USE AND OCCUPATION OF THE FORESTS AND GRASSLAND

TIMBER PRODUCTION

INTRODUCTION

Timber management and harvesting is an important tool for managing biological diversity and ecosystems, forest insect and disease populations, tree growth and yields, recreation settings, wildlife habitat, and wildfire hazard mitigation. Timber harvesting provides forest products that help support local wood-processing industries and associated communities. It helps meet the demands of the local public for products such as lumber, fuelwood, transplants, Christmas trees, and posts and poles. Public interest in the management of timber and in the acceptable level of timber harvest on the Arapaho and Roosevelt National Forests is intense.

Lodgepole pine and Engelmann spruce forests are the most productive on the ARNF from the standpoint of sustainable commercial forest products. They are also the most prevalent, covering 59 percent of the Forests. Ponderosa pine and Douglas-fir cover 15 percent of the Forests but generally occur on lower-productivity sites and do not significantly contribute to sustainable commercial forest products. The lands suitable and available for timber harvest and used in the calculation of the allowable sale quantity (ASQ) will be primarily lodgepole pine and Engelmann spruce.

The ASQ in each alternative is formulated by considering the suitable timber land base, management area objectives, desired condition, the management requirements in NFMA regulations (36 CFR 219.27) and the forestwide standards and guidelines. ASQ includes live green trees (at the time of ASQ calculations) which meet utilization standards. Each alternative will also yield an estimated quantity of fuelwood harvested for personal use from suitable or unsuitable lands, other products from material not meeting utilization standards that is harvested from suitable lands, and timber volume harvested for other vegetation management objectives on unsuitable or tentatively suitable and not available lands. The total of these will make up the timber sale program quantity (TSPQ) for the Forests.

A variety of silvicultural systems, methods, and practices will be used to achieve the desired resource management objectives and timber product outputs. Silvicultural practices are the driving force—the means used to achieve the desired end. The silvicultural system can be viewed as the process by which we grow a forest stand for a specific purpose. This process includes all practices over a rotation period—harvest or regeneration cuttings, intermediate cuttings, and other cultural treatments—necessary for replacement and development of the forest stand. See Forestwide Direction, Chapter One in the *Forest Plan* and Appendix E for

appropriate silvicultural systems, methods and practices and the guidelines for application for the forest cover types on the Arapaho and Roosevelt National Forests.

LEGAL FRAMEWORK

From a legal standpoint, the principal statutes governing timber management on National Forests are:

1. *The Organic Act of 1897* (16 U.S.C. 473-475) authorizes the Secretary of Agriculture to establish regulations governing the occupancy and use of National Forests and to protect the forests from destruction.

2. *The Knutson-Vandenberg Act of 1930* (16 U.S.C. 576-576b), as amended by the *National Forest Management Act of 1976* (16 U.S.C. 472a), directs the Secretary to provide for improvement of the productivity of the renewable resources within the National Forest timber sales areas. It authorizes the collection and use of timber receipts for these purposes.

3. *The Multiple-Use, Sustained Yield Act of 1960* (U.S.C. 528-531) recognizes timber as one of five major resources for which the National Forests are to be managed. It further directs the Secretary to develop and administer the renewable surface resources of the National Forests for multiple-use and sustained yield of the many products and services obtained from these resources.

4. *The Roads and Trails Act of 1964* (16 U.S.C. 532-538) directs the Secretary to provide for the existence of an adequate system of roads and trails within or near National Forests.

5. *The Small Business Act* (15 U.S.C.644, as amended 1958) provides for the agencies to participate in programs with the Small Business Administration. This is the authority for the Small Business Timber Sale Set-aside Program.

6. *The National Environmental Policy Act (NEPA) of 1969* (16 U.S.C. 4321) requires agencies to analyze the physical, social, and economic effects associated with proposed plans and decisions, to consider alternatives to the proposed action, and to document the results of the analysis.

7. *The Forest and Rangeland Renewable Resources Planning Act of 1974* (RPA) (16 U.S.C. 1600-1614, as amended by the *National Forest Management Act of 1976*) directs the Secretary to periodically assess the forest and rangeland resources of the nation, and to submit to Congress at regular intervals, recommendations for long-range Forest Service programs essential to meet future resource needs.

8. *The National Forest Management Act (NFMA) of 1976* (16 U.S.C. 472a) sets forth the requirements for Land and Resource Management Plans for the National Forest System. It also amends several Acts applicable to timber management. It specifically addresses most aspects of timber management and how it is related to other resources. NFMA is the primary authority governing the management and use of timber resources on the National Forests.

9. *The Forest Resources Conservation and Shortage Relief Act of 1990* (16 U.S.C. 620) sets forth restrictions on export of unprocessed timber originating from federal lands. It addresses certain exceptions to export restrictions and establishes reporting requirements.

The following regulations also apply: The rules governing the sale and disposal of timber are set forth at 36 CFR 223, Subparts A and B. Subpart C governs suspension and debarment of timber purchasers, and Subpart D covers timber export and substitution restrictions. The Chief's authority to manage and dispose of timber is delegated from the Secretary at 7 CFR 2.42 and described at 36 CFR 223.1. The text of these rules is set forth in *FSM 1010.*

HISTORICAL TO PRESENT-DAY USE

Historical documentation presented in past Timber Management Plans for the Arapaho and Roosevelt National Forests shows that specific areas of the Forests were used heavily for wood products. The history of cutting on the Roosevelt National Forest dates back to the 1860s. In or near the northern part of the Forest the first sawmills were in operation in 1862 in Rist Canyon and near Laporte. From these early mills, lumber was sawed for building materials used in Greeley. With the advent of the Denver and Pacific Railroad, tie camps were established in 1867 when ties were cut in great numbers and floated down the Cache la Poudre River for construction of the railroad. At about the same time,"tie-hacks" were cutting ties in the Laramie River and its tributaries and floating them down the river to Laramie, Wyoming, for use in the construction of the Union Pacific Railroad. In the late 1920s logging contractors began furnishing sawed ties, and the purchase of hand-hewed ties by the railroads ended by the late 1930s. Portable mills located at various points in the northern part of the Forest supplied the local demand for lumber for many years.

In the southern part of the Forest, early history followed much the same direction as in the northern part. The discovery of gold and the settlement of Rollinsville and Ward created a keen demand for forest products for the construction of homes and for the mining industry. The first sawmill was established about 1861 where the town of Rollinsville now stands.

In the Arapaho National Forest the first timber cutting was to supply the mining settlements of Black Hawk, Central City, Nevadaville, and Breckenridge. The greatest demand was for fuelwood, which was hauled by bull teams. It took less than ten years to completely strip the hills within five miles of Central City and Blackhawk. The first sawmill was set up in 1860 in Gilpin County, soon followed by others. By 1880, there was not a sawmill within 8 to 10 miles of the gold camps due to the exploitation of the timber stands. It is estimated that from 1860 to

1878, 322,100,000 board feet of timber was used, clearing approximately 40,260 acres of forest land, or about half of Gilpin County.

Timber harvesting has been a continuing industry on the Arapaho and Roosevelt National Forests. Records indicate that from 1915 to 1958 the average annual harvest from the Roosevelt National Forest was 8,960,000 board feet and from the Arapaho National Forest (including those portions currently administered by the Routt and White River National Forests) 7,326,000 board feet. From 1965 to 1974 10,560,000 board feet were harvested annually from the Roosevelt National Forest and from 1970 to 1974 12,000,000 board feet were harvested annually from the Arapaho National Forest. (The specific information for the years not mentioned is not available.)

From 1976 to 1994 the average annual harvest for the currently administered ARNF has been 14,647,000 board feet. The volume (both sawtimber and products other than logs) sold and cut declined steadily during the implementation period of the existing *Forest Plan*. Table 3.92 clearly displays this decline.

Table 3.92 FY 84-FY 94 - Volume (Thousand Board Feet (MBF)) Sold and Cut

Fiscal Year	Volume Sold	Volume Cut
1984	25,905	20,255
1985	40,485	25,562
1986	17,923	14,611
1987	14,795	21,474
1988	15,981	14,311
1989	13,207	24,739
1990	3,118	8,586
1991	3,936	7,931
1992	3,010	8,950
1993	5,551	9,673
1994	3,637	8,856

During the above period, the Allowable Sale Quantity for the ARNF was approximately 30,000 MBF per year. Obviously this was not achieved over the time period. The volume sold in the peak year, 1985, was in response to a mountain pine beetle epidemic on the Sulphur Ranger District. The reduced volume sold in later years reflected limitations due to decisions not to enter roadless areas, other resource management objectives, overestimating timber growth and yield, and available budget.

Like many western timber economies, the Arapaho Roosevelt timbershed (the ARNF, the Routt NF, the Medicine Bow NF, except Laramie Peak District, and the Eagle, Holy Cross and Rifle Ranger Districts of the White River NF) is in a state of transition as documented in a study by Rideout and Stone (1992). Declining volumes have pushed purchasers to reduce the amount of volume they hold under contract and this has resulted in record high prices for stumpage. Table 3.93 shows the relationship between declining volume sold and increasing stumpage values for the ARNF. The highest volume of timbershed supply comes 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 the overall timbershed supply, it has little effect on overall industry structure (Rideout and Stone 1992). However, if supply diminishes on the Medicine Bow and Routt National Forests a sustainable supply from the ARNF may increase in importance. The maintenance of a forest products industry is vital to the accomplishment of the forest management activities on the ARNF, including management for forest health, wildlife habitat, and reduction of hazardous fuels. Therefore it is important to provide a consistent and dependable supply of forest products.

Table 3.93 FY 84-94 Volume Sold and Average Value per MBF

Fiscal Year	Volume Sold (MBF)	Average Value/MBF ($)
1984	25,905	9.98
1985	40,485	7.43
1986	17,923	10.44
1987	14,795	12.43
1988	15,981	23.36
1989	13,207	32.19
1990	3,118	48.13
1991	3,936	46.49
1992	3,010	33.87
1993	5,551	82.89
1994	3,637	165.24

Fuelwood demands on the ARNF for both personal and commercial use have shown a significant decline since implementation of the *Forest Plan*, as Table 3.94 makes apparent. This decline is contrary to demand projections in the original *Forest Plan*. At that time, it was believed the supply of dead and down material would be liquidated by 1995, raising the demand for

greenwood to be used for fuelwood. The ARNF did experience a short period of time in the mid-1980s when greenwood appeared to be more valuable as fuelwood than other products.

Table 3.94 FY 84-94 Fuelwood Volume Sold (MBF)

Fiscal Year	Personal Use	Commercial Use	Total
1984	2,808	11,721	14,529
1985	3,974	14,311	18,285
1986	3,847	5,387	9,234
1987	1,808	7,470	9,278
1988	1,279	3,015	4,294
1989	1,276	1,029	2,305
1990	1,123	1,194	2,317
1991	820	879	1,699
1992	592	1,317	1,909
1993	591	178	769
1994	334	154	488

Rideout and Stone (1992) suggest two main causes for the decline in the fuelwood market:

1. mandatory and voluntary environmental restrictions along the Front Range to reduce air pollution. These restrictions have cut the demand for fuelwood by banning wood burning on high-pollution days and by designating exemptions for high-efficiency stoves that use about half as much wood as the older, less efficient models.

2. the availability of affordable alternative sources of fuel, primarily natural gas.

The fuelwood supply and demand is not likely to decrease any lower than at present. There may be opportunity in the future for modest increases.

The Christmas tree market on the ARNF is primarily for personal use (Rideout and Stone 1992), encouraged by unrestricted personal use sales at two areas on the National Forests, near Redfeather Lakes and near Fraser. Commercial Christmas tree sales have been limited and are advertised for competitive bid. Table 3.95 shows Christmas tree sales since 1986 on the ARNF.

The decline in tree sales for personal use since 1988 is related to increased sales on the Pike-San Isabel National Forest. The personal use Christmas tree market is driven primarily by the

recreational experience it affords, and is stable (Rideout and Stone 1992). The Christmas tree program has, furthermore, consistently generated more revenues than it has cost. Since

Table 3.95 FY 86-94 Christmas Trees Sales (Number of Trees)

Fiscal Year	Personal Use	Commercial Use	Total
1986	13,789	3,999	17,778
1987	10,085	3,663	13,748
1988	11,405	1,185	12,590
1989	8,660	2,880	11,546
1990	8,511	2,050	10,561
1991	6,138	1,300	7,438
1992	6,302	1,500	7,802
1993	4,518	1,650	6,168
1994	5,126	736	5,862

implementation of the original *Forest Plan* the price of personal use Christmas trees has been raised from $5.00 to $10.00.

Forest products result from applied forest management activities to achieve a number of objectives. Table 3.96 displays the acres harvested by forest type and by silvicultural method for the period FY 1987 to 1994, which resulted in the volume harvested displayed in Tables 3.93 and 3.94. Information prior to FY 87 is not displayed because it is not consistently reliable.

Table 3.96 FY 87-94 Acres Harvested by Forest Type by Method

Cutting Method	Forest Type					Total	Average Annual
	LP	SF	DF	AA	PP		
Clearcut	3895	301	0	111	18	4325	541
Shelterwood-Prep	751	1355	448	0	84	2638	330
Shelterwood-Seed	733	424	20	0	472	1649	206
Overstory Removal	1247	158	15	0	181	1601	200
Selection	38	259	0	0	0	297	37
Commercial Thin	184	0	0	0	23	207	26

Cutting Method	Forest Type					Total	Average Annual
	LP	SF	DF	AA	PP		
Sanitation-Salvage	886	90	519	0	23	1,518	190
Special Cut	2	30	0	0	0	32	4
Total	7,736	2,617	1,002	111	801	12,267	1,534

As a point of comparison, the original *Forest Plan* predicted the FY 1986-1990 average annual acres harvested (all forest types) by silvicultural treatment to be clearcut, 1,185 acres, shelterwood, 6,605 acres, and selection, 414 acres.

In addition to the above management activities the ARNF has also accomplished 20,371 acres of precommercial thinning, almost exclusively in lodgepole pine, and 5,715 acres of site preparation for natural regeneration during the period of FY 1985 through FY 1994.

TIMBER LAND SUITABILITY

Timber land suitability and management is a *Forest Plan revision topic.* It was a topic of concern in the June 1984 Colorado Mountain Club (CMC) appeal of the *Forest Plan* and the Chief's July 1987 appeal decision. The Chief required the Forest to: 1) conduct a financial analysis of timber management; 2) prepare an expanded analysis and documentation of specific objectives to be obtained by vegetation management; and 3) determine if existing *Forest Plan* decisions need to be changed based on items 1 and 2 above. In 1989, it was agreed with CMC that the Forests would complete the Stage II financial analysis and analyze the costs and benefits associated with noncommercial methods of vegetation treatment which was done in a separate document. It was also agreed the Forest would initiate a revision of the *Forest Plan* in 1990.

The NFMA regulations require the determination of the Forest's tentatively suitable timber lands (TSTL) base. Each *Forest Plan* alternative will use the TSTL as the starting point for determining the suitable timber lands (STL) for each alternative. The STL will be different for each alternative. (See Table 3.98). The difference in the STL among the alternatives is based on the management prescriptions used in the alternative and the financial and economic strategy of the alternative. Results from the TSTL evaluation show approximately 55 percent of the ARNF's land base is tentatively suitable for timber management.

Table 3.97 Species Composition - Tentatively Suitable Timber Lands

Cover Type	Tentatively Suitable Timber Lands (Acres)
Lodgepole pine	371,519
Spruce/fir	129,270
Ponderosa pine	116,386
Douglas-fir	45,783
Aspen	36,776
TOTAL	699,734

The TSTL base is composed of the forest cover types listed in Table 3.97. See Appendix B for a detailed discussion of timber land suitability determination.

RESOURCE PROTECTION MEASURES

Specific resource protection measures for timber production are found within the (revised) *Forest Plan's* forestwide goals, objectives, standards and guidelines. Additional protective measures may be part of the standards and guidelines specific to management area direction. Other resource protection measures are included within the standard and special provisions of 2400-3(T) and 2400-6(T) timber sale contracts. All alternatives provide for preserving the productive capability of timber resources.

ENVIRONMENTAL CONSEQUENCES

The following effects described assume full implementation budget level of the various alternatives unless otherwise noted.

DIRECT AND INDIRECT EFFECTS

Effects on Timber Resources from Timber Management

Effects common to all alternatives

Timber may be cut and removed to meet the appropriate allowable sale quantity (ASQ), with the intent to create a new timber stand which will meet future timber product needs. This includes live green trees which meet the utilization standards on suitable and available lands, and dying timber which at the time of ASQ calculations was green volume. All suitable and available lands, under each alternative, will eventually be treated, although the time period to do so will

span several decades. Timber may be cut and removed to meet vegetation management objectives, such as experimentation, hazard-tree removal, fuels reduction, wildlife habitat maintenance or improvement, enhancement of scenic vistas, and ecosystem management. Also, timber affected by natural mortality events (fires, windstorms, insect and disease infestations) may be harvested under salvage sales to serve objectives other than commercial product offering. Commercial products may be a byproduct of meeting these objectives. The volume of timber cut and removed to meet these objectives will vary among alternatives based on objectives and available funding.

The only timber harvesting that is likely to occur as the result of experimentation would be on the Fraser Experimental Forest; at this time there is no specific plan to do so. Removal of timber to enhance scenic vistas has been practiced on the ARNF in the past on a limited and successful basis. It is expected that opportunities and desires for this type of harvesting will arise in the future. However, no detailed information is available for predicting what actual products might result from this activity.

Timber harvest may occur to accomplish biodiversity goals. If analyses indicate that current vegetation differs greatly from historical norms, vegetation manipulation, including timber cutting, may be done to try to emulate natural patterns of composition and structure. Timber products derived from this cutting may be sold commercially.

A primary objective when harvesting timber on suitable and available lands will be to use silvicultural methods that favor and facilitate natural regeneration. If the silviculturalist determines that a site does not have the potential for satisfactory natural regeneration within five years of the final harvest, the site will not be harvested. It is expected that this approach will be successful on 95 percent or more of the harvested sites. On lodgepole pine sites that are clearcut it may be necessary to leave tree tops on the site to assure an adequate seed source. When harvesting occurs on unsuitable lands to meet goals besides sustainable timber production, the determination for regeneration within five years may not be necessary in proceeding with the harvest activity.

Planting will be required where final harvest activities have taken place and minimum stocking requirements are not likely to be met from natural regeneration. Stocking surveys will be done the third and fifth growing season after harvest to assure that regeneration is taking place. Site preparation for natural regeneration may be needed on as much as 50 percent of the regeneration harvest sites to improve the success of natural regeneration. This will be determined on a site-by-site basis after assessing the amount of ground cover and scarification expected from harvesting activities. Site-preparation activities may include roller chopping, piling and burning the large surface debris, scarifying with a dozer, or prescribed fire.

Effects compared among alternatives

The amount of tentatively suitable land base that is scheduled for commercial timber production varies by alternative. Table 3.98 displays the acres by forest cover type that are suitable and available for each alternative.

Table 3.98 Suitable and Available Acres by Forest Cover Type at Full Implementation Budget Level

Cover Types	Alternatives					
	A	B	C	E	H	I
Lodgepole pine	233,569	140,206	247,510	33,174	17,179	212,846
Spruce/fir	57,745	35,429	72,173	9,939	3,996	69,012
Ponderosa pine	56,625	9,894	59,729	0	178	23,215
Douglas-fir	17,362	3,378	19,905	0	0	6,501
TOTAL	365,301	188,907	334,357	43,113	21,353	310,574

Alternative A will have the greatest longterm impact on timber resources of any of the alternatives from timber harvesting because it allocates the largest area of suitable and available lands. However, Alternative C allocates more acres for harvest the first fifty years and will have the highest ASQ for the same period. Overall, timber harvest effects related to acres treated and volume produced are very similar under Alternatives A and C; Alternative I is slightly lower, while Alternative B is considerably less, and Alternatives E and H are the lowest. See Tables 3.99 through 3.101 for a comparison, across all alternatives, of acres treated and ASQ on an annual basis for the first five decades (50 years).

Table 3.99 Acres Harvested per Year (First Five Decades)

Cover Types	Alternatives					
	A	B	C	E	H	I
Lodgepole pine	2,327	980	2,279	220	143	1,225
Spruce/fir	850	163	451	12	2	285
PP/DF	42	50	578	0	0	27
TOTAL	3,219	1,193	3,308	232	145	1,537

Table 3.100 Sawtimber Volume Harvested per Year (first Five Decades)(Thousand Board Feet) at Full Implementation Budget Level

	Alternatives					
	A	B	C	E	H	I
Volume MBF (ASQ)	16,800	6,668	18,400	1,900	900	14,200

Effects common to silvicultural harvest methods (and described in Appendix E) will be expected for the acres shown in Table 3.101. This table displays the annual average acres harvested for the first five decades (50 years).

In all alternatives harvesting will be dominated by an even-aged management system, either clearcut or shelterwood. All of the clearcutting is in the lodgepole pine type. Clearcutting is the preferred even-aged method for regeneration of mature and overmature lodgepole pine because of several factors: (1) Lodgepole pine is a pioneer species, is shade intolerant and reproduces best in most instances when overstory competition is removed or drastically reduced. (2) Dwarf mistletoe, present in many stands in varying degrees, is best controlled by separating the old stand from the new. (3) Windfall and mountain pine beetle, while variable, are always a threat. (4) The potential for future growth is limited because of the generally low vigor of mature and overmature stands and the suppressed condition of many smaller trees. Furthermore, many natural stands appear to be even-aged, having developed after catastrophic fires or other disturbances (Alexander 1986).

Table 3.101 Acres Harvested by Silvicultural System Average per Year (First Five Decades) at Full Implementation Budget Level

Silvicultural Method	Alternatives					
	A	B	C	E	H	I
Clearcut	745	479	878	189	75	1,216
Shelterwood	2,342	474	2,085	39	70	70
Group Selection	132	1	345	4	0	251
Special[a]	0	239	0	0	0	0
TOTAL	3,219	1,193	3,308	232	145	1,537

[a] Conventional silvicultural methods applied in special situations, primarily in management areas 3.5 and 4.3. The likely result is reduced volume removal per entry.

Alternative I treats the most acres under an uneven-aged system. This would be group selection in spruce/fir and ponderosa pine/Douglas-fir.

Suitable and available lands for all alternatives are found in MAs 3.5 Forested Flora and Fauna Habitats, 4.3 Dispersed Recreation, 5.11 General Forest and Intermingled Rangelands, 5.13 Forest Products, and 5.5 Forest Products and Dispersed Recreation. MA 5.11 and MA 5.13 are allocated extensively in Alternatives A, C, and I which are the alternatives that yield the most forest products along with other resource outputs. Alternatives B, C, and E utilize MA 5.5 which specifies primary emphasis to provide for dispersed recreation opportunities while providing for wood products. Alternatives A and B include MA 4.3 which is also a dispersed recreation opportunity emphasis. Alternatives A, B, and C have suitable and available lands in MA 3.5. In this management area timber management and harvesting may occur to meet timber management goals that emphasize the resource objectives of that management area, specifically wildlife habitat. Timber harvesting may occur on unsuited and tentatively suitable and not available lands, and in other management areas only for the purpose of meeting other vegetation management objectives.

Timber harvesting affects timber stand composition, structure, and density. For example, a harvest treatment may be designed to: (1) remove less desirable species (composition); (2) remove mostly small suppressed and large diseased trees (structure); and (3) reduce the competition among existing trees by thinning the stand (density). These changes often result in a change in structural stage. Expected changes in structural stage as a result of timber harvesting are discussed in the Terrestrial Habitat-Coarse Filter section of this *FEIS*.

A limited amount of thinning of lodgepole pine is planned for most alternatives. Table 3.102 reflects expected precommercial thinning, in acres annually for the first five decades.

Table 3.102 Acres of Precommercial Thinning per Year (First Five Decades)

	Alternatives					
	A	**B**	**C**	**E**	**H**	**I**
Thinning	1,582	686	1,540	233	98	1,392

Precommercial thinning is desirable in lodgepole pine to maintain optimum growth and to prevent the trees from stagnating at a very small size. The alternatives that have the most suitable and available acres also require the most precommercial thinning (Alternatives A, C, I, and B).

Road construction and reconstruction will enhance access to both sawtimber and other forest products. Therefore road construction and reconstruction needs by alternative is commensurate with the amount of suitable and available timber production lands. Alternative A would require the most construction and reconstruction followed by Alternatives C, I, B, E, and H in descending order. See Table 3.103 for a display of estimated road construction and reconstruction by alternative. The road construction consists of temporary and permanent roads of which some may have restrictions. (Refer to Table 3.145 for the proposed management of

roads after the timber activity has taken place.) The result of such road construction on timber resources will be the conversion of forest ground to roadway and the splitting up of forest stands by road corridors. For Alternative H, the result of little or no new road construction and the closing of formerly used timber roads will result in a net reduction in timber sale roads.

Table 3.103 Road Construction and Reconstruction for Timber Production Average Miles per Year (First Five Decades)

	Alternatives					
	A	B	C	E	H	I
New Construction	7.5	5.4	6.9	0.9	0.4	6.4
Reconstruction	22.7	13.0	20.8	2.7	1.3	19.3

Some road construction into roadless areas is predicted to occur in all alternatives. Alternative A would require the most entry into roadless areas followed by Alternatives C, I, B, E, and H.

The availability of other forest products, such as personal use firewood and posts and poles is expected to be fairly consistent and to meet current demand levels except for Alternatives E and H. Limitations on timber sale activities in these alternatives will reduce access and byproducts of the sawtimber sales and their opportunities for other products. Opportunities for other products will, however, be made available under all alternatives as a byproduct of vegetation management for other resource objectives.

The total volume available for ASQ and other resource management activities will contribute to the potential total timber sale program quantity for the Forests. Table 3.104 displays the estimated average annual quantity for the timber sale program in thousand cubic feet, for the first decade of the planning period.

Table 3.104 Average Annual Timber Sale Program Quantity (TSPQ) (ARNF) Thousand Cubic Feet (MCF) for the First Decade

Component [a]	Alternatives					
	A	B	C	E	H	I
ASQ	4,775	1,888	5,213	562	281	4,036
PUF	175	175	175	175	50	175
OP	0	0	0	0	0	0
OVM	720	350	605	605	350	605

Component [a]	Alternatives					
	A	B	C	E	H	I
SAL	375	116	375	50	50	375
TSPQ	6,045	2,529	6,368	1,267	731	5,191

[a] Abbreviations are as follows:

ASQ: Allowable sale quantity. Includes live green trees which meet utilization standards on suitable and available lands, and dead or dying timber which, at the time of ASQ calculation, was green volume included in the forest planning yield tables.

PUF: Personal use fuelwood harvested from suitable or unsuitable lands. Volumes are estimated.OP: Other products. This is material that is harvested from suitable lands which do not meet the utilization standards, excluding PUF. Volumes are estimated.

OVM: Other vegetation management. Timber volume harvested for OVM objectives on tentatively suitable but not available lands only; e.g. experimentation, hazard tree removal, wildlife habitat maintenance/improvement, enhancement of scenic vistas, ecosystem management. Volumes are estimated.

SAL: Salvage. Dead and/or dying timber harvested from either suitable or unsuitable lands. Volumes are estimated.

The output of products from other vegetation management (OVM) objectives results primarily from the treatment of vegetation for wildlife habitat improvement, tree clearing (e.g., ski run construction), aspen regeneration, and the reduction of wildfire fuel hazards. The outputs for all alternatives are consistent with earlier discussions of rankings. Alternative H has the potential to yield a high volume of forest products as a byproduct of creating biological diversity to ensure the maintenance of viable populations of plant and animal species across the ARNF but it is expected that access for the removal of products under Alternative H would be severely limited. Timber harvesting is a means of creating diversity, in addition to, and in a more controlled manner, than fire and insect and disease disturbances.

The availability of Christmas trees and transplants through both commercial and personal use opportunities, will remain relatively the same as 1995 levels in Alternatives A, B, C, and I. It is expected that decreases would be necessary under Alternatives E and H because there would not be funding emphasis for those programs, along with the decrease in other management activities that facilitate the removal of these products.

Effects on Timber Production from Recreation

All alternatives involve the construction of new campgrounds and trailheads, and the reconstruction of existing facilities. The cutting of trees is expected at these sites, though the volume of timber removed is expected to be low. The most significant volume derived from recreation management is from the expansion of ski areas. There will be limited amounts of volume produced periodically if developments occur on existing ski areas.

Effects on Timber Production from Wilderness

Under Alternative B over 29,000 acres and under Alternative H over 290,000 acres are considered for inclusion in the wilderness system. This action will reduce the area where vegetation manipulation can occur for any purpose using motorized equipment. Under both of these alternatives the suitable and available land base is not reduced as a result of the wilderness recommendations exclusively. However, wilderness designation for these areas will preclude the harvesting of any timber products in the future.

Effects on Timber Resources from Travel Management

Construction of new roads in relation to travel management is expected to be minimal under all alternatives. Closing existing roads will allow those areas to revert back to natural vegetation including tree species. The closures may also limit access for the removal of forest products. The overall effect is not considered to be significant in terms of total volume lost because road closures will generally be in areas not available for timber production.

Effects on Timber Resources from Fire Management

The effects from wildfire are estimated to be similar across all alternatives except Alternative H. Alternative H emphasizes allowing natural processes to occur which will likely result in larger acreage burned due to wildfire. The ultimate effect on timber production will depend on which acres are burned. If suitable and scheduled areas are burned, the result could be a reduction in timber production. Therefore, the potential effect is somewhat relative to the suitable and available land base for each of the alternatives. No estimate of potential reduction is made at this time. Salvage logging following fires may or may not be appropriate, depending on management area objectives and site restoration needs.

Natural fuel treatment using prescribed fire on 2,000 to 6,000 acres per year in the ponderosa pine and Douglas-fir cover type could result in thinning ponderosa pine stands, favoring ponderosa pine over Douglas-fir, reducing coarse woody debris and other potential fire fuels, and reducing the competition from other vegetation on pine-growing sites. It is estimated that approximately 200 acres of mechanical fuel treatment would be accomplished annually under Alternatives A, C, E, and I, which may yield forest products. This type of treatment is estimated to increase to 500 acres or more under Alternatives B and H as a means of restoring and maintaining natural ecosystems processes. Meeting fire management treatment objectives by using mechanical treatments instead of, or in combination with, prescribed fire could potentially bring a significant increase in the yield of forest products. However this will require improvement or creation of additional market opportunities for using the primarily small diameter material removed. This will in turn require collaboration and cooperation with the forest products industry.

Effects on Timber Resources from Insects and Disease

Under Alternatives E and H it is expected that insect and disease infestations will be allowed to run their course with little prevention or intervention. Insect and disease outbreaks have generally occurred frequently over small areas and infrequently over large areas except for dwarf mistletoe which infects large areas of lodgepole and ponderosa pine. Depending on the severity of an infestation, effects on timber resources can vary widely. Major outbreaks could have the most serious effect on Alternatives C, A, I, and B, in that order, because of damage to the suitable and available land base scheduled for timber production purposes. Predicting the severity of the effects is not possible at this time. (Refer to the Insect and Disease Section for additional information.)

Under all alternatives, the potential exists for salvage and sanitation cuts to dead and damaged timber and for cuts that attempt to slow or impede the spread of insect and disease infestations. The degree to which these harvests are undertaken will largely depend on the risks associated with wildfire potential, infestation spread into healthy stands, public safety, the presence of high value resources, the resource emphasis of the infected or adjacent area, and accessibility. As with fire management there is the opportunity for an increase in forest product yields from treatments on other than suitable and available lands for the purpose of improving forest health conditions.

Effects on Timber Production from Special Areas

Timber harvesting is not permitted or is severely limited in special emphasis areas such as management areas 2.2 (Research Natural Areas) and 3.1 (Special Interest Areas). Alternative B allocates the most acres to these areas, followed by Alternatives A, C, and E which are nearly the same. Alternatives I and H allocate the least. However, the allocation across all the alternatives is not significant enough to have an effect on the suitable and available lands allocation. Therefore, these areas do not have an effect on timber production capabilities during the planning period. Once lands are designated for a Research Natural Area, they will be excluded for consideration for timber production.

Effects Resulting from Reduced Funding Levels

It is unlikely that funding levels will permit full implementation of any of the alternatives. The most significant reduction in timber production outputs would likely occur in timber stand improvement (TSI) activities. Future funding levels may reduce TSI by as much as 27 to 42 percent across all alternatives except E which would have minimal reduction. Over time, a reduction in TSI could result in a lower ASQ. However, it is expected that funding levels during the first period of the plan may result in a 1 to 23 percent reduction in harvest levels below the projected ASQ. The greatest reduction would occur under Alternative B (23 percent) and the least under Alternative A (1 percent). The reduction under the other alternatives would be 2 to 9

percent. Reduced funding levels may also lower the estimated volume available from other vegetation management objectives (OVM); this is not, however, expected to be a significant reduction because estimates were based on expected funding.

CUMULATIVE EFFECTS

Effects from Timber Management on Lands Adjoining the Arapaho and Roosevelt National Forests

Private Lands: Private lands are scattered throughout the ARNF with many tracts containing merchantable stands of timber. How many of these lands timber harvesting has affected over the past is not known. The trend on most of these lands appears to be toward development for mountain residences rather than for natural resource commodity production. Forest stewardship on these lands will be primarily for maintaining healthy and viable timber stands and for reducing fire hazards. The cumulative impacts are minimal.

State-Owned Lands: Most of the state-owned lands within the National Forest boundary are owned and managed by the Colorado Division of Wildlife and have no timber production objectives. There are a few scattered sections throughout the Forests that were reserved for the state school system which may be managed for timber production. The Colorado State Forest, adjacent to the ARNF on the west side of the Medicine Bow Mountains, is managed for resource commodity production including timber harvesting. However, it is in a different watershed and viewshed than any of the ARNF. The cumulative effects from timber management on any of the state-owned lands is negligible.

Federal Lands: Rocky Mountain National Park is the largest tract of land in other federal ownership within the ARNF. The Park has done limited vegetation management along some boundary areas to reduce fire hazards. There are no cumulative effects from this activity.

Harvesting has occurred on all National Forests bordering the ARNF. 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.

From a watershed standpoint the cumulative effects of these adjacent harvesting activities are considered negligible due to the distance downstream before the runoff accumulates. Downstream agricultural activities probably have a greater cumulative effect than timber harvesting. Effective wildlife habitat has undoubtedly been affected by ARNF and adjacent timber harvesting activities. Past activities will need to be considered in determining the effects of proposed future activities.

Timber harvesting has also occurred on adjacent lands administered by the Bureau of Land Management, primarily in Grand County. However they have a limited amount of commercial timber lands adjacent to the ARNF so the total effect is not very significant.