	1990	1995	2000	2005	2010
Larimer, Weld Area	162,102	194,248	218,614	245,133	269,238
	Alternative A		3,743		
	Range of Alternatives		-70 to +0		
Adams, Arapaho, Boulder, Clear Creek, Denver, Douglas, Gilpin, Jefferson Area	1,008,132	1,166,060	1,253,709	1,338,119	1,406,971
	Alternative A		4,298		
	Range of Alternatives		-469 to +795		
Grand Area	4,207	5,297	6,090	7,113	7,851
	Alternative A		3,283		
	Range of Alternatives		-82 to +0		
Albany, Carbon Area	27,900	30,400	31,200	32,500	33,300
	Alternative A		102		
	Range of Alternatives		-97 to +8		

FINANCIAL AND ECONOMIC EFFICIENCY

The planning process specified in the NFMA regulations requires consideration of economic efficiency. The following sections describe the financial and economic efficiency of the alternatives over a 50 year period. The main criterion used in financial and economic efficiency analysis is *present net value* (PNV). PNV is an index in which discounted costs are subtracted from discounted benefits or revenues. A 4 percent discount rate was used. Another criterion used was the revenue-to-cost or benefit-to-cost ratio. Discounted revenues or benefits are placed in the numerator and divided by the disounted costs. Ratios greater than one indicate that revenues or benefits exceed costs, and ratios less than one indicate that costs exceed the benefits or revenues.

FINANCIAL EFFICIENCY

Financial efficiency is measured by comparing actual or estimated revenues or receipts where money changes hands to actual or estimated costs. Some examples of revenues include money collected at developed campsites, receipts for timber purchases, and money received for oil and gas leases and ski area permits. The costs used in this analysis are the estimated budget costs at the full implementation or experienced budget levels.

Tables 3.165 and 3.166 show the results of the financial efficiency analysis for each alternative. All alternatives at both budget levels have a negative PNV and revenue-to-cost ratio less than one. This means that the estimated costs of operating the ARNF-PNG are higher than the money that is expected to be collected. The alternatives which feature higher levels of commodity production had the highest PNV and revenue-to-cost ratio. Alternatives I and C have the highest PNVs at -$232 million and -$221 million, respectively, for the full implementation budget level. Alternatives B and H have the lowest PNVs at -$313 and -$311 million, respectively.

Table 3.165 Financial Present Net Value and Discounted Revenues and Costs of Alternatives at the Full Implementation Budget Level (Thousands of Dollars) Using a Discount Rate of 4 Percent Over a 50-Year Period

	Alt A	Alt B	Alt C	Alt E	Alt H	Alt I
Revenues	$155,741	$106,078	$174,811	$100,327	$46,392	$153,801
Costs	$443,972	$419,332	$395,444	$410,525	$357,012	$385,992
Net Value	$-288,231	$-313,254	$-220,633	$-310,198	$-310,620	$-232,191
Revenue/ Cost Ratio	0.35	0.25	0.44	0.24	0.13	0.40

Table 3.166 Financial Present Net Value and Discounted Revenues and Costs of Alternatives at the Experienced Budget Level (Thousands of Dollars) Using a Discount Rate of 4 Percent Over a 50-Year Period

	Alt A	Alt B	Alt C	Alt E	Alt H	Alt I
Revenues	$161,226	$98,913	$172,138	$99,379	$48,756	$152,346
Costs	$295,853	$279,591	$263,736	$273,597	$237,034	$257,486
Net Value	$-134,627	$-180,678	$-91,598	$-174,218	$-188,278	$-105,140
Revenue/ Cost Ratio	0.54	0.35	0.65	0.36	0.21	0.59

ECONOMIC EFFICIENCY

Economic efficiency is similar to financial efficiency but also includes dollar benefits for items where there is no actual money transaction. For instance, hiking on trails is provided to the public free of charge. However, there is a value associated with hiking that can be calculated based on what hikers would be willing to pay if they were charged. Some other examples of economic benefits are other recreation uses like hunting, fishing, snowmobiling, and driving for pleasure. Other outputs could be assigned a dollar value, but there is uncertainty over whether the outputs will occur and what the actual contribution is. Mineral development, grazing, timber, and special uses are examples where no economic benefit was added to the revenue. Water yield is another output which was not assigned an economic benefit dollar value.

Tables 3.167 and 3.168 show the results of the economic efficiency analysis for each alternative. All alternatives at both budget levels have a positive PNV and benefit-to-cost ratio much larger than one. This means that the estimated costs of operating the ARNF-PNG are lower than the estimated benefits the ARNF-PNG provides to the public. The alternatives which feature higher levels of commodity production had the highest PNVs and benefit-to-cost ratios. Alternatives C and I have the highest PNVs and ratios. Alternatives B and H have the lowest PNVs and Alternatives A and H have the lowest ratios.

Table 3.167 Economic Present Net Value and Discounted Revenues and Costs of Alternatives at the Full Implementation Budget Level (Thousands of Dollars) Using a Discount Rate of 4 Percent Over a 50-Year Period

	Alt A	Alt B	Alt C	Alt E	Alt H	Alt I
Benefits	$2,787,545	$2,714,482	$3,023,462	$2,912,253	$1,964,805	$3,002,196
Costs	$443,972	$419,332	$395,444	$410,525	$357,012	$385,992
Net Value	$2,343,573	$2,295,150	$2,628,018	$2,501,728	$1,607,793	$2,616,204
Benefit / Cost Ratio	6.28	6.47	7.65	7.09	5.50	7.78

Table 3.168 Economic Present Net Value and Discounted Revenues and Costs of Alternatives at the Experienced Budget Level (Thousands of Dollars) Using a Discount Rate of 4 Percent Over a 50-Year Period

	Alt A	Alt B	Alt C	Alt E	Alt H	Alt I
Benefits	$2,794,003	$2,707,047	$3,020,735	$2,911,797	$1,964,805	$3,000,548
Costs	$295,853	$279,591	$263,736	$273,597	$237,034	$257,486
Net Value	$2,498,150	$2,427,456	$2,756,999	$2,638,200	$1,727,771	$2,743,062
Benefit / Cost Ratio	9.44	9.68	11.45	10.64	8.29	11.65

RESOURCE COMMITMENTS

UNAVOIDABLE ADVERSE EFFECTS

Application of forestwide, management area and geographic area standards and guidelines and the resource protection measures described throughout Chapter Three would limit the extent and duration of adverse environmental effects. Nevertheless, some residual adverse effects would occur under any alternative. Each section of Chapter Three of this *FEIS* has described such effects and should be consulted for more details than those summarized here.

AIR QUALITY

Road construction, road reconstruction, timber harvest, prescribed burning, some recreational activities and other activities can cause temporary and localized reductions in air quality due to dust, exhaust fumes, and smoke. Smoke from wildfires temporarily reduces air quality and visibility. Firewood gathered on Forest System lands and burned for heat contributes gases and particulate matter to the atmosphere.

SOILS

Wherever vegetation cover and soils are disturbed, there is some short-term erosion. Activities involving vehicles or heavy equipment cause soil compaction.

WATER QUALITY

When vegetation cover is removed, or soils are disturbed or compacted, there is a short-term increase in sedimentation (movement of soil particles into water). Natural precipitation and flood events can cause sedimentation. Natural occurrences of chemical compounds in surface water reduce water quality. Mining operations have the potential to contaminate surface and ground water. Many historical mining operations are leaking chemical compounds that reduce water quality.

HAZARDOUS MATERIALS

The use of motor vehicles and the transport of hazardous materials on the roads and highways carry the potential for accidental spills.

HERITAGE RESOURCES

Both human activities and natural events have the potential to disturb or destroy heritage resources.