United States
Department of
Agriculture

Forest Service

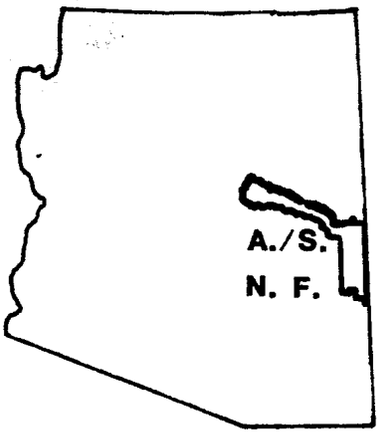
Southwestern
Region

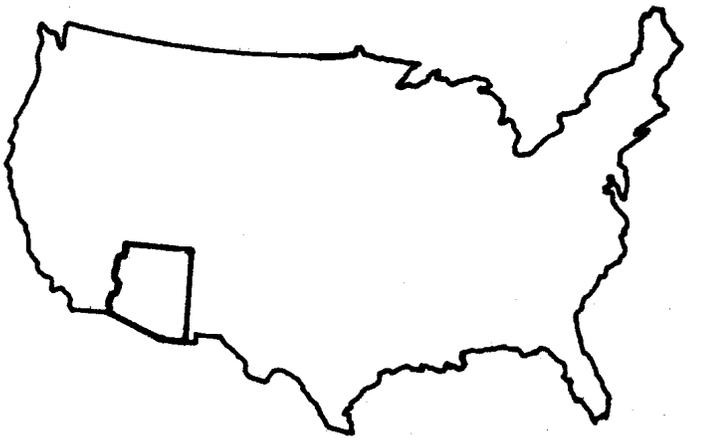
Environmental Impact Statement for the Apache-Sitgreaves National Forests Plan

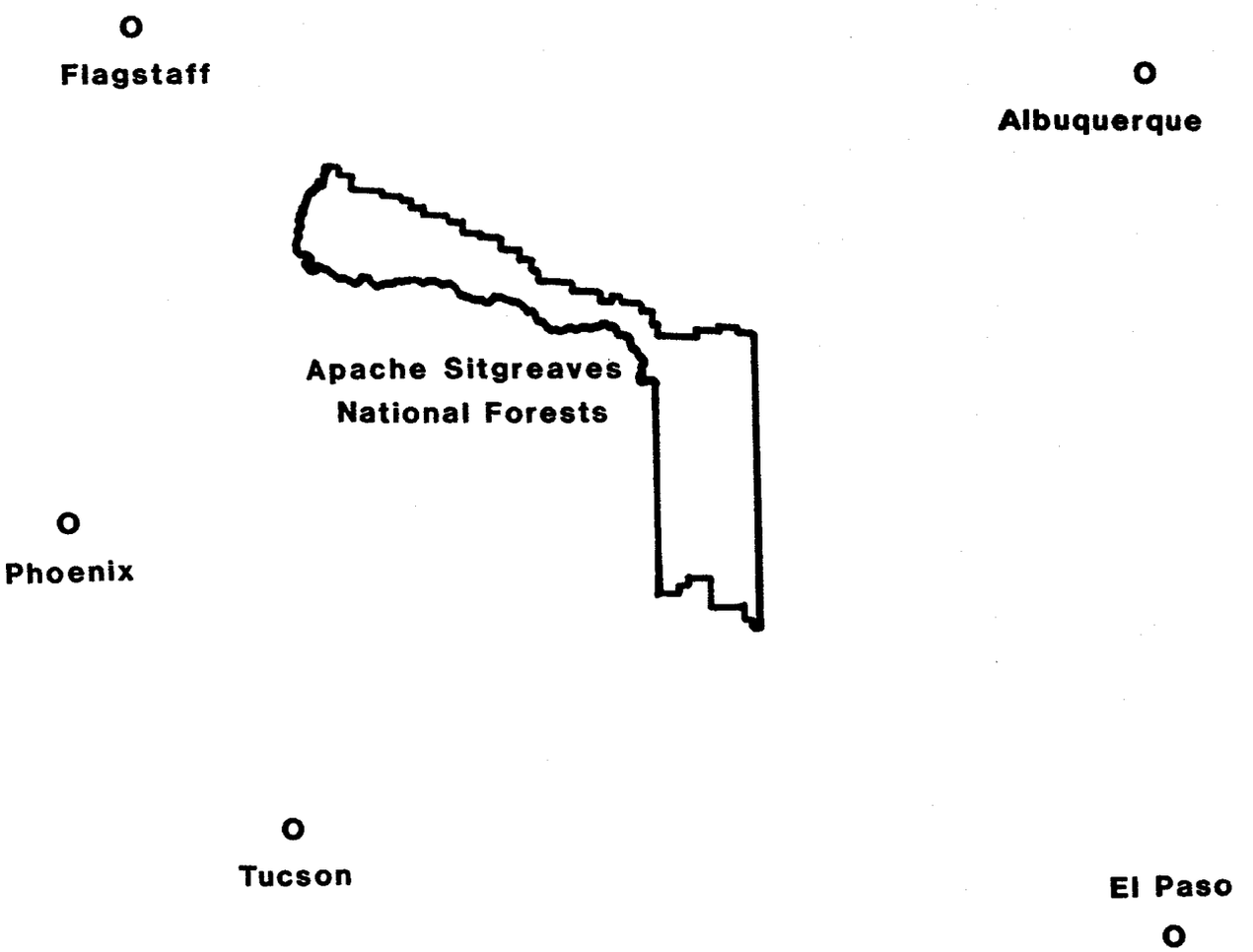
"Land, then, is not merely soil; it is a fountain of energy flowing through a circuit of soils, plants, and animals."

Aldo Leopold
1887-1948
The Sand County Almanac

VICINITY MAP







Published August 1987

ENVIRONMENTAL IMPACT STATEMENT

Proposed Apache-Sitgreaves National Forests Land and Resource Management Plan
Apache, Coconino, Greenlee, and Navajo Counties, Arizona

Type of Action: Administrative

Lead Agency: USDA Forest Service

Responsible Official: Sotero Muniz

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Abstract: A Proposed Action and five alternatives for a Land and Resource Management Plan (Forest Plan) for the 2,003,552 acre Apache-Sitgreaves National Forests are described and compared. The Proposed Action (PA) and alternatives are:

PA - Responds to the recreation, soil and water, range, transportation, landownership, and ORV management issues, and emphasizes wildlife habitat management.

A - Emphasizes lower management intensity levels. It responds well to the recreation, ORV, soil and water, and wildlife habitat management issues.

B - This alternative is highly responsive to recreation and ORV management, and responds to timber and transportation issues.

C - Highly responsive to the recreation and transportation issues, responds to timber and range issues.

D - Attempts to meet Resource Planning Act objectives. Responds to soil and water, landownership, range, and transportation issues.

E - Projects current resource management. Responds well to transportation, unauthorized use, and public information.

The PA constitutes the Forest Service preferred alternative. The Forest Plan, when approved, will guide future management of the Forest and will ordinarily be revised on a ten-year cycle or at least every fifteen years. Accomplishment of the planning objectives is contingent upon programmed funding by Congress.

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1. Purpose of and Need for Action

OVERVIEW

This Environmental Impact Statement (EIS) describes a Proposed Action (Preferred Alternative) and alternatives to the Proposed Action, for the management of the land and resources of the Apache-Sitgreaves National Forests for the next 10 to 15 years. Each alternative provides a different way to address local, regional, national, public issues and management concerns; responds to resource management opportunities; provides for use and protection of resources, and; fulfills legislative requirements. Every alternative generated a different mix of goods and services from the Forest. Each alternative was evaluated to determine its potential to provide a sustained yield of goods and services in a way that maximizes long-term public benefits in an environmentally sound manner. Alternatives were evaluated as to how well they maximized net public benefits. Net public benefits (NPB) is an overall expression of the value to the nation of all outputs and positive effects (benefits), less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index. The proposed action is the alternative that, in the opinion of the Forest Service, provides for a level of goods and services that maximizes long-term net public benefits, and is the Forest Service Preferred Alternative.

The EIS describes the affected environment, discloses the significant environmental consequences, and displays response to issues, concerns, and opportunities (ICO) of implementing the Proposed Action and Alternatives. An EIS is required by the implementing regulations for NFMA (36 Code of Federal Regulations (CFR) 219). The EIS is prepared in the format recommended in National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508). The Proposed Action is the Forest's Land and Resource Management Plan (Plan), which is a separate document. Preparation of the Plan is required by the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974, as amended by the National Forest Management Act (NFMA) of 1976. For purposes of NEPA disclosure, the EIS and Plan are treated as combined documents [40 CFR 1506.4].

A Notice of Intent to prepare an EIS for the Plan was published in the Federal Register on September 23, 1980. The EIS and Plan are being circulated for review and comment. After the close of the comment period, the Plan and EIS was revised as necessary, and the revised EIS filed with the Environmental Protection Agency, and made available to the public. The Regional Forester used the revised EIS in making a decision under NFMA as to approval of the Plan [36 CFR 219.10(c)]. This decision has been documented in a Record of Decision which is now available to the public.

OBJECTIVES

The purpose of the Plan is to provide for multiple use and sustained yield of goods and services from the Forest, to maximize long-term net public benefits in an environmentally sound manner [36 CFR 219.1(c)]. The Forest Plan will accomplish these objectives by:

Determining public issues, management concerns and resource use, and development opportunities identified at the national, regional, and local levels.

Defining management practices appropriate to the range of resource conditions found on the Forest.

Assigning combinations of management practices to lands for which they are most suited based on productivity and sensitivity of the land, and the needs expressed in the issues and concerns.

Specifying the resource production outputs and schedules associated with implementing specific management practices.

Establishing standards and guidelines for resource use and protection.

Establishing monitoring standards to ensure that actual outputs and effects are consistent with those planned.

Providing a framework for project level decisions and for development of budget proposals.

Integrating individual resource planning activities.

Coordinating Forest Service planning activities with the efforts of other Federal agencies, State and local governments and Native American tribes.

Providing input to subsequent RPA Programs and Regional Guides.

The Plan will guide management of the Forest until a new plan is prepared. Management practices and standards, and guidelines in the Plan are not irreversible. When a new plan is prepared, all aspects of the Plan will be re-evaluated based on improved data, monitoring results, and new or revised issues, concerns, and opportunities. A new Plan will normally be prepared at 10 year intervals but must be prepared at least every 15 years. Provision for preparation of a new plan or amendment of the Plan is specified in the regulations for implementation of the NFMA of 1976 [36 CFR 219.10(f) and (g)].

The planning horizon used to estimate outputs and effects was 200 years. The displays in the EIS show data for only specified portions of the planning horizon, usually the first 50 years. While long range effects have been estimated, the plan is only valid until a new plan is prepared committing the Forest to a course of action no longer than 15 years.

The Plan either incorporates, supersedes, or replaces all previous resource or land use management plans prepared for the Forest. Following approval of the Plan, all future permits, contracts, and other instruments for the use and occupancy of the Forest must be consistent with this Plan. In addition, all subsequent administrative activities affecting the Forest, including budget proposals, will be based on the Plan [36 CFR 219.10(e)].

The Plan and EIS will guide all subsequent project implementation. Specific project proposals will be tiered to the EIS [40 CFR 1508.28]. Tiering means that, if needed, future environmental documents for projects based on the Plan will summarize or incorporate by reference the issues discussed in this EIS. Environmental documents for those projects will focus on site specific issues, concerns, and opportunities unique to the project. Environmental documents will not be prepared for projects which, based on past experience and environmental analysis, will have no significant effect, individually or cumulatively, to either the biological or physical components of the human environment [40 CFR 1508.14] (FSM 1951.2), or have been addressed in other environmental documents, including this EIS.

PLANNING PROCESS

National and Regional Planning

Forest planning occurs within the overall framework of both national regional planning as structured by the laws and implementing regulations. The National RPA Program sets policy, standards, guidelines, and resource production objectives in response to identified national issues, concerns, and opportunities. The RPA Program also assigns national production objectives (RPA targets) to each Forest Service Region. A Regional Guide establishes management standards and guidelines, addresses regional issues and concerns, and responds to the National Program by distributing RPA Program targets to the individual National Forests. The Southwestern Regional Guide of August 1983 provides this direction for the Forest.

The planning process is a continuously repeating process in that the information from the Forest level flows up to the national level, is incorporated in the RPA Program, and then flows back to the Forest level. The RPA Program and Regional Guide are updated every five years.

Forest Planning Process

The planning process specified in NFMA regulations [36 CFR 219.12] was followed in development of the plan. The planning process used an interdisciplinary (ID) approach. An ID Team was formed of professionals with diverse backgrounds in the physical, biological, economic, and social sciences. The ID team approach ensured that the perceptions and in-depth knowledge of different specialists were integrated into a common management plan.

The NFMA planning process represents a logical, rational, and trackable approach to natural resource decision making. The planning actions as described in the NFMA regulations [36 CFR 219.12(b)-(k)] and used in the planning effort are:

Identification of purpose and need
Development of planning criteria
Inventory data and information collection
Analysis of the management situation
Formulation of alternatives
Estimation of effects of alternatives
Evaluation of alternatives
Preferred alternative recommendation (Proposed Action)
Plan approval
Monitoring and evaluation

The implementing regulations for NFMA (36 CFR 219) require that a number of analyses be done during the planning process in contrast to the requirements for items to be displayed in the Plan. Examples of process requirements are identification of lands not suited for timber production, suitability and potential capability for forage production, probable occurrence of minerals and potential for future mineral development, and an overview of cultural resources. The EIS and Plan are not intended to contain all of the documentation for process requirements. Complete documentation is contained in a number of files and process reports. For example, the Analysis of the Management Situation (AMS) report documents most of the planning process requirements specified in 36 CFR 219.13 through 219.26. The second page of Appendix B contains a description of the analytical process and planning actions used to prepare the Plan.

Planning Records

The documents and files that chronicle the forest planning process are available for inspection at the Forest Supervisor's Office during regular business hours. The planning records contain detailed information and criteria used in developing the Plan as required in 36 CFR 219.10[h]. Planning records are incorporated by reference at appropriate points in the text and appendices of this EIS and Plan.

Coordination of Planning

Planning for management of the Forest is coordinated with other land managers and private landowners. Coordination also takes place within adjacent National Forests. Planning for the General Crook National Historic Study Trail was coordinated between the Coconino, Prescott, and Apache-Sitgreaves National Forests. The Coconino's Plan studies, recommends and specifies the trail corridor designation and management for the entire 160 mile route from Fort Whipple to Fort Apache. The Prescott and Apache-Sitgreaves National Forests provide trail maintenance, patrols, and other resource management coordination on those portions of the trail within their boundaries. Coordination is a continuous process facilitated by the planning effort described in this EIS and Plan.

There are 108,000 acres of private land within the Forest boundary. Some of these inholdings are small scattered tracts which originated as homesteads, and others are larger tracts which may have been the result of past land exchanges or lands which were not available when the Forest was proclaimed. The Forest Service has no jurisdiction over these private lands.

Notification of private landowners was attempted through advertisements in all local newspapers within the zone of influence and through business reply mailers sent to local postal patrons within the zone. As a result of these efforts, many of the landowners became involved in the planning process.

Indian reservations are located immediately adjacent to or within close proximity to the Forest. These include the White Mountain Apache Reservation along the south and west edge of the forest and the San Carlos Apache Reservation along the southwest edge of the forest. Native American groups were notified during the initial public involvement programs. Follow-up letters were sent requesting any comments they might have regarding the planning effort.

All Native American groups mentioned above were asked to comment on the planning process and meetings were also held with Forest Service representatives to discuss concerns. Further efforts to involve these people were made during the public review period for the EIS and Plan.

Because portions of the Forest are important for religious reasons for several of the tribes, a concern was expressed related to access to sacred sites and freedom to gather plant material for ceremonial purposes. There was also a concern that Forest activities be limited in certain areas so as not to disturb or destroy sacred or historical use sites.

Other concerns presented at these meetings by the tribes included: 1) Employment of Native Americans by the Forest; 2) Possible timber sale contract bidding; 3) Wilderness users trespassing onto Reservation lands in the Mt. Baldy Wilderness area; 4) Water Yields from the Forest and downstream demands.

Numerous Federal, State, county, and local agencies in the area were contacted during the initial public involvement phase in late 1980; coordination has continued since that time.

Personal contacts were made with representatives of several agencies to review and discuss planning efforts. These contacts were to identify potential areas of coordination or conflict between the Forest Plan and plans of other agencies. Contacts were made with:

Pinetop/Lakeside/Show Low officials and planners--Discussed problems of growth in these municipalities and the need for National Forest lands and/or special use permits for sewer systems, airports, and parks. Also discussed were the Townsite Act, rights-of-way, and land acquisition.

Bureau of Land Management, Safford District--Coordination of Hells Hole Further Planning Area. BLM lands were later dropped from wilderness consideration (1983) and the Arizona Wilderness Bill resolved the roadless/further planning issue in the summer of 1984.

Bureau of Indian Affairs, Whiteriver--discussed Wild and Scenic River studies, law enforcement, trespass, and timber sale bidding.

Bureau of Indian Affairs, San Carlos--discussed future land exchanges, water yields, and sustained-yield units.

Arizona Department of Game and Fish--wildlife habitat management standards and guidelines, and threatened and endangered species.

Appendix A provides a complete list of agencies, tribes, and organizations contacted and the results of these contacts.

Planning Area

The Apache and Sitgreaves National Forests are administered as one Forest with the Supervisor's Office located in Springerville, Arizona. The Apache-Sitgreaves N.F. is located in East-Central Arizona and encompasses approximately two million acres. It is an administrative unit of the Southwestern Region of the Forest Service, U. S. Department of Agriculture. Portions of the Forest lie within Apache, Navajo, Coconino, and Greenlee Counties. The eastern portion of the Apache National Forest, located in the state of New Mexico, is administered by the Gila National Forest. These lands will be included in the Gila National Forest Plan, except for a small area in northwest Catron County which will be covered in this document.

Ranger Districts on the Sitgreaves National Forest are, Chevelon, Heber, and Lakeside. Districts on the Apache National Forest are, Springerville, Alpine, and Clifton. For the sake of clarity, the two forests will be referred to as a single entity in this EIS and the Forest Plan.

PUBLIC ISSUES

Issue Development

Land management planning began in May of 1980. An interdisciplinary planning team (ID Team) was appointed. This ID Team identified approximately 279 preliminary issue statements. After applying five screening criteria, this list was reduced to 18 issues which were subsequently included in the original work plan.

In October of 1980, issue booklets for the Arizona National Forests were distributed by mail and at workshops to approximately 15,000 people. This booklet was the major solicitation for issues, concerns, and opportunities (ICO's). A section of the booklet was provided for each National Forest (with the exception of the Coronado) to describe their resources by RPA element. A large space for comment was provided under each element description.

Five statewide public meetings were held in November of 1980 (three in Phoenix, one in Tucson, and one in Flagstaff). Four local meetings were also held during this same period in Springerville, Clifton, Show Low, and Winslow. Additionally, special letters were sent to State Legislators and local officials concerning meetings. Special meetings were held with local officials the same days as the the public meetings. Approximately 200 people attended the four local public meetings.

A meeting was held in mid-November, 1980 for Apache-Sitgreaves employees, with approximately 30 people attending.

During the comment period, the Arizona booklet and public meetings generated around 20,000 comments on a state-wide basis from some 2,000 respondents. There were 972 respondents providing over 7,000 comments concerning the Apache-Sitgreaves. Comments were provided to the Forest by way of the booklet, letters, verbal comments at public meetings, form letters, petitions, and reports.

In early 1981, the process of coding and analyzing the returned response forms began and continued through the spring. Comments were numbered and recorded on a State-wide basis by Forest or groups of Forest. A content analysis was used to summarize and display the number, content, and nature of response.

When a response was coded, only the stated meaning was examined, without interpretation. This enabled the Forest Supervisor and his staff to objectively review the potential ICO's.

A Technical Report titled Issues, Concerns, and Opportunities Identification Process contains a more detailed description, and is available for review at all offices of the Apache-Sitgreaves.

Issues and Opportunities Addressed

Management concerns and public issues are called issues, and are described below along with opportunities addressed in the EIS and Forest Plan. They establish the scope of the EIS [40 CFR 1501.7 and 1508.25].

1. Timber Management

What timber harvest level should be maintained?

Reforestation is inadequate in some areas. In others, slash is not being adequately treated. The level of timber harvest affects the opportunities for management and use of other resources, and the economic stability of local communities. There are views that the current timber harvest level is too high, too low, and just right.

Other issues and concerns have to do with the fact that demand for many species of fuelwood may soon exceed supply in some areas; that commercial and personal-use wood cutters compete for the available supply; that logging residue is available for firewood where timber has been cut; and requirements be placed on logging operations to yard unmerchantable material for other uses, thereby reducing waste. The information on these firewood sources should be made available to the public.

2. Range Management

The range resources are perceived as being overgrazed in some areas. There are livestock conflicts with other resources on rangelands.

These conflicts occur between livestock grazing and timber, wildlife, riparian resources, and soils and watershed resources. Range management techniques such as juniper "pushes" [eradication of woodland species] are controversial.

Other factors include livestock overuse of riparian areas; woodland species are increasing on land suitable for grazing; some allotments may need reductions in numbers while others have the potential to increase; conversion of woodland to grassland will reduce the longterm supply of firewood.

3. Soils and Water

Water quality is adversely impacted in some areas by activities and management practices. Manipulation of vegetation, and activities such as road building, off-road vehicle use, and grazing are believed to be causes of soil movement. Downstream demand for water exceeds supply.

4. Land Ownership

What adjustments in ownership should be made, considering community expansion in Show Low, Pinetop, and Lakeside? Intermingled ownerships, resource and administrative needs, and property line identification are of concern to the public and managers.

Consideration should be given to land exchange and Townsite Act sales to meet the special needs of local communities for support services such as landfills, airports, sewage treatment facilities, and fire protection.

5. Recreation

The demand for developed recreation sites exceeds the availablility of improvements, particularly around lakes and along streams. Miles of trail are insufficient in high demand areas such as along the Mogollon Rim, in the Pinetop/Lakeside area, and in the vicinity of Big Lake and Black River.

This issue includes considerations of the level of maintenance of recreation improvements and trails, impact of recreational use on lakes and streams, visitor safety, allowable length of stay and length of visitor use season, insufficient law enforcement and protection, and proximity to metropolitan areas of New Mexico and Arizona.

6. Off-Road Vehicles (ORV's)

Damage is occurring from ORV use in certain areas. Conflicts are occurring in both winter and summer.

Other factors of this issue include motorized vs. non-motorized use on and off trails in the summer, demands for open/closed areas to ORV use, and resource damage from motorized use.

7. Wilderness Management

Visitors to existing and recommended wildernesses are experiencing conflicts with the Apache Indians, range management, and fire management. Wilderness classification restricts access by the handicapped and elderly.

8. Fish and Wildlife

Managers and the public are concerned that grazing, timber harvesting, and associated activities will reduce fish and wildlife habitiat or adversely effect animal diversity and populations. Many species are dependent upon riparian areas. Conflicts in riparian areas are occurring between range, recreation, road construction, and water use demands.

9. Transportation Facilities

The transportation system, standards, and maintenance do not always accommodate the wide range of vehicles such as motorhomes, camp trailers, logging trucks, and automobiles that travel the roads.

Productive land lost to transportation corridors, demand for more signed trails, access by commodity users, too many roads, conflicts between recreationists and logging operations, and conflicts between the number of roads, wildlife, and dispersed recreation were expressed as needing attention in the plan.

10. Public Information

People's information needs and desires concerning National Forest management are not being met. The public stated that problems from user demands and resource conflicts may be eliminated by better public information or notification. More information is needed about firewood location and access; personal-use or commercial-use of firewood; restrictions, laws, regulations, use restrictions concerning specific areas; and resource management practices (range, prescribed burning, etc.).

11. Unauthorized Use

Violations of specific laws and regulations were mentioned by many respondents. Violations were said to be committed by ORV users, pot hunters, poachers, timber thieves, length of stay violators, and drivers on Forest roads. There is insufficient law enforcement capability to handle every violation.

READER'S GUIDE

The following Reader's Guide is provided to assist the reader in understanding what information is presented in subsequent chapters of the EIS. To thoroughly comprehend the implications of the EIS, the reader is asked to completely read the remainder of this document.

Chapter 2

Alternatives Including the Proposed Action. This is based on information and analysis presented in Chapter 3 and Chapter 4. It presents the environmental impacts of the proposed alternative compared to other alternatives, defines the issues, and provides a basis for choice among the various options.

Chapter 3

Affected Environment. This chapter describes the environment of the area affected by the alternatives under consideration, including the physical and biological setting, the socio-economic setting, and current resource situation and management for specific resources.

Chapter 4

Environmental Consequences. This chapter discloses the environmental impacts of all alternatives, any adverse environmental effects which cannot be avoided should the Proposed Action be implemented, the relationship between short-term uses of the environment and maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented.

Chapter 5

List of Preparers. This chapter lists people who were primarily responsible for preparing the EIS, or significant background papers.

Chapter 6	Consultation With Others. This chapter lists the businesses, industries, conservation organizations, federal agencies, Native Americans, individuals, local governments and/or officials, State agencies and/or officials, and others that received the EIS and Plan, or the Summary document of the EIS.
Glossary	Provides an alphabetical listing of special terms or words and their definition used.
Appendix A	Presents an overview of public involvement activities which were used to develop the issues addressed. It also includes criteria for issue development, a listing of the various publics contacted and/or consulted, a listing of the issues, and a display of issue resolution by each of the alternatives considered in detail.
Appendix B	Describes the analysis process used in developing the alternatives. It focuses attention on the quantitative methods used to perform the analysis. It also contains a mill capacity analysis.

Comparison of alternatives and evaluation of environmental impacts were based upon factors which relate to the issues, concerns, and opportunities, or to the regulatory requirements (36 CFR 219). These factors and the relationship to regulations and the issues, concerns, and opportunities follow:

Table 1. Reader's Guide

Uses and Activities	Unit of Measure*	Connection to ICO's & 36 CFR 219, 40 CFR 1500
RECREATION		219.21 (All Factors)
Developed Recreation	MRVD/Narrative	219.12(g)(3)(ii), ICO 5
Dispersed Recreation (Non-Wildlife)	MRVD/Narrative	219.12(g)(3)(ii), ICO 5
Off-Road Vehicle Recreation	Narrative Acres-Open Acres - Closed	219.21(3)(g), ICO 5, ICO 6, ICO 7
Recreation Opportunities	Acres by ROS Class	219.21(3)(d), ICO 5
Demand	MRVD	219.12(a)(3)
WILDERNESS		
Management	Narrative	219.18(a),219.12(g)(3)(i)ICO 7
Distribution of Use and Maximum Use Levels	Narrative	219.18(a) ICO 7
FISH AND WILDLIFE		219.19 (All Factors)
Old Growth	Acres/Narrative	219.12(g)(1), 219.19, 219.19(a)(2), 219.27(b)(6), 219.27 (c) ICO 1, ICO 5, ICO 8
Cover Habitat Hiding, Thermal	Acres/Narrative	219.12(g)(1), 219.19, 219.19(a)(2), 219.27(b)(6), 219.27 (c) ICO 1, ICO 5, ICO 8

Table 1, Reader's Guide (Continued)

Uses and Activities	Unit of Measure*	Connection to ICO's & 36 CFR 219, 40 CFR 1500
Effects on T&E	Narrative	219.19(a)(7), ICO 8, 219.27(a)(8)
Effects on Indicator Species Habitat and Trend	Narrative/Habitat Capability	219.19(a)(2), ICO 8
Maintenance of Minimum Viable Populations	Narrative	219.19, 219.27(a)(6), ICO 8
Wildlife Recreation Use	WFUD	219.12(g)(3)(iii), ICO 5 ICO 8
RANGE		219.20 (All Factors)
Suitable Range	Acres/Narrative	ICO 2, 3
Permitted Use	AUM	219.12(g)(3)(iii), ICO 3, ICO 2
Capacity	AUM	ICO 2
Management Level	Narrative	ICO 2
Vegetation Manipulation	Narrative & Acres by Practice	219.10(b), ICO 2, ICO 3, ICO 8
Demand	Narrative	219.12(e)(3), 219.11 (a) ICO 2
TIMBER		219.14 & 219.16
Land Suitability	Acres	219.13
Sawtimber Harvest	MBF	219.12(g)(3)(iii) ICO 1
Area Available for Cable Logging	Acres	ICO 1, ICO 8
Merchantable Timber	MCF	219.16(a) ICO 1

Table 1. Reader's Guide (Continued)

Uses and Activities	Unit of Measure*	Connection to ICO's & 36 CFR 219, 40 CFR 1500
Area Available for Cable Logging	Acres	ICO 1, ICO 8
Merchantable Timber Vol.	MCF	219.16(a) ICO 1
Long-term Sustained Yield	MCF	219.16(a) ICO 1
Products	MCF	219.12(g)(3)(iii) ICO 1
Fuelwood Free	MBF	ICO 1
Fuelwood Sold	MBF	219.12(g)(3)(ii) ICO 1
Reforestation	Acres	ICO 1
Timber Age Class	Acres Age, Class, Narrative	219.14, 219.16 ICO 1, ICO 8
WATER AND SOIL		
Water Yield Increase	Acres Feet	219.23(e), 219.12(g)(3)(ii), ICO 3
Watershed Condition	Acres by Condition/ Narrative	219.23(e), ICO 3
Water Quality	Narrative	219.23(d), ICO 3
On Site Soil Loss	MTONS & Narrative	219.23(e), 219.27(a)(i), 219.27(f), 219.23(e), ICO 1, ICO 2, ICO 3
PROTECTION		
Unauthorized Use	Narrative/Person Years Enforcement	ICO 11

Table 1. Reader's Guide (Continued)

Uses and Activities	Unit of Measure*	Connection to ICO's & 36 CFR 219, 40 CFR 1500
LANDS		
Base for Exchange Acquired Acres, R.O.W.'s	Acres/Narrative	ICO 4
FACILITIES		
Road/Trail Construction and Reconstruction and Maintenance	Narrative/Miles	ICO 5, 7, 9
Road Obliteration	Narrative/Miles	ICO 9
GENERAL ADMINISTRATION		
BUDGET	PNV/$	219.12, ICO All
County Receipts - Returns to Treasury	$/Narrative	219.12
Information and Education	Narrative	ICO 10

2. Alternatives Including the Proposed Action

OVERVIEW

This chapter is the heart of the environmental impact statement (EIS). The Proposed Action, alternatives considered in detail, and alternatives considered but eliminated from detailed study are described. The major environmental impacts associated with the alternatives are presented in comparative form based on information and analysis presented in Chapter 3, Chapter 4, and the Appendices. The comparisons displayed were selected because they address the issues, concerns, and opportunities (ICO's) described in Chapter 1, and clearly show the major differences between the Proposed Action and the alternatives considered in detail. Also included is a summary of the process used to develop alternatives.

Alternatives described and presented in this chapter address ICO's in varying degrees. The alternatives display different ways of managing the lands and resources of the Apache-Sitgreaves National Forest. They differ from each other in the land uses and management practices which would occur on different parts of the Forest and in the scheduling of management activities.

Each alternative is a unique combination of management prescriptions and activity schedules applied to the land. As a result, each alternative would generate a different mix of goods and services for the public, and a different combination of resource outputs, land uses, and environmental effects.

Space is conserved in tables by abbreviating units of 1,000 with "M". A number such as 1,500 may be displayed as 1.5 M. To calculate the actual number, multiply the number by 1,000 where the "M" notation is used. One million is designated "MM".

REGULATORY REQUIREMENTS

The process of formulating alternatives responded to a number of regulatory requirements. Regulations (40 CFR 1502.14) for implementing the procedural provisions of the National Environmental Policy Act (NEPA) require that agencies:

> Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives that were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.
>
> Devote substantial treatment to each alternative considered in detail including the Proposed Action so reviewers may evaluate their comparative merits.
>
> Include reasonable alternatives not within the jurisdiction of the lead agency.
>
> Formulate reasonable alternatives which may require a change in existing law or policy to implement, if necessary, to address a major public issue, management concern, or resource opportunity identified during the planning process.

Include the alternative of No Action.

Identify the agency's preferred alternative--Proposed Action.

Include appropriate mitigation measures not already included in the Proposed Action or other alternatives.

In addition, the National Forest Management Act (NFMA) implementing regulations [36 CFR 219.12(f)] provide the following requirements for formulating alternatives:

Alternatives shall be distributed between the minimum resource potential and the maximum resource potential to reflect to the extent practicable the full range of major commodity and environmental resource uses and values that could be produced from the Forest. Alternatives shall reflect a range of resource outputs and expenditure levels.

Alternatives shall be formulated to facilitate analysis of opportunity costs and of resource use and environmental trade-offs among alternatives and between benchmarks and alternatives.

Alternatives shall be formulated to facilitate evaluation of the effects on present net value, benefits, and costs of achieving various outputs and values that are not assigned monetary values but that are provided at specified levels.

Alternatives shall provide different ways to address and respond to the major public issues, management concerns, and resource opportunities identified during the planning process.

At least one alternative shall be developed which responds to and incorporates the RPA Program tentative resource objectives for each forest displayed in the regional guide.

At least one alternative shall reflect the current level of goods and services provided by the unit and the most likely amount of goods and services expected to be provided in the future if current management direction continues. Pursuant to NEPA procedures, this alternative shall be deemed the "no action" alternative.

Each alternative shall represent to the extent practicable the most cost efficient combination of management prescriptions examined that can meet the objectives established in the alternative.

Each alternative shall state at least--the condition and uses that will result from long-term application of the alternative; the goods and services to be produced, the timing and flow of these resource outputs together with associated costs and benefits; resource management standards and guidelines; and the purposes of the management direction proposed.

ALTERNATIVE DEVELOPMENT PROCESS

A broad range of alternatives was formulated by the Interdisciplinary Team using a specific and structured analytical process as required in the planning regulations [36 CFR 219.12(e) and (f)].

Analysis Areas

For analysis purposes the Forest was subdivided into units of land called analysis areas. Analysis areas were identified based on public issues, management concerns, resource development opportunities, biological capability, suitability for management practices, and economic factors.

Analysis areas may contain lands that are subject to laws committing them to specific uses. These prior commitments were not changed in any alternative.

These areas are:

Mt. Baldy Wilderness Area	7,079 acres
Escudilla Mountain Wilderness	5,200 acres
Bear Wallow Wilderness Area	11,080 acres
Blue Range Primitive Area	167,379 acres

Management Prescriptions

Management prescriptions are combinations of management practices, activities, standards, and guidelines designed to achieve specific multiple-use goals and objectives. Management prescriptions include all the necessary mitigation and resource coordination measures required by laws, regulations, and policies. Different management prescriptions were developed to emphasize individual resource potentials, continue current management, manage at a reduced intensity, and address public issues and management concerns in a variety of ways. A number of possible management prescriptions were developed for each analysis area and are discussed in more detail in Appendix B.

Benefits and Costs

Resource outputs and costs of implementation for all management activities and practices were estimated for each combination of management prescriptions and analysis areas. Refer to Appendix B for a complete listing of the resource outputs and cost categories which were used in the analysis.

Cost estimates for each management prescription were developed from historical records of Forest Service costs. Non-Forest Service costs for private permittee investment necessary to carry out range allotment plans, timber purchasers for the development and use of non-traditional logging techniques, were also included in the analysis because of the potentially significant impacts.

The resource outputs that have an existing market and are sold, as well as those resource outputs which could potentially be sold, were assigned benefit values and are called "priced benefits." Timber; firewood; dispersed, developed, wildlife and wilderness recreation; livestock grazing; and water yield were assigned benefit values. All benefit values were based on the point in the production process when the output is removed from the Forest. Refer to Appendix B for a complete listing of the values used.

No attempt was made to assign benefit values to many other outputs such as visual quality, threatened and endangered species, changes in income and employment, or community lifestyles. These kinds of outputs produce "nonpriced" benefits that were also considered in the analysis. Nonpriced benefits may be constraints or restrictions on the production of priced benefits, or may be increased by the production of priced benefits, depending on the degree of compatibility between priced and non-price benefits.

Present Net Value

The priced benefits and the costs of all management practices and activities were used to calculate the present net value (PNV) of all alternatives considered in the analysis. PNV is the difference between the present value of the priced benefits and the present value of all costs discounted at a 4 percent interest rate.

PNV is a means of comparing several different investment opportunities to see which would be the best investment. PNV is calculated from the sum of all of the benefits—the quantity of priced outputs multiplied by the benefit value—minus the sum of all costs necessary to produce the priced and nonpriced outputs. The mechanical process by which all of these dollars are adjusted back to the present year so they can be compared is called "discounting." The discount rate, 4 percent, was established by the Chief of the Forest Service.

PNV is a relative indicator of economic efficiency and was used as a means to develop and compare alternatives. The objective in development of each alternative was to maximize PNV; thus, each alternative is the most economically efficient combination of management prescriptions that will achieve a given set of priced and nonpriced goals and objectives.

Net Public Benefits

The NFMA Regulations (36 CFR 219.1) describe the objective of land and resource management planning on National Forest System lands:

> The resulting plans shall provide for multiple use and sustained yield of goods and services from the National Forest System in a way that maximizes long-term net public benefits in an environmentally sound manner.

Since not all costs and benefits can be priced in the analysis, PNV was not the only index used to develop, compare, and evaluate alternatives. Alternatives were evaluated to determine how well they maximized net public benefits. Net public benefits (NPB) is an overall expression of the value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index such as PNV. Alternatives having the highest PNV may not always provide the highest net public benefits when nonpriced benefits and costs are considered.

Computer Model

The goal in alternative development was to find the most economically efficient combination of management prescriptions that would achieve a given set of priced and nonpriced goals and objectives. Since there were 146 analysis areas, each using a possible 3,467 prescriptions, millions of possible combinations had to be analyzed. This was an impossible job without computer assistance.

A linear programming model called FORPLAN was used as a tool to do the millions of calculations to test possible combinations of areas, prescriptions, and schedules that would maximize economic efficiency (PNV) while meeting the priced and nonpriced goals and objectives specified for a given alternative. Goals and objectives for each alternative were determined on the basis of legal requirements, policies, issues, management concerns, and desired levels of priced and nonpriced benefits and costs.

In some cases, the FORPLAN model indicated the Forest could not be managed to meet some combinations of objectives. The limitations of land and resources, an impact on environmental quality, or the practical limits of budgets often caused an infeasibility. The ID Team then modified the objectives and made other "runs" of the computer model to find the particular combination of lands, activities, and schedules which would best meet the goals of that alternative. FORPLAN solutions were validated by the ID Team to insure that solutions represented implementable options. Because FORPLAN is only an aid for analysis that does not model all components of net public benefits, adjustments in final solutions were made by the ID Team based on professional expertise and prior experience. While the alternatives may not exactly match final FORPLAN solutions, relative differences between alternatives have not been affected. Refer to Appendix B for more detailed discussion of the FORPLAN model and constraints used.

Benchmark Formulation

One phase of the analysis leading to formulation of alternatives was development of benchmarks. A benchmark is an alternative which defines the limits of feasibility for the management and utilization of Forest resources. Benchmarks were designed to emphasize the production of individual resource outputs, to maximize economic efficiency, and to define the least intensive level of management. Benchmarks encompass the range of possibility from which alternatives can be developed.

Many of the first planning actions involved the creation of benchmarks and the inspection of their outputs, costs, and assumptions. Benchmarks are similar to alternatives. They are a combination of land capability, management practices, and schedules to achieve certain objectives for the Forest as a whole. Unlike alternatives, they are usually not fully implementable, because they lack consideration of likely budgets, specific geographic location, and other details. They do provide significant information about the maximum biological and economic production opportunities and they assist in evaluating the compatibilities and conflicts between market and nonmarket objectives, and they define the range within which integrated alternatives will be developed.

Some benchmarks are economically based, while others indicate the maximum physical productivity of land for various resources. In these benchmark analyses, each option must include meeting minimum management requirements of 36 CFR 219.27, such as protecting the productivity of the land and meeting minimum air and water quality standards. Benchmarks are also described further in Appendix B.

Analysis of the Management Situation

During the Analysis of the Management Situation (AMS), the Forest's current management situation was compared and evaluated against the Forest's potential to supply goods and services as demonstrated by the maximum benchmarks. This analysis provided a basis for evaluating the need for management changes and developing alternatives. The AMS contains much of the documentation for procedural requirements specified in 36 CFR 219, particularly the requirements to be covered in the planning process.

Alternative Formulation

Appendix B contains greater detail concerning the formulation of of alternatives. In brief, the ID Team formulated alternatives by:

Developing a broad range of prescriptions representing minimum to maximum resource production potentials and expenditures within management requirements designed to protect and enhance long term productivity.

Formulating benchmark alternatives to define the feasible decision space within which alternatives considered in detail would be developed.

Defining goals and objectives for tentative alternatives considered in detail based upon the range of outputs determined by benchmarks; issues and concerns to be addressed and opportunities presented; cost efficiency; financial feasibility and; nonpriced public benefits.

Refining tentative alternatives into alternatives considered in detail by analyzing results for achievement of goals and objectives, optimum integration and production, cost efficiency, financial feasibility, and production of public benefits.

ALTERNATIVES CONSIDERED, BUT ELIMINATED FROM DETAILED STUDY

This section deals with those alternatives considered and subsequently eliminated from further study. These alternatives were generated as benchmarks, departures from nondeclining timber yield, or as other alternatives considered but not modeled. The reasons they were not considered in detail are presented. Appendix B summarizes constraints and modeling techniques used for alternatives not considered in detail.

Benchmarks

Because benchmarks define the limits of feasibility, they were considered as potential alternatives and were used as a basis for developing other alternatives. Most of them are not evaluated in detail in the EIS. The Maximize PNV Assigned Values Benchmark was used as a standard in a number of comparisons between alternatives. Refer to Appendix B for additional detail on benchmarks and the range of alternatives established by benchmarks.

Minimum Level

The purpose of the minimum level benchmark is to estimate naturally occurring outputs and minimum costs of maintaining the Forest as part of the National Forest System. This benchmark enables controllable outputs and discretionary costs to be identified. The minimum level is a Forest-wide management strategy that would meet the following statutory requirements: 1) administration of unavoidable, nondiscretionary land uses; 2) prevention of impairment of the productivity of the land; and 3) protection of the life, health, and safety of incidental users. The sum of these activities defines the long-term fixed costs of public ownership.

The minimum level benchmark was eliminated from further study because it did not conform to existing legislation governing management and use of the Forest, nor did it address issues and concerns. Although eliminated from further study, the benchmark does provide a basis for comparing base costs and benefits with those alternatives considered in detail.

The minimum level was not modeled in FORPLAN. Outputs and costs were estimated by resource specialists outside the model.

Low Intensity Level

The purpose of this benchmark is to determine outputs and costs associated with managing the Forest at a low intensity level and/or reduced budget level. This alternative was not considered in detail because the level of management does not respond to the issues and concerns. This benchmark meets only minimum management standards. Developed recreation sites are operated at reduced service levels and will be closed when they deteriorate below minimum health and safety standards. Trails will be closed as they deteriorate below safe use level or cause excessive erosion. Wilderness is not managed resulting in significant deterioration of the wilderness resource and experience. Timber production is significantly reduced since funds to perform cultural activities to improve timber growth and to prepare and administer timber sales are not available in this alternative. There is no new construction or reconstruction of roads. Road maintenance and facilities maintenance is sharply curtailed. Many roads will be closed due to an inability to maintain an acceptable maintenance level.

Buildings will deteriorate and no new building construction will occur. Grazing capacity and permitted livestock use decline as management is allowed to decrease and improvements needed for maintenance of capacity deteriorate. Use and capacity balance significantly below current levels in Period 4. Soil and watershed treatment work is not accomplished and wildlife habitat is not enhanced.

Maximize Single Resources

These benchmarks maximize production of a single resource while maximizing present net value. They were developed for timber, range grazing capacity, and water yield. As each single resource was maximized, the other resources were allowed to float to the highest level compatible with the high intensity management level of the emphasized resource.

The benchmarks were developed to determine the Forest's potential to produce goods and services and to evaluate the Forest's potential to resolve issues, concerns, and opportunities. They were utilized to guide the formulation and analysis of all alternatives.

Single resource benchmarks were eliminated from detailed analysis because each alternative responded to only a few public issues. Few constraints were placed on the model during the analyses. Therefore, combinations of budgets and prescriptions assigned by the model for each of these benchmarks may not represent feasible solutions. NFMA requires that the Forest Plan provide for multiple use and sustained yield of products and services in accordance with the Multiple Use Sustained Yield Act of 1960. Maximizing a single resource does not satisfy this requirement.

Maximize Present Net Value

Two benchmarks were modeled which maximize PNV. The first maximized PNV with market values for timber products, fuelwood sold, permitted livestock use and developed recreation RVD's--Max PNV Market. The other benchmark, Max PNV Assigned Values, maximized PNV for resources with market values as well as those with assigned values for water yield; dispersed, wildlife, and wilderness recreation visitor days (RVD's), and free personal use fuelwood.

The Max PNV Assigned Values Benchmark is used as a comparison in the Economic Factors and Present Net Value Tradeoff sections of this chapter.

The Max PNV benchmarks were not considered in detail because these alternatives met only the cost efficiency criteria. In addition, the budget is far in excess of anticipated levels.

Departure Alternatives

A deviation from nondeclining yield through a planned decrease in timber sales in the future was developed for the Proposed Action Alternative. In order to justify implementation of a departure, the departure should meet some or all of the following criteria according to NFMA regulations:

-Reduce mortality losses.
-Improve age class distribution.
-Improve economic conditions in dependent communities.
-Is necessary to meet the goals of RPA.
-Improve overall multiple use management.

This departure does not appear to reduce mortality losses. The departure does not improve age class distribution.

The early high harvest level, followed by lower harvest, later would create a boom and bust cycle which would be detrimental to local economies. Current mill capacity can be maintained and even increased without resorting to a departure.

Alternatives PA, B, C, and D all meet or exceed RPA targets without departure.

This departure results in poorer multiple use management because, as discussed above, it would take too much of the limited budget to implement it.

Based on this analysis, this alternative was rejected, and was not analyzed in further detail. A more in depth discussion of the departure alternative is contained in the Timber Technical Report which is available in the Forest Planning records.

Other Alternatives Considered

Alternatives with output constraints that differ from those presented were considered. It was decided the alternatives considered in detail and the benchmarks provided are an adequate and reasonable range of output options.

Higher resolution of the fuelwood issue by harvesting and selling commercial sawtimber for firewood was considered. While firewood is in high demand, so is commercial sawtimber. Since the Forest Service is required to charge fair market value for timber cut and removed from National Forest lands, the value that would be charged for sawtimber size trees removed as fuelwood would exceed the price of alternative energy sources. This would make this an economically inefficient alternative.

An uneven-aged management alternative was considered, but not in detail.

Uneven-aged management creates conditions favorable to the spread and intensification of dwarf mistletoe, since it is easy for the parasite to drop from large trees to small trees. Current losses to dwarf mistletoes on the Apache-Sitgreaves are estimated to be 60-90 million board feet per year [Forest Pest Management Report R3-75-10]. Uneven-aged management could be expected to result in even greater losses.

Selection harvest, an uneven-aged management system, was offered as an option in the FORPLAN model for all alternatives. In Alternatives D and E, no selection harvests were selected by the model. Alternatives PA, A, B, and C each selected 37 acres of selection harvest. This indicates that selection harvest is not economically efficient.

Uneven-aged management would result in a slow conversion of timbered areas to climax vegetation, since there is never an adequate disturbance to set succession back to early stages. This results in the climax tree species having lower market values than the early seral species, particularly for ponderosa pine.

For these reasons, the uneven-aged management alternative was not considered in detail.

ALTERNATIVES CONSIDERED IN DETAIL

Each of the alternatives considered in detail meets the requirements of the NFMA regulations and provides goods and services at a level responsive to all or part of the issues while maximizing present net value. Appendix B describes the model constraints used in formulating the alternatives, including alternatives not considered in detail.

Issues developed during the scoping process and the response to objectives assigned in the Regional Guide are addressed differently in each alternative. These differing emphases are reflected in the varying mix of management prescription assignments among alternatives. The Proposed Action, RPA, and the No Action alternatives are identified. Resource outputs were projected for 200 years.

The location of prescription assignments for the Proposed Action and other alternatives is illustrated on maps in the packet which accompanies this document. Appendix B describes the management areas and emphases for each alternative and how analysis areas are grouped into management areas.

The following assumptions were common to all alternatives:

Meet the legal minimum management requirements as specified in 36 CFR 219.27.

All alternatives provide for protection and study of the following potential Research Natural Areas: 1) North Fork Thomas Creek is 500 acres and features spruce/fir as a major ecosystem; 2) Escudilla Mountain is 909 acres featuring Arizona Fescue and mountain muhley ecosystems; 3) Hayground Creek is 316 acres featuring Blue spruce as a major ecosystem, and; 4) Wildcat Canyon is 513 acres featuring pinyon and juniper.

All alternatives provide for continuation of the existing electronic sites and power corridors.

All alternatives provide for the evaluation of potential electronic sites to meet public need for high power broadcast services.

The Blue Range Primitive Area is managed to protect its wilderness qualities in compliance with 36 CFR 293.17.

All alternatives provide for expansion of communities surrounded by National Forest System Lands.

All alternatives provide for the acquisition of 4.2 miles of right-of-way.

A base-for-land exchange of 12,060 acres is identified along with 27,576 acres identified as desirable private lands.

In all alternatives, the General Crook National Recreation Trail which crosses the Chevelon and Heber Ranger Districts is proposed for designation as a National Historic Study Trail (see Appendix D, Coconino N.F. DEIS). All alternatives provide for continued management of the Escudilla, Blue Ridge, and Eagle Creek National Recreation Trails.

The March 28, 1983, Amendment to the National Trails Act (Public Law 98-11) designated in Section 5(c) the General Crook Trail for study as a National Historic Trail from Prescott, Arizona, across the Mogollon Rim to Fort Apache. The revised Region 3 Interim Directive #11 assigned the lead effort for studying and recommending historic trail designation for those portions of the General Crook on the Prescott, Apache-Sitgreaves, and Coconino National Forests to the Coconino. The 138 miles of the trail on National Forest land is classified as eligible for National Historic Trail status, based on the criteria stated in Section 5(b) of the Act. The entire length of the trail on National Forest land was designated a National Recreation Trail in October 1979. In 1978, a 160-mile portion of the original 200 mile General Crook Trail was designated Arizona's first historic trail" by the Arizona Parks Board. The 138 miles of trail on National Forests from Prescott to Fort Apache is eligible for placement on the National Register of Historic Places, and is currently protected pursuant to Executive Order 11593 and the Procedures for Compliance (36 CFR 800).

In addition to the assumptions listed above, the following harvest constraints were common to all alternatives to comply with the requirements of 36 CFR 219.16(a)(1), (a)(2)(iii), and (a)(2)(iv): Nondeclining yield (NDY); Allowable Sale Quantity-Long Term Sustained Yield Capacity Link (ASQ-LTSYC); Harvest of even-aged stands at or beyond Culmination of Mean Annual Increment (CMAI), and Perpetual Timber Harvest (Ending Inventory).

Range of Alternatives Considered

The alternatives considered were developed within the resource production levels, both minimum and maximum, established by the benchmarks. The Low Intensity Benchmark established the base level with subsequent alternatives providing outputs at or above this level. The maximum single resource benchmarks formed the cutoff level for outputs at the upper end of the decision space. As objectives for alternatives were formulated, the output levels for each resource were determined by consulting the range of outputs established by the benchmarks. Limits for each resource were specified by alternative to insure outputs fell within the range or decision space established by the benchmarks. The alternatives considered represent a broad range of reasonable alternatives. A display of the range and relative ranking of the alternatives within the decision space is contained in Appendix B.

PROPOSED ACTION ALTERNATIVE [PREFERRED ALTERNATIVE]

The Proposed Action provides an increased emphasis for fish and wildlife habitat improvement, and recreation management, both developed and dispersed. It provides a slight increase in timber production and a moderate level of other outputs. A moderate to high level of issue resolution is provided.

Specific objectives of the alternative are:

The budget for Period 1 is constrained to $11.44 MM, annually.

Bring permitted grazing use into balance with capacity in the first decade by improving the grazing capacity and stabilizing the permitted numbers.

Manage the pinyon-juniper areas to emphasize wildlife habitat, fuelwood, and foraging areas.

Provide an increase of approximately 10% in timber production. This increase would be taken from the mixed conifer type where dwarf mistletoe is a significant problem, and where western spruce budworm is a potential problem.

Meet the demand for developed recreation with the assistance of the private sector where possible; manage dispersed recreation in concentrated use areas to protect settings and maintain experience levels; provide an overall higher quality wilderness experience by managing the Mt. Baldy Wilderness to capacity through various controls and increased distribution; and, develop new trails in high use areas while improving the condition of high use existing trails.

By 2030, reduce forest-wide soil loss by at least 28% when compared to 1985.

Shift forest fire initial attack forces from strictly fire management funding, to projects in order to fully utilize project crews as part of the multi-functional workforce.

Dispersed Recreation

Forest-wide, the recreation opportunity spectrum is 11% primitive, 15% semi-primitive non-motorized, 35% semi-primitive motorized, 37% roaded natural, and 2% urban and rural. Resource damage at concentrated use areas is mitigated by hardening the sites (paved or gravel parking areas), and restricting concentrated use to acceptable areas through the use of barrier systems along with Forest Service enforcement. Erosion control measures, revegetation practices, and site closures are utilized to rehabilitate denuded areas caused from past concentrated use.

Fifty percent of the use is managed at the Standard Service Level for the first period. All use is managed at the Standard Service Level beginning in the second period. The objective of dispersed use management is to provide a relatively high experience level in spite of increasingly higher number of users.

Woods Canyon Lake/Willow Springs Lake/Al Fulton Point Area are managed intensively to keep use below the areas' user capacity and maintain a predominately natural appearing setting. Waterbased settings are controlled to ensure maintenance of stream/lakeside vegetation, and to enhance the fisheries.

Dispersed Facilities

Generally, trails are adequately maintained at a level dictated by the type and amount of use (Standard Maintenance Level). Fifty new miles of trails are built within the first two decades, most of them being along the Mogollon Rim and in close proximity to the concentrated use areas on the Heber, Lakeside, and Chevelon Ranger Districts.

Approximately 221 miles of existing trails are reconstructed within the first two decades. An Adopt-a-Trail volunteer program is maintained. Trail maintenance and reconstruction is coordinated with users.

Existing dispersed facilities such as parking areas, toilets, corrals, information signs, as well as minimally developed camping areas are reconstructed or rehabilitated to meet Maintenance Class 1 standards. New dispersed facilities are built where needed and poorly designed dispersed facilities are redesigned and reconstructed.

Developed Recreation

Demand for developed recreation sites is met in the first period by expanding Aspen, Canyon Point, and Rainbow Campgrounds, as well as the construction of a multi-family/group campground near Big Lake. Demand in later periods is met through the construction of additional public developed sites. All existing sites are rehabilitated and maintained to meet Class 1 maintenance standards. All use is managed at the Standard Service Level. Concessionaire operation of Forest Service facilities is expanded.

Aggressive efforts are implemented to exchange one organization camp, and three recreation residence areas meeting base-for-exchange criteria. The remaining existing private sector facilities are continued.

Ski areas at both South Mountain and Green's Peak are individually evaluated. Any use is not expected prior to 1990. Maximum capacity for either or both sites combined does not exceed 5,000 skiers at one time within the first planning period. Other private sector involvement in providing various other recreation opportunities occurs.

Off Road Vehicle (ORV)

ORV activities are managed to minimize conflicts with other recreation users and other resources, such as wildlife habitat, soil, water, etc. Closed areas are effectively posted and enforced. A Forest ORV map is provided to the public which identifies the special ORV restrictions, closed areas, and trails open to ORV use. Designated motorized activity areas will not be incorporated into the Woods Canyon Lake/Al Fulton Point/Willow Springs Lake dispersed area management plan. Motorized activity opportunities are considered in the design of the Bear Canyon Lake Campground developments in period 3.

Wilderness Management

Table 2. Areas Managed as Wilderness (acres).

Area Name	Formally Designated by Congress	F/S Recommends for Primitive Area Designation	F/S Recommends Areas Released to Multiple Use Management
Mt. Baldy (7,079)	7,079	N/A*	N/A
Escudilla (5,200)	5,200	N/A*	N/A
Bear Wallow (11,080)	11,080	N/A*	N/A
Blue Range Primitive (167,379)	0	163,751	23,659
TOTAL (190,738)			

*N/A - Not Applicable

The trailheads for Trails 94 and 95 that access the Mt. Baldy Wilderness are relocated away from the wilderness boundary on the east side of Forest Road 113. A limit of acceptable change inventory is conducted on the Mt. Baldy Area and an accurate capacity is determined for each Wilderness Opportunity Spectrum (WOS) zones. A wilderness permit system is implemented for the Mt. Baldy Wilderness if needed to contain use below capacity for each of the WOS zones. The White Mountain Apache Indian Reservation boundary near the summit of Mt. Baldy is well marked to prevent conflicts between forest users and the Indian authorities. Wilderness use on the Mt. Baldy is managed at the Standard Service Level.

Recreation use on the Escudilla and Bear Wallow Wilderness Areas is managed at the Less than Standard Service Level, however, use does not exceed capacity. Existing trails are maintained and no new trails are constructed with the exception of a route to Bead Springs (on Escudilla) marked with rock cairns. Wilderness area maps are included in the responsible District Recreation Opportunity Guides for Escudilla and Bear Wallow as well as the Blue Range.

All acres of the Blue Range Primitive Area, additions and deletions included, are managed to protect wilderness values, until Congressional action makes the final determination. Use in the Blue Range Primitive Area is managed at the Less than Standard Service Level, however, use is below capacity. Trailheads for key trails are developed and properly signed along Highway 666. Mineral exploration and development is allowed with appropriate measures to minimize effects on the wilderness resource.

Wild and Scenic Rivers

The Black River is proposed for study as a possible inclusion into the Wild and Scenic Rivers System. The other river/creek segments that have been inventoried by the National Park Service or identified by the Forest Service for classification under the Wild and Scenic Rivers Program (Eagle Creek, Leonard Canyon from Knolls Lake, Willow Creek, Clear Creek, Chevelon Creek, East and West Forks of the Black River) are not proposed for inclusion.

The Black River within the National Forest is recommended for "scenic" classification.

Cultural Resources	Prior to any ground disturbing projects, the Forest ensures compliance with requirements as set forth in 36 CFR 800, or the Programmatic Memorandum of Agreement with the State Historic Preservation Officer and the Advisory Council. A comprehensive cultural resource inventory is developed and the existing backlog is completed by 2030. At least one site per year is nominated to the National Register of Historic Places. An overview of the Forests cultural resources is maintained. Interpretive programs or sites are developed to enhance public and employee awareness to the importance of cultural resource protection and study. Any site which Native Americans are known to utilize for religious ceremonies are managed to preserve the integrity of the site. Significant sites known to have potential for nomination to the National Registers are patrolled systematically to reduce pot-hunting. Sites are protected to maintain their potential for research or interpretation, to maintain their integrity, and to make their cultural value available to public use, study, and enjoyment.
Wildlife & Fish	Acres managed for old growth would be 18% of each Diversity Unit. Riparian management would be emphasized. Fifty-five percent of each diversity unit would be managed for 180 snags per 100 acres. Big game habitat capability would be high. Habitat effectiveness would be high. Fish habitat improvement would have a high emphasis. The Proposed Action will achieve a high rate of recovery of the classified Threatened and Endangered Species. This alternative will provide protection of nest or roost sites for the Bald Eagle and Peregrine Falcon, and will provide habitat protection and improvement for the Apache Trout.
Range	Range investments will remain at current levels. Permitted use will not exceed capacity after the first decade.
Timber & Fuelwood	The objective is to manage timber in a way to compliment other resource values, particularly wildlife. The level of production in the first period is constrained to less than the maximum potential. Approximately 96% of the tentatively suitable forest land is managed for scheduled timber outputs.

The allowable sale quantity for the first decade is 119,376 MBF. This is 27% above the sale level of the past 10 years. Seed cuts, removal cuts, clear cuts, and intermediate cuts account for 15, 54, 2, and 28% respectively, of the acreage harvested in the first decade. There is also a very small acreage of selection cuts.

The annual fuelwood production in the first period is estimated at 15,700 cords which is inadequate to meet demand.

Watershed & Soils

Watershed condition is satisfactory or better by the end of the fourth period. This alternative improves watershed condition in the shortest time.

Landownership

In period 1, an accelerated landownership program is implemented by being more responsive to land adjustments for community expansion needs and by establishing a more frequent inspection schedule for all special uses. Additional funding in periods 2 and 3 enables the Forest Service to resolve the land line location backlog, to identify all unauthorized use situations, to purchase all remaining road and trail rights-of-ways, to appraise a representative number of permitted uses to update fees, and to implement a land line maintenance program. The remaining periods concentrate on thorough management of special uses, maintenance of and land lines, and land adjustments to improve forest administration.

Transportation

The transportation system would be improved partially as a result of reconstruction of roads for timber sale haul roads, but also because of moderate funding for capital investment roads and a big increase in funding for roads associated with recreation improvements. Road maintenance would be increased above current levels resulting in improved road conditions. 3,000 miles of unneeded roads would be closed permanently or obliterated by the end of the fourth decade.

ALTERNATIVE A

Alternative A provides management at a reduced budget level which is 75% of Alternative E for the first five decades. This alternative overall fails to provide an acceptable level of outputs and opportunities responsive tc the issues except those for recreation. Many public benefits would be provided at reduced levels to meet a reduced budget.

Specific objectives of the alternative are:

Bring permitted use into balance with capacity in the fourth decade.

Manage pinyon-juniper areas extensively. Provide fuelwood permits for dead and down wood only. Provide little or no administration of permits.

Provide least cost timber management. There will be no cultural treatments to increase growth rates. There will be no intermediate cuts. All timber harvest will be from regeneration cuts.

Meet the demand for developed recreation; manage dispersed recreation in concentrated use areas to protect settings and maintain experience levels; better protect the Mt. Baldy Wilderness resource through relocation of trailheads; and, develop new trails in high use areas while improving the condition of high use existing trails.

By 2030, reduce forest-wide soil loss by at least 30% when compared to 1985.

Traditional fire management forces will be maintained with a 3% reduction from current. Fire suppression cost will increase by 45%.

Dispersed Recreation

Forest-wide, the recreation opportunity spectrum is 11% primitive, 15% semi-primitive non-motorized, 35% semi-primitive motorized, 37% roaded natural, and 2% urban and rural. Resource damage at concentrated use areas is mitigated by hardening the sites (paved or gravel parking areas), and restricting concentrated use to acceptable areas through the use of barrier systems along with Forest Service enforcement. Erosion control measures and site closures are utilized to rehabilitate denuded areas caused from past concentrated use.

Nearly 49% of the dispersed use is managed at the Standard Service Level. The emphasis is to intensively manage dispersed recreation use in most of the timbered vegetation areas, and extensive management elsewhere. The objective is to maintain a relatively high experience level in the timbered vegetation areas in spite of increasingly higher number of users.

Special emphasis is placed on managing the Woods Canyon Lake/Willow Springs Lake/Al Fulton Point Area, as well as other waterbased settings with fisheries within capacity and maintain a predominately natural appearing setting.

Dispersed Facilities

Trails are generally adequately maintained at a level dictated by type and amount of use (Standard Maintenance Level). Fifty new miles of trails are built within first two decades, most of them being along the Mogollon Rim and in close proximity to the concentrated use areas on the Heber and Chevelon Ranger Districts. Approximately 185 miles of existing trails are reconstructed within the first two decades. An Adopt-a-Trail volunteer program is maintained. Trail maintenance and reconstruction is coordinated with users.

Existing dispersed facilities such as parking areas, toilets, corrals, information signs, as well as minimally developed camping areas are reconstructed or rehabilitated to meet Maintenance Class 1 standards. New dispersed facilities are redesigned and reconstructed.

Developed Recreation

Demand for developed recreation sites is met entirely through construction of new sites by the Forest Service. Existing sites are rehabilitated and maintained to meet Class 1 Maintenance Standards. All use is managed at the Standard Service Level. Concessionaire operation of Forest Service facilities are permitted at Hoyer-Winn, Lakeside, and the Big Lake Area campgrounds, as well as at Woods Canyon Lake.

Proposals to exchange three recreation residence areas and one organization camp that meet the base-for-exchange criteria are considered and acted upon if proposals are received. The remaining existing private sector facilities are continued.

Ski areas at both South Mountain and Green's Peak are individually evaluated. Any use is not expected prior to 1990. Maximum capacity for either or both sites does not exceed 5,000 skiers at one time within the first planning period. Other private sector involvement in providing recreation opportunities occurs.

Off Road Vehicle (ORV)

ORV activities are managed to minimize conflicts with other recreation users and other resources. Closed areas are posted and enforced. A Forest ORV map is provided to the public which identifies the special ORV restrictions, closed areas, and trails open to ORV use. ORV opportunities are incorporated into the design of the Bear Canyon Lake campground development in Period 3.

Wilderness Management

Table 3. Areas Managed as Wilderness (acres).

Area Name	Formally Designated by Congress	F/S Recommends for Primitive Area Designation	F/S Recommends Areas Released to Multiple Use Management
Mt. Baldy (7,079)	7,079	N/A*	N/A
Escudilla (5,200)	5,200	N/A*	N/A
Bear Wallow (11,080)	11,080	N/A*	N/A
Blue Range Primitive (167,379)	0	167,379	20,031
TOTAL (190,738)			

*N/A - Not Applicable

The trailheads for Trails 94 and 95 that access the Mt. Baldy Wilderness are relocated back from the wilderness boundary on the east side of Forest Road 113. A wilderness permit system is not implemented.

All recreation use on Mt. Baldy, Escudilla, and Bear Wallow Wilderness Areas, as well as the Blue Range Primitive Area is managed at the Less than Standard Service Level. Use exceeds capacity on the Mt. Baldy Wilderness. Existing trails are maintained and no new trails are constructed. All of the Blue Range Primitive Area, additions and deletions included, are managed to protect wilderness values until Congress makes the formal designation.

Trailheads for key trails are developed and properly signed at the highway.

Within the Blue Range Primitive Area mineral exploration and development is allowed with appropriate measures to minimize effects on the wilderness resource.

Wild & Scenic Rivers

None of the river/creek segments that have been inventoried by the National Park Service for classification under the Wild and Scenic Rivers Program are proposed for inclusion into the Wild and Scenic Rivers System.

Cultural Resources

Prior to ground disturbing projects, the Forest ensures compliance with requirements as set forth in 36 CFR 800, or the Programmatic Memorandum of Agreement with the State Historic Preservation Officer and the Advisory Council.

Cultural resource inventories are conducted prior to any ground disturbing projects. No efforts are made to complete surveys on areas not scheduled for projects.

One site per year is nominated to the National Register of Historic Places. Interpretive programs are developed to enhance public and employee awareness to the significance of cultural resource protection.

Any site which Native Americans are known to utilize for religious ceremonies are managed to preserve the integrity of the site.

Significant sites known to have potential for nomination to the National Register are patrolled systematically to reduce pothunting. Sites are protected to maintain their potential for research or interpretation, to maintain their integrity, and to make their cultural value available to public use, study, and enjoyment.

Wildlife and Fish

Acres managed for old growth would be at least 18% of each Diversity Unit. Riparian areas would improve at a moderate level. Sixty percent of each Diversity Unit would be managed for 180 snags per 100 acres. Big game habitat capability would be moderate. Habitat effectiveness would be low. No emphasis would be given to fish habitat improvement.

This alternative will achieve a low rate of recovery of the classified Threatened and Endangered Species.

This alternative will provide protection of nest or roost sites for the Bald Eagle and Peregrine Falcon, and will provide habitat protection and improvement for the Apache Trout.

Range

Low funding would result in the loss of range structures and reduced grazing capacity. Permitted use would exceed grazing capacity until the fourth decade. There would be no new overstory modifications in the pinyon-juniper vegetation type. Existing acres of treated seral grasslands will be only partially retreated. The majority of the range resources would be managed at Level B intensity.

The objective is to manage timber under an extensive management system. Cultural treatments are reduced to a bare minimum to reduce costs.

Timber & Fuelwood

Approximately 91% of the tentatively suitable forest land is managed for scheduled timber outputs.

The allowable sale quantity for the first decade is 76,600 MBF. This is 18% below the sale level of the past 10 years. Seed cuts, clear-cuts, and intermediate cuts account for 10, 53, and 37 percent, respectively, of the acreage harvested in the first decade. Removal cuts and selection cuts occur in small quantities.

The annual fuelwood production is estimated at about 18,000 cords per year, which is inadequate to meet projected demand.

Watershed & Soils

Watershed condition is satisfactory or better by the end of the sixth period.

Landownership

A moderate land exchange program is conducted with the emphasis towards improving the administration of National Forest System Lands. National Forest lands adjacent to expanding communities (specifically Show Low, Pinetop, and Lakeside), that meet the base-for-exchange criteria are made available for exchange consideration.

Transportation

Road reconstruction and road maintenance would be reduced substantially. Many roads would be closed or traffic would be managed to protect investments. Road obliteration would not occur.

Roadway obliteration or road closures would only occur as a result of timber sales. Road maintenance will keep roads at or nearly at their designated maintenance levels. Traffic management would continue to be emphasized. Moderate levels of road construction/reconstruction will reduce loss of investments in the road system.

ALTERNATIVE B

Alternative B emphasizes resource outputs with market values. This alternative was developed to maximize PNV with an emphasis on outputs having market values (sawtimber and related timber products, livestock permitted use, and developed recreation). Dispersed recreation RVD's and water yield were not allowed to exceed 75% of their maximum output levels. Management for all other resources is maintained at feasible levels consistent with the emphasis on market oriented outputs.

Specific objectives of the alternative are:

Bring permitted grazing use into balance with capacity in the fourth decade.

Manage pinyon-juniper to emphasize fuelwood and grazing values.

Provide high level timber outputs through intensive management. Reduce occurrence of dwarf mistletoe in all timber types and reduce susceptibility to western spruce budworm.

Meet the demand for developed recreation; aggressively manage dispersed recreation use to protect settings and maintain experience levels; better protect the Mt. Baldy Wilderness resource through relocation of trailheads; and, develop new trails in high use areas while improving the condition of most existing trails.

By 2030, reduce forest-wide soil loss by at least 27% compared to 1985.

Traditional fire management forces will be maintained with a 3% reduction from current. Fire suppression cost will increase by 45%.

Dispersed Recreation

Forest-wide, the recreation opportunity spectrum is 11% primitive, 15% semi-primitive non-motorized, 30% semi-primitive motorized, 42% roaded natural, and 2% urban and rural. Resource damage at concentrated use areas is mitigated by hardening the sites (paved or gravel parking areas), and restricting concentrated use to acceptable areas through the use of barrier systems along with Forest Service enforcement. Erosion control measures and site closures are utilized to rehabilitate denuded areas caused from past concentrated use.

Nearly 94% of the use is managed at the Standard Service Level. The emphasis is to aggressively manage dispersed use to continue a relatively high experience level in spite of increasingly higher number of users.

Woods Canyon Lake/Willow Springs Lake/Al Fulton Point Area are managed intensively to keep use below capacity, and maintain a predominately natural appearing setting. Waterbased settings are controlled to ensure maintenance of stream and lakeside vegetation, and to enhance the fisheries.

Dispersed Facilities

Trails are adequately maintained at a level dictated by type and amount of use (Standard Maintenance Level). Fifty miles of trails are built within first two decades, most of them along the Mogollon Rim and in close proximity to the concentrated use areas on the Heber and Chevelon Ranger Districts. Approximately 650 miles of existing trails are reconstructed within the first two decades. An Adopt-a-Trail volunteer program is maintained. Trail maintenance and reconstruction is coordinated with users.

Existing dispersed facilities such as parking areas, toilets, corrals, information signs, as well as minimally developed camping areas are reconstructed or rehabilitated to meet Maintenance Class 1 standards. New dispersed facilities are built when needed, and poorly designed dispersed facilities are redesigned and reconstructed.

Developed Recreation

Demand for developed recreation sites is met entirely through construction of new sites by the Forest Service. Existing sites are rehabilitated and maintained to meet Class 1 maintenance standards. All use is managed at the Standard Service Level. Concessionaire operation of Forest Service facilities are permitted at Hoyer-Winn, Lakeside, and the Big Lake Area campgrounds, as well as at Woods Canyon Lake.

Proposals to exchange the three recreation residence areas, and the one organization camp that meet the base-for-exchange criteria are considered, and acted upon if proposals are received. The remaining existing private sector facilities are continued.

Ski areas at both South Mountain and Green's Peak are individually evaluated. Any use is not expected prior to 1990. Maximum capacity for either or both sites does not exceed 5,000 skiers at one time within the first planning period. Other private sector involvement in providing recreation opportunities occurs.

Off Road Vehicle (ORV)

ORV activities are managed to minimize conflicts with other recreation users and other resources. Closed areas are effectively posted and enforced. A Forest ORV map is provided to the public, which identifies the special ORV restrictions, closed areas, and trails open to ORV use. Designated motorized activity areas will be incorporated into the Woods Canyon Lake/Al Fulton Point/Willow Springs Lake dispersed area management plan. Motorized opportunities are considered in the design of the Bear Canyon Lake Campground developments in Period 3.

Wilderness Management

Table 4. Areas Managed as Wilderness (acres).

Area Name	Formally Designated by Congress	F/S Recommends for Primitive Area Designation	F/S Recommends Areas Released to Multiple Use Management
Mt. Baldy (7,079)	7,079	N/A*	N/A
Escudilla (5,200)	5,200	N/A*	N/A
Bear Wallow (11,080)	11,080	N/A*	N/A
Blue Range Primitive (167,379)	0	167,379	20,031
TOTAL (190,738)			

*N/A -- Not Applicable

The trailheads for Trails 94 and 95 that access the Mt. Baldy Wilderness are relocated back from the wilderness boundary on the east side of Forest Road 113. A wilderness permit system is not implemented.

All recreation use on Mt. Baldy, Escudilla, and Bear Wallow Wilderness Areas as well as the Blue Range Primitive Area is managed at the Less than Standard Service Level. Use exceeds capacity on the Mt. Baldy Wilderness. Existing trails are maintained and no new trails are constructed. All of the Blue Range Primitive Area, additions and deletions included, are managed to protect the wilderness values until Congress makes the final designations.

Trailheads for key trails are developed and properly signed at the highway.

Within the Blue Range Primitive Area mineral exploration and development is allowed with appropriate measures to minimize effects on the wilderness resources.

Wild and Scenic Rivers

None of the river/creek segments that have been inventoried by the National Park Service for classification under the Wild and Scenic Rivers Program are proposed for inclusion into the Wild and Scenic Rivers System.

Cultural Resources

Prior to ground disturbing projects, the Forest ensures compliance with requirements as set forth in 36 CFR 800, or the Programmatic Memorandum of Agreement with the State Historic Preservation Officer and the Advisory Council.

Cultural resource inventories are conducted prior to any ground disturbing projects. No efforts are made to complete surveys on areas not scheduled for projects.

One site per year is nominated to the National Register of Historic Places. Interpretive programs are developed to enhance public and employee awareness to the significance of cultural resource protection.

Any site which Native Americans are known to utilize for religious ceremonies are managed to preserve the integrity of the site.

Significant sites known to have potential for nomination to the National Register are patrolled systematically to reduce pothunting. Sites are protected to maintain their potential for research or interpretation, to maintain their integrity, and to make their cultural value available to public use, study, and enjoyment.

Nearly 92% of the dispersed use is managed at the Standard Service Level. The emphasis is to aggressively manage dispersed recreation use to continue a relatively high experience level in spite of increasingly higher number of users.

Woods Canyon Lake/Willow Springs Lake/Al Fulton Point Area are managed intensively to keep use below capacity, and maintain a predominately natural appearing setting. Use at waterbase settings are controlled to ensure maintenance of stream/lakeside vegetation and to enhance the fisheries.

Dispersed Facilities

Trails are adequately maintained at a level dictated by type and amount of use (Standard Maintenance Level). Fifty new miles of trails built within first two decades, most of them being along the Mogollon Rim and in close proximity to the concentrated use areas on the Heber and Chevelon Ranger Districts. Approximately 690 miles of existing trails are reconstructed within the first two decades. An Adopt-a-Trail volunteer program is maintained. Trail maintenance and reconstruction is coordinated with users.

Existing dispersed facilities such as parking areas, toilets, corrals, information signs, as well as minimally developed camping areas are reconstructed or rehabilitated to meet Maintenance Class 1 standards. New dispersed facilities are built where needed, and poorly designed facilities are redesigned and reconstructed.

Developed Recreation

Seventy-five percent of the demand for developed recreation sites is met entirely through construction of new sites by the Forest Service. All existing sites are rehabilitated and maintained to meet Class 1 maintenance standards. Concessionaire operation of Forest Service facilities is permitted at Hoyer-Winn, Lakeside, and the Big Lake Area campgrounds, as well as at Woods Canyon Lake. All use is managed at the Standard Service Level.

Proposals to exchange the three recreation residence areas and the one organization camp that meet the base-for-exchange criteria are considered and acted upon if proposals are received. The remaining existing private sector facilities are continued.

Ski areas at both South Mountain and Green's Peak are individually evaluated. Any use is not expected prior to 1990. Maximum capacity for either or both sites does not exceed 5,000 skiers at one time within the first planning period. Other private sector involvement in providing recreation opportunities occurs.

Off Road Vehicle (ORV)

ORV activities are managed to minimize conflicts with other recreation users and other resources. Closed areas are posted and enforced. A Forest ORV map is provided to the public which identifies the special ORV restrictions, closed areas, and trails open to ORV use. ORV opportunities are incorporated into the design of the Bear Canyon Lake Campground development in Period 3.

Wilderness Management

Table 5. Areas Managed as Wilderness (acres).

Area Name	Formally Designated by Congress	F/S Recommends for Primitive Area Designation	F/S Recommends Areas Released to Multiple Use Management
Mt. Baldy (7,079)	7,079	N/A*	N/A
Escudilla (5,200)	5,200	N/A*	N/A
Bear Wallow (11,080)	11,080	N/A*	N/A
Blue Range Primitive (167,379)	0	163,751	23,659
TOTAL (190,738)			

*N/A - Not Applicable

The trailheads for Trails 94 and 95 that access the Mt. Baldy Wilderness are relocated back from the wilderness boundary on the east side of Forest Road 113. A wilderness permit system is not implemented.

All recreation use on Baldy, Escudilla, and Bear Wallow Wilderness Areas as well as the Blue Range Primitive Area is managed at the Standard Service Level. Use exceeds capacity in the Baldy Wilderness. Existing trails are maintained and no new trails are constructed.

All acres of the Blue Range Primitive Area, additions and deletions included, are managed as wilderness until Congressional action makes the final determination.

Trailheads for key trails for the Blue Range are developed and properly signed along Highway 666.

Those portions of the Blue Range representing the most "primitive" characteristics of the wilderness resource (approximately 117,552 acres) are withdrawn from mineral entry. The rest of the Blue Range remains open to mineral exploration and development with appropriate measures to minimize effects on the wilderness resource.

Wild and Scenic Rivers

Chevelon Creek, the Black River (including the east and west forks), and Leonard Canyon (which includes Clear Creek and portions of Willow Creek), are proposed for inclusion into the Wild and Scenic Rivers System. Eagle Creek, the other river/creek segment inventoried by the National Park Service for classification under the Wild and Scenic River Program, are not proposed for inclusion.

Chevelon Creek is recommended for "scenic" classification for all segments from where it enters the Sitgreaves Forest north boundary (Chevelon Canyon Lake - omitted) to where it splits, and includes both forks up to the dams (Willow Springs Lake, Woods Canyon Lake).

The Black River within the National Forest along with the East and West Forks are recommended for "recreation" classification for all its segments.

Leonard Canyon from Knolls Lake until its confluence with Clear Creek, then Clear Creek to the Forest north boundary, and Willow Creek from Wiggins Crossing to it confluence with Clear Creek are recommended for "scenic" classification.

Cultural Resources

Prior to any ground disturbing projects, the Forest ensures compliance with requirements as set forth in 36 CFR 800, or the Programmatic Memorandum of Agreement with the State Historic Preservation Officer and the Advisory Council.

A comprehensive cultural resource inventory is developed and the existing backlog is completed by 2030.

At least one site per year is nominated to the National Register of Historic Places. An overview of the Forests cultural resources is maintained. Interpretive programs or sites are developed tc enhance public and employee awareness to the importance of cultural resource protection and study.

Any site which Native Americans are known to utilize for religious ceremonies are managed to preserve the integrity of the site.

Significant sites known to have potential for nomination to the National Registers are patrolled systematically to reduce pothunting. Sites are protected to maintain their potential for research or interpretation, to maintain their integrity, and to make their cultural value available to public use, study, and enjoyment.

Wildlife and Fish	Acres managed for old growth would be at least 20% of each Diversity Unit. Riparian areas below and above the Rim would be significantly improved due to wildlife and watershed investment. Seventy percent of each Diversity Unit would be managed for 180 snags per 100 acres. Big game habitat capability would be moderate. Habitat effectiveness would be moderate. Fish habitat improvement would have a high emphasis. This alternative will achieve a high rate of recovery of classified Threatened and Endangered Species. This alternative will provide protection of nest or roost sites for the Bald Eagle and Peregrine Falcon, and will provide habitat protection and improvement for the Apache Trout.
Range	Range forage capacity for livestock would decrease due to low investments. Permitted use would exceed grazing capacity until the fourth decade. Approximately 4,000 acres per decade will be modified to a grassland in the pinyon-juniper type. The majority of the range resource will be managed to management intensity C.
Timber & Fuelwood	The objective is to emphasize the amenity values from the Forest. The marketable outputs are allowed to float to a maximum level of 75% of their respective benchmark maximums. Approximately 97% of the tentatively suitable timberland is managed for scheduled timber outputs. The first decade allowable sale quantity of 139,900 MBF per year is 27% above the sale level of the past 10 years. Clearcuts and removal cuts account for 52 and 48 percent, respectively, of the acreage harvested in the first decade. Selection cuts occur in small quantities. The annual fuelwood production is estimated at about 36,000 cords in the first period, which is inadequate to meet projected demand.
Watershed & Soils	Watershed condition is satisfactory or better by the end of the fourth period.
Landownership	A moderate land exchange program is conducted with the emphasis towards improving the administration of National Forest System lands. National Forest lands adjacent to expanding communities [specifically Lakeside, Show Low, and Pinetop], that meet the base-for-exchange criteria, are made available for exchange consideration.

Transportation

Road maintenance and road reconstruction would be at a level to enhance visitor appreciation of the Forest. User comfort would be a major consideration. Capital Investments for roads will be higher than currently funded. Road obliteration will occur on an opportunity basis.

ALTERNATIVE D

This alternative was developed to attempt to meet or exceed targets assigned to the Forest in the Regional guide. The targets were developed for the 1980 RPA Program. This alternative deals more with the Regional or National topics as viewed during the 1985 RPA Assessment. The combination of constraints and objective functions were designed to come as close as possible to meeting RPA targets.

Specific objectives of the alternative are:

Bring permitted use into balance with capacity in the second decade.

Manage pinyon-juniper areas and timber to meet targets assigned in the most recent RPA Program, at least cost.

Maintain the highest capacity of existing developed recreation sites possible; expand the dispersed area volunteer host program to minimize resource damage in concentrated use areas; aggressively manage dispersed recreation use in selected high value waterbase or riparian settings; expand the utilization of volunteers for wilderness management; and, develop new trails in high use areas along the Rim while improving the condition of high use existing trails.

By 2030, reduce forest-wide soil loss by at least 28% when compared to 1985.

Traditional fire management forces will be maintained with a 75% increase from current. Fire suppression cost will increase by 45%.

Dispersed Recreation

Forest-wide, the recreation opportunity spectrum is 11% primitive, 15% semi-primitive non-motorized, 30% semi-primitive motorized, 42% roaded natural, and 2% urban and rural. Resource damage at concentrated use areas in critical high value waterbased or riparian settings is mitigated through control measures such as barrier systems and enforcement. Regulatory signing and enforcement of closures are methods used to manage concentrated use in other areas.

Nearly 20% of the use is managed at the Standard Service Level. Dispersed use is managed aggressively within selected high value waterbase or riparian settings only.

Dispersed area volunteer hosts are utilized to maintain signs and educate the public in land use etiquette to contain the concentrated use in high impact areas such as Woods Canyon Lake, Willow Springs Lake, and Al Fulton Point Areas, as well as waterbased settings.

Dispersed Facilities

Volunteers are the principal labor source to maintain trails. Only trails with a recreational value are maintained. Many trails are maintained at the Less than Standard Service Levels. Twenty-five miles of new trails are built, all within the first period, and all along the Mogollon Rim and in close proximity to the concentrated use areas on the Heber and Chevelon Ranger Districts. Three hundred and thirty-five (335) miles of existing trails are reconstructed within the first two decades. An Adopt-a-Trail volunteer program is maintained.

Existing dispersed facilities such as parking areas, toilets, corrals, information signs, as well as minimally developed camping sites are maintained to meet operation and maintenance standards. Volunteers such as dispersed area hosts are relied upon heavily to keep facilities from falling below minimum health and safety standards. No dispersed facilities are reconstructed and no new facilities built.

Developed Recreation

No new developed recreation sites are built, therefore, demand is not met. Existing facilities receive no rehabilitation or reconstruction work until the third decade when minimal rehabilitation projects are undertaken at fee sites to maintain the fee status. Concessionaire operations are expanded where feasible.

Developed sites are managed for a mix of service levels which are largely dependent on variables such as unexpected maintenance costs and availability of volunteers. Project Service Level mixes are: Period 1 - 58% (STD) - 42% (LSTD); Period 2 - 58% STD - 42% LSTD; Period 3 - 45% STD - 55% LSTD; Period 4 - 12% STD - 88% LSTD; Period 5 - 100% LSTD.

Minimal reconstruction and rehabilitation funding results in developed site closures within the first two decades. Beginning in Period 3, 63% of the 1985 developed site practical maximum capacity is achieved.

Proposals to exchange the three recreation residence areas and the one organization camp that meet base-for-exchange criteria are considered and acted upon if proposals are received.

Ski areas at both South Mountain and Green's Peak are individually evaluated. Any use is not expected prior to 1990. Maximum capacity for either or both sites does not exceed 5,000 skiers at one time within the first planning period. Proponent reimburses the Forest Service, for costs to administer the site area permit as well as associated permits.

Off Road Vehicle (ORV)

ORV activities are managed to minimize conflicts with other recreation users and other resources. Closed areas are posted and enforced. Trails are closed to ORV use unless signed open. A Forest ORV map is provided to the public identifying the closed areas, and ORV opportunity areas. Designated motorized activity areas are not incorporated into the Woods Canyon Lake/Al Fulton Point/Willow Springs Lake dispersed area management plan.

Wilderness Management

Table 6. Areas Managed as Wilderness (acres).

Area Name	Formally Designated by Congress	F/S Recommends for Primitive Area Designation	F/S Recommends Areas Released to Multiple Use Management
Mt. Baldy (7,079)	7,079	N/A*	N/A
Escudilla (5,200)	5,200	N/A*	N/A
Bear Wallow (11,080)	11,080	N/A*	N/A
Blue Range Primitive (167,379)	0	167,379	20,031
TOTAL (190,738)			

*N/A -- Not Applicable

All recreation use on Mt. Baldy, Escudilla, and Bear Wallow Wilderness Areas as well as the Blue Range Primitive Area is managed at the Less than Standard Service Level. Use exceeds capacity on the Mt. Baldy Wilderness. Volunteers are relied upon to maintain existing trails. No new trails are constructed. No wilderness permit system is implemented. All of the Blue Range Primitive Area, additions and deletions, are managed to protect the wilderness values until Congress makes the final designation.

Within the Blue Range Primitive Area mineral exploration and development is allowed with appropriate effects on the wilderness resource.

Wild and Scenic Rivers	None of the river/creek segments that have been inventoried by the National Park Service for classification under the Wild and Scenic Rivers Program are proposed for inclusion into the Wild and Scenic Rivers System.
Cultural Resources	Prior to ground disturbing projects, the Forest ensures compliance with requirements as set forth in 36 CFR 800, or the Programmatic Memorandum of Agreement with the State Historic Preservation Officer and the Advisory Council. Cultural resource inventories are conducted prior to any ground disturbing projects. No efforts are made to complete surveys on areas not scheduled for projects. One site per year is nominated to the National Register of Historic Places. Interpretive programs are developed to enhance public and employee awareness to the significance of cultural resource protection. Any site which Native Americans are known to utilize for religious ceremonies are managed to preserve the integrity of the site. Significant sites known to have potential for nomination to the National Registers are patrolled systematically to reduce pothunting. Sites are protected to maintain their potential for research or interpretation, to maintain their integrity, and to make their cultural value available to public use, study, and enjoyment.
Wildlife and Fish	Acres managed for old growth would be 13% of each Diversity Unit. The condition of riparian areas would improve significantly above current. Fifty-five percent of each Diversity Unit would be managed for 130 snags per 100 acres. Big game habitat improvement would be moderate. Habitat effectiveness would be high. Fish habitat improvement would have a high emphasis. This alternative will achieve a moderate rate of recovery of the classified Threatened and Endangered species. This alternative will provide protection of nest or roost sites for the Bald Eagle and Peregrine Falcon, and will provide habitat protection and improvement for the Apache Trout.
Range	Due to investments, range grazing capacity would increase to a relatively high level of output of 249,000 Animal Unit Months (AUM's), by the fifth decade. Permitted use will equal capacity in the first decade. Approximately 4,000 acres per decade will be modified to a grassland in the pinyon-juniper type. The majority of the range resource will be managed at levels D and E.

Timber & Fuelwood	The objective is to meet the targets assigned in the most recent RPA Program, at least cost. Approximately 97% of the tentatively suitable forest land is managed for scheduled timber outputs. The first decade allowable sale quantity of 104,000 MBF per year is 11% above the sale level of the past 10 years. Removal cuts and intermediate cuts account for 76 and 24 percent, respectively, of the acreage harvested in the first decade. The annual fuelwood production is estimated at about 32,000 cords, which is inadequate to meet demand.
Watershed & Soils	Watershed condition is satisfactory or better by the end of the fourth period.
Landownership	A moderate land exchange program is conducted with the emphasis towards improving the administration of National Forest System lands. National Forest lands adjacent to expanding communities (specifically Show Low, Lakeside, and Pinetop), that meet the base-for-exchange criteria are made available for exchange consideration.
Transportation	Road maintenance and road construction/reconstruction projects will be at a moderately high level. Road obliteration projects will be planned. The road standards will improve and investment losses minimized.
ALTERNATIVE E	Alternative E projects current resource management. This is the No Action Alternative as required by the NEPA regulations. The alternative provides a base for comparison of other alternatives by projecting existing management into the future. Existing management including current plans, policies, standards, and guidelines to provide resource outputs consistent with current budget levels. Specific objectives of the alternative are: Bring permitted use into balance with capacity in the third decade. Continue historic management practices. Pinyon-juniper areas are managed primarily for grazing with fuelwood and other values being less important.

Timber management is fairly intensive, and includes cultural treatments and intermediate cuts, but is not very effective in the control of dwarf mistletoe.

Maintain the highest capacity of existing developed recreation sites possible for the longest period of time; expand the dispersed area volunteer host program to minimize resource damage in concentrated use areas; expand the use of volunteers for wilderness management; and, utilize the volunteer program to maintain the most heavily used recreation trails.

By 2030, reduce forest-wide soil loss by at least 27% when compared to 1985.

Traditional fire management forces and suppression activities will remain at current level.

This alternative is the same as the current level benchmark and is based on the premise that current management would continue. The FORPLAN model was constrained to select only current level prescriptions.

Dispersed Recreation

Forest-wide, the recreation opportunity spectrum is 11% primitive, 15% semi-primitive non-motorized, 30% semi-primitive motorized, 47% roaded natural, and 2% urban and rural. Regulatory signing is the management method used to control resource damage from concentrated use. Forest Service enforcement of closures as well as barrier systems are used when extreme resource damage or safety problems at concentrated use areas warrant action. Volunteer groups are recruited to rehabilitate denuded areas caused from past concentrated use.

All dispersed use is managed at the Less Than Standard Service Level. Dispersed Area volunteer hosts are utilized to maintain signs, and educate the public in land use etiquette to contain the concentrated use in high impact areas such as Woods Canyon Lake, Willow Springs Lake, Al Fulton Point Areas, as well as most waterbased settings.

Dispersed Facilities

Volunteers are the only means available to maintain trails. No new trails are built. No trails are reconstructed unless volunteers are utilized. An Adopt-a-Trail volunteer program is maintained.

Existing dispersed facilities such as parking areas, toilets, corrals, information signs, as well as minimally developed camping areas are maintained to meet R-3 Operations and Maintenance standards. Volunteers such as dispersed area hosts are relied upon heavily to keep facilities from falling below minimum health and

safety standards. No dispersed facilities are reconstructed and no new facilities built.

Developed Recreation

No new developed recreation sites are built, therefore, demand is not met. Existing facilities receive no rehabilitation or reconstruction work until the third decade, when minimal rehabilitation projects at the fee sites occur to maintain their fee status. Concessionaire operations are expanded where feasible.

Developed sites are managed for a mix of service levels which are largely dependent on variables such as unexpected maintenance costs and availability of volunteers. Projected Service Levels are: Period 1 - 58% STD - 42% LSTD; Period 2 - 58% STD - 42% LSTD; Period 3 - 45% STD - 55% LSTD; Period 4 - 12% STD - 88% LSTD; Period 5 - 100% LSTD.

Due to the minimal reconstruction and rehabilitation, site closures will occur within the first two decades. Beginning in Period 3, 63% of the 1985 developed site practical maximum capacity is operated.

Proposals to exchange the three recreation residence areas and the one organization camp that meet the base-for-exchange criteria are considered and acted upon if proposals are received.

Ski areas at both South Mountain and Green's Peak are individually evaluated. Any use is not expected prior to 1990. Maximum capacity for either or both sites does not exceed 5,000 skiers at one time within the first planning period. Proponent reimburses the Forest Service, including associated expenditures for costs to administer the ski area permit as well as associated permits.

Off Road Vehicle (ORV)

Conflicts between ORV activities and other recreation users or other resources are responded to through the use of ORV closures and available Forest Service enforcement. Areas not posted closed, will be open to use.

Wilderness Management

Table 7. Areas Managed as Wilderness (acres).

Area Name	Formally Designated by Congress	F/S Recommends for Primitive Area Designation	F/S Recommends Areas Released to Multiple Use Management
Mt. Baldy (7,079)	7,079	N/A*	N/A
Escudilla (5,200)	5,200	N/A*	N/A
Bear Wallow (11,080)	11,080	N/A*	N/A
Blue Range Primitive (167,379)	0	163,751	23,659
TOTAL (190,738)			

*N/A - Not Applicable

All recreation use on Mt. Baldy, Escudilla, and Bear Wallow Wilderness Areas as well as the Blue Range Primitive Area is managed at the Less than Standard Service Level. Use exceeds capacity on the Mt. Baldy Wilderness. Volunteers are relied upon to maintain existing trails. No new trails are constructed. No wilderness permit system is implemented. All areas of the Blue Range Primitive Area, additions and deletions included, are managed to protect wilderness values until Congress makes the final designation.

Within the Blue Range Primitive Area mineral exploration and development is allowed with appropriate measures to minimize effects on the wilderness resource.

Wild and Scenic Rivers

None of the river/creek segments that have been inventoried by the National Park Service for classification under the Wild and Scenic Rivers Program are proposed for inclusion into the Wild and Scenic Rivers System.

Cultural Resources

Prior to ground disturbing projects, the Forest ensures compliance with requirements as set forth in 36 CFR 800, or the Programmatic Memorandum of Agreement with the State Historic Preservation Officer and the Advisory Council.

Cultural resource inventories are conducted prior to any ground disturbing projects. No efforts are made to complete surveys on areas not scheduled for projects.

One site per year is nominated to the National Register of Historic Places. Interpretive programs are developed to enhance public and employee awareness to the significance of cultural resource protection.

Any site which Native Americans are known to utilize for religious ceremonies are managed to preserve the integrity of the site.

Significant sites known to have potential for nomination to the National Register are patrolled systematically to reduce pothunting. Sites are protected to maintain their potential for research or interpretation, to maintain their integrity, and to make their cultural value available to public use, study, and enjoyment.

Wildlife and Fish

Acres managed for old growth would be at least 9% of each Diversity Unit. The condition of riparian areas would improve slightly. Forty percent of each Diversity Unit would be managed for 180 snags per 100 acres. Big game habitat capability would be low. Habitat effectiveness would be moderate. Fish habitat improvement would have a moderate emphasis.

This alternative will protect and maintain Threatened and Endangered species habitat.

Range

Grazing capacity would continue to improve at a slow rate, but funding would be inadequate to completely replace range improvements. Therefore, grazing capacity would slightly decrease for livestock. Permitted use would exceed capacity until the third decade. There would be no overstory modifications in the pinyon-juniper type. The majority of the range resource will be managed at management intensity Level C.

Timber & Fuelwood

The objective is to maintain historic management practices and harvest levels. Approximately 94% of the tentatively suitable timberland is managed for scheduled timber outputs.

The first decade allowable sale quantity of 106,000 MBF is 13 percent greater than the sale level of the past 10 years. Removal cuts and intermediate cuts account for 74 and 26 percent, respectively, of the acreage harvested in the first decade.

Total annual fuelwood production is estimated at 28,000 cords. This is inadequate to meet current demand.

Watershed & Soils

Watershed condition is satisfactory or better by the end of the fifth period.

Landownership

A moderate land exchange program is conducted with the emphasis towards improving the administration of National Forest System lands. National Forest lands adjacent to expanding communities (specifically Pinetop, Show Low, and Lakeside), that meet the base-for-exchange criteria are made available for exchange consideration.

Transportation

Annual road construction/reconstruction is held at a moderate level. Roadway obliteration projects would occur to benefit wildlife. Maintenance will decrease slightly below present funding. Road management becomes important to protect road investments.

COMPARISON OF ALTERNATIVES

Issues, Concerns, and Opportunities

The following discussions and tables show in quantitative and qualitative terms how each alternative addresses the issues, concerns, and opportunities (ICO).

There are quantity and/or quality aspects of each ICO. Those quantities affecting the ICO are listed for the end of the first 10

years and at the end of 50 years so that the reader can get the feel of the short-term and long-term effects.

The quality aspects are dealt with in the text. Naturally, some of these evaluations are subjective, and are based on professional expertise and experience of the ID Team. Each ICO is addressed separately.

ISSUE 1 - TIMBER MANAGEMENT

Table 8. Average Annual Sawtimber, Products, and Fuelwood Production in (MMBF)* for Each Alternative in Periods 1 and 5.

Product Type	Alternatives PA	A	B	C	D	E
SAWTIMBER						
Period 1	99	77	169	140	102	90
Period 5	140	70	144	107	130	122
PRODUCTS						
Period 1	20	T**	2	T	2	16
Period 5	25	2	24	32	11	35
ALLOWABLE SALE QUANTITY***						
Period 1	119	77	171	140	104	106
Period 5	165	72	168	139	141	157
FUELWOOD****						
Period 1	16	9	17	18	16	14
Period 5	15	8	15	14	19	17

* MMBF = million board feet

** T = less than 1/2 million board feet

*** Allowable sale quantities are normally expressed in cubic feet, but are referenced here in board feet. Non-declining yield occurs in all alternatives when referencing production in cubic feet.

**** MMBF can be converted to cords by multiplying by 2,000. In period 1, the PA produces 32,000 cords.

Resources are affected by the acreage managed for timber production and by the intensities of timber management applied. The previous timber management plan described approximately 949,000 acres as suitable, with an average annual ten year allowable sale level of 101 MMBF for sawtimber and products. The current average *(1974-1983)

sold quantity is 93.6 MMBF per year. The timbered and pinyon-juniper acreages are 52 and 38 percent of the Forest total, respectively.

The suitable timber acres vary by alternative. Alternative B has the largest acreage at 810,529 acres, while Alternative A has the least at 740,035 acres. Alternative E has 763,376 acres and the remaining alternatives (PA, C, and D) all have approximately 774 to 788 thousand acres. All alternatives have less suitable acres than was identified in the previous timber plan. Reductions in the acreages can be attributed to low reforestation potential, sensitive soils, excessive roading costs, administrative withdrawals, and allocations to meet other resource objectives.

Timber management intensity varies between alternatives. Intensive alternatives can improve stand health, diversity, regeneration, production, and the integration of other resources like wildlife. Extensive management provides for stand improvement, but to a far lesser degree, where stand improvement investments like reforestation and thinning are insufficient to maintain the Forest in it's optimum growing condition. The most intensive timber management alternatives are B, C, PA, and D, with PA and C providing the best resource integration. Alternatives A and E provide the worst resource integration and are the least extensive in timber management.

The current allowable sale quantity is 101 million board feet per year. Alternatives B, C, PA, E,and D would raise this ceiling by 69, 39, 18, 5, and 3 percent, respectively in period 1. Alternative A would lower this ceiling 24 percent in period 1.

There are several effects on other resources that are related to timber management intensity. Opportunity for semi-primitive non-motorized recreation is reduced in Alternatives B and D as unroaded timber areas are accessed. Timber road activity also causes reductions in visual quality in Alternative B and increases the potential for impacts from surface disturbance in Alternatives B, C, PA, and D.

Wildlife habitat and species diversity are also related to timber management intensity. The current stand is unbalanced relative to age classes represented. The alternatives that bring stands to optimum growing conditions and regulation the quickest generally improve wildlife habitat. The alternatives in decreasing order of overall wildlife benefit in terms of timber management are PA, B, E, C, D, and A.

Increasing timber activity also increases the associated fire hazard from slash. Alternative B generates the most activity fuels and therefore poses the greatest fire risk. Alternative A poses the

least risk. The other alternatives have risks that are similar and intermediate to Alternatives B and A.

One of the most ecologically sound treatments for various forest pests and diseases can be achieved by application of appropriate silvicultural prescriptions. Alternative B does this best with Alternatives C, D, and PA the next best. Alternatives A and E do not adequately address this forest management problem.

Fuelwood demand is projected to be about 25,000 MBF in Period 1 and 110,000 MBF in Period 5. None of the alternatives will meet current or projected demand. Alternatives PA, B, C, D, and E all meet about 65% of current demand, and only 15% of projected demand. Alternative A will meet about 35 and 7 percent of current and projected demand, respectively.

The current supply potential for the Forest is approximately 20,000 MBF per year, which includes green pinyon-juniper, improved use of logging slash, and other dead/down materials. As demand increases, fuelwood species can be expected to rise, which will cause financial strains on people who burn wood for their sole source of heat. People living in rural communities will be the most severely impacted.

Resolution of this issue relates directly to basic management objectives. In order to improve and maximize timber production, Alternatives B and D would be best. If the objective is to reduce production and thereby, costs, Alternatives A and E would be best. Alternatives PA and C have objectives that balance production, reduce unit costs, and improve resource integration objectives. The ranking of the alternatives in descending order of issue resolution is PA, C, B, D, E, and A, respectively.

ISSUE 2 - RANGE MANAGEMENT

Table 9. Summary of Range Management Characteristics by Alternative

	Alternatives					
	PA	A	B	C	D	E
Period of Balance*	1	4	3	2	1	3
AUM Capacity in Balance Period (MAUMS)	204	177	189	151	211	193
Management Intensity**	C	E	E	C	I	C
Pinyon-Juniper Treatments (M Acres/Decade)						
New Areas Treated	4	0	9	4	4	0
Old Areas Retreated	16.9	2	16.9	16.9	16.9	16.9

* Period of balance is the decade that permitted AUMS equals capacity AUMS. Animal Unit Months displayed above are in thousands of units (MAUMS).

** I = Intensive, E = extensive, and C = combination of I and E.

In 1985 permitted AUM's are 213,000. The maximum potential grazing capacity from the Maximum Range Benchmark is approximately 248,000 AUM's by the fifth period.

The objective of all alternatives is to bring permitted use in balance with capacity, while maintaining a viable livestock industry. Strategies for balancing capacity and permitted use can be classified into three broad categories. Category one uses a strategy of increasing management intensity and investments to develop additional capacity. Category two uses a strategy of reducing permitted numbers to be in line with capacity. Category three employs a strategy that uses a combination of both the previously discussed methods. Each strategy has it's own distinct effect on other basic resources and the grazing industry.

Alternative D is the most intensive grazing management alternative with 90% of the full capacity acres at a very intensive level of management. Existing improvements would be replaced and new structural and nonstructural work would be accomplished. Delays in balancing permitted use with capacity would slow watershed and riparian area improvement. Nonstructural range improvement in pinyon-juniper would provide additional forage for livestock and wildlife and improve critical wildlife winter range habitats. No adverse impacts would occur to the range permittees because of livestock reductions.

The PA alternative is the next most intensive grazing management alternative with over 50% of the full capacity acres at a very intensive level. Existing improvements would be adequately replaced and new structural improvements would be accomplished. Balancing permitted and capacity AUM's in the first period would speed up the watershed condition and riparian area improvements. Nonstructural improvement retreatment in pinyon-juniper would maintain forage production and maintain critical wildlife winter range capabilities. Some livestock operators would receive adjustments, but overall the impact to permittees would be minimal.

Alternative C is similar to the PA alternative, except most of the full capacity acres would be under extensive forms of management. Delaying capacity and permitted AUM balancing would delay watershed and riparian area condition improvement more than Alternatives D and PA. Forage production and critical winter range habitats in old pinyon-juniper treated areas would be retreated. Impacts to permitteees would be significantly higher than the PA, because of livestock reductions.

The remaining alternatives (A, D, & E) would all employ extensive management strategies. Capacity and permitted AUM's would not be balanced until the 4th, 3rd, and 3rd periods, respectively. Watershed and riparian condition improvement would be the slowest in these alternatives. Old P-J treated areas would not all be retreated in Alternative A, and forage production and critical winter range habitat capability would decline. Impacts to permittees from livestock reductions would be the greatest in these alternatives with Alternative A being the worst, but not as bad as Alternative C.

The alternative that best resolves all aspects of this issue is the PA alternative with Alternative D the next best. The remaining alternatives in descending order of issue resolution are C, E, B, and A, respectively.

ISSUE 3 SOIL AND WATER

Table 10. Summary of Soil and Water Program Objectives by Alternative in Period 5.

	Alternatives					
	PA	A	B	C	D	E
Average Annual Soil Loss as a % of Current	72	70	73	58	72	100
Unsatisfactory Watershed Condition (M Acres)	0	5	0	0	0	0
Average Annual Water Yield as a % of Current	102	100	101	101	100	100

Soil losses decline through time in all alternatives. Alternative C results in the greatest soil loss reduction. This large reduction is directly related to the reduced emphasis on ground disturbing commodity production. Standards and Guidelines in all alternatives would employ "best management practices" to maintain water quality that is within State standards.

Estimates of improvements in unsatisfactory watershed condition can best be made by considering the timing associated with bringing capacity and permitted use in balance, and the intensity levels of range and timber management [see discussion for Issues 2 and 3]. All alternatives except A achieve the objective of watershed improvement by the fifth period. Alternatives PA and D achieve the objectives at the fastest rate. Significant improvements in watershed condition are realized in the first period in all alternatives. The improvements are the result of range management adjustments made in the decade prior to plan implementation.

There are no significant differences in water yield improvement among any of the alternatives. Alternatives PA, B, and C show 2, 1, and 1 percent increases, respectively.

The alternatives ranking in descending order of issue resolution is C, PA, D, B, E, and A, respectively.

ISSUE 4 - LANDOWNERSHIP

Alternatives A, B, C, D, and E all continue the current level of management. This results in minimal resolution of trespass cases which can have adverse effects on various resources as well as programs. In these alternatives, only those special uses with the greatest potential to affect the Forest are administered. Other special uses are not administered which can created adverse impacts and does not allow for collection of justifiable fees. Landline work will take place only to resolve high priority cases and program needs. Many landlines will not be maintained and eventually will have to be resurveyed. Trespasses would increase. The high priority to respond to local community needs requires the land adjustment program to be maintained to a high degree in all of these alternatives. However, the program will handle only a minimal caseload, therefore reducing the Forest's response time and resulting in a possible slow down of community expansion. Rights-of-way acquisitions may not occur, which could prevent some resource management activities from taking place.

The PA alternative intensifies the landownership program allowing the Forest to be more responsive and timely in making desirable land adjustments in the local community areas. Landlines are located in areas where potential for trespass exists and/or to resolve trespass cases. Existing landlines are maintained. All special uses are administered, therefore, conflicts with other resource management objectives are reduced. Special use fees are collected and justified to a higher degree than the other alternatives. Needed rights-of-ways are acquired in order to enhance attainment of other resource objectives in a cost efficient and timely manner.

Alternative PA best resolves this issue and Alternative A does the worst for resolving this issue. The remaining alternatives (B, C, D, and E) all resolve a portion of the issue and are intermediate in issue resolution to the other two alternatives.

ISSUE 5 - RECREATION MANAGEMENT

Table 11. Summary of Recreation Management Characteristics by Alternative in Period 5.

	Alternatives					
	PA	A	B	C	D	E
DEVELOPED RECREATION						
Public Outputs (MRVD's)	1,749	1,840	1,840	1,008	669	738
% RVDS at Standard Service Level	100	100	100	100	0	0
DISPERSED RECREATION						
Public Outputs (MRVD's)	1,554	1,545	1,564	1,675	1,701	1,846
% RVDS at Standard Service Level	100	61	96	93	23	0

DEVELOPED RECREATION: The developed recreation demand of 2,293 MRVD's is met in Alternatives PA, A, and B, through a combination of in service and out service development. Nearly 90% of the increased capacity of new sites constructed are in waterbased settings. The service level of management is at optimum and provides for user comfort, public safety, and resolution of law enforcement problems. Public contacts are frequent and provide a forum for more voluntary compliance with management objectives and regulations. Visitor use seasons are lengthened in selected sites, but current length of stay regulations remain the same.

New facilities are not constructed nor are old sites expanded in Alternatives D and E. The current separation between supply and demand continues to become greater with time. Closures of existing sites due to reduced site reconstruction and maintenance further adds to the inability to meet demand. The service level of management is at less than standard. User comfort, public safety, and law enforcement problems continue to persist and actually become harder to resolve as time goes on. Public contacts are inadequate to gain voluntary compliance with management objectives and regulations. Visitor use seasons are shortened for most sites, but current length of stay regulations remain the same.

DISPERSED RECREATION: There is adequate overall capacity to meet demand in all alternatives. Alternatives B and C manage over 90 percent of the RVD's at the standard level of service. Alternative PA manages 50% of the RVD's at the standard level in period 1 and increases to 100% in period 2. Users experience greater visitor satisfaction and use is dispersed over broader areas. Impacts to desirable settings such as along streams are minimized in these alternatives. Public contacts are adequate to insure voluntary compliance with management objectives and regula- tions in most areas. As the service level of management declines, the ability of the alternative to resolve the issues also decline. Visitor concentration, satisfaction, and their voluntary compliance to management objectives and regulations continue to remain an issue. Alternatives A, D, and E, in descending order, decreasingly provide less and less resolution of dispersed recreation management problems.

Alternatives PA, A, and C would show no change in ROS classes, and, therefore no change in overall recreation opportunity potential. Alternatives PA and C provide for the highest degree of protection of highly desirable settings. Alternatives B, D, and E would reduce recreation opportunity for semi-primitive non-motorized recreation, due to the higher intensity management of the timber resource and the associated road improvements.

TRAIL MANAGEMENT: All alternatives except E build new trails (50 miles the first 20 years). Highest priority is the development of the trail system in the Mogollon Rim area in coordination with the Tonto and Coconino National Forests. The primary focus is the development of the General Crook National Recreation Trail. This trail is currently being studied for inclusion in the National Historic Trail System (see the Coconino National Forest Plan). Trail loops will be developed to link the major trails systems of the adjacent Forests.

Visitor satisfaction will be optimum in this area as new trails are developed and improved maintenance of existing trails is accomplished. User conflicts will be resolved to a high degree. Trails will accommodate a broad range of accessibility to user ability and experience.

New trail routes have been identified in the Pinetop/Lakeside, Big Lake, and Black River areas. As demand increases in these areas, Alternatives PA, A, B, and C provide the mechanisms to reassess trail construction and maintenance priorities to accommodate construction of routes.

Issue resolution is best attained in the PA alternative. Alternatives B, A, and C are next best. Alternatives D and E fail to comprehensively address all aspects of this issue.

ISSUE 6 - OFF-ROAD VEHICLE USE

There are 1,460 acres specified in all alternatives with motorized snow travel restrictions in order to resolve conflicts with cross country skiing.

Under all alternatives, closures and/or restrictions could technically be implemented in response to the localized ORV conflicts that are currently recognized or anticipated. However, only Alternatives PA, A, B, and C have the funding level to enforce ORV restrictions. Alternatives B and C have funding levels of sufficient quantity to be more responsive if conflicts occurred at a higher than projected level. Alternatives PA, A, and C fully resolves while Alternatives D and E only partially resolves those conflicts associated with developed recreation sites. The roaded natural ROS class acreage increases in Alternatives B, D, and E; therefore, the chance for potential conflicts is decreased in Alternatives PA, A, and C. Over-all road densities and reduced in Alternatives PA and D which would also lessen the opportunity of conflicts. Road obliteration projects are proposed in all Alternatives except A, while PA has a much more aggressive program than the others (B, C, D, E).

Alternative PA resolves the issue in descending order, Alternatives C, D, A, B, and E fail more and more ro resolve the issue.

ISSUE 7 - WILDERNESS MANAGEMENT

The issue of allocation of National Forest System Lands to wilderness management was resolved August 28, 1984 with the passage of the Arizona Wilderness Act. The Hell's Hole Area was not designated as wilderness.

The issue between Mt. Baldy Wilderness users and the White Mountain Apache Tribe over access to the summit of Mt. Baldy cannot be resolved by the Forest Service, as the summit is on Indian land. However, the PA alternative provides for better signing of the Reservation boundary and more frequent contacts with the wilderness users. All other alternatives provide minimal signing maintenance along the boundary to warn visitors that the Baldy summit is off limits.

Improved trailhead facilities, which are provided in Alternatives PA, A, and B, would allow improved opportunities for certain handicapped and elderly individuals to at least enjoy the periphery of some wilderness areas. Opportunities for more primitive type recreation activities that handicapped and elderly individuals can't experience in wilderness areas are abundantly available in areas outside the wilderness in all alternatives.

Allowable fire management activities are the same for all alternatives. Maintenance of the wilderness character is the primary objective dictating which fire management activities are prescribed. Alternative PA provides the greatest opportunity to inform users of fire management activities.

Grazing continues in all alternatives. Range management activities that have traditionally been conducted are allowed to continue when determined necessary to maintain current range stocking levels. Construction of new structural range improvements are authorized only for the protection of the resource rather than increased range capacity.

Alternative PA provides better signing along the Reservation boundary and more frequent contacts with wilderness visitors. The other alternatives in descending order of issue resolution are A, B, C, D, and E, respectively.

ISSUE 8 - WILDLIFE

Table 12. Percent Change in trend from Existing Potential Habitat Capability for Indicator Species Expected by the Fifth Decade by Alternative.

	Alternatives					
Indicator Species	PA	A	B	C	D	E
Goshawk	+31	+17	- 4	+ 3	- 7	- 3
Pygmy Nuthatch	+93	+71	+57	+42	+25	+41
Turkey	+18	- 2	- 2	+ 1	-11	- 7
Red Squirrel	+86	+75	+57	+59	+43	+48
Spotted Owl	+74	+64	+15	+26	+19	+23
Elk	+22	+ 2	- 3	+ 4	- 3	-19
Aberts Squirrel	+91	+56	+53	+59	+31	+58
Hairy Woodpecker	+77	+64	+20	+20	+16	+21
Yellow Bellied Sapsucker	+117	+83	+75	+68	+50	+75
Plain Titmouse	+23	0	+ 4	+ 6	- 2	0
Mule Deer	+22	+ 2	- 3	+ 4	- 3	-19
Antelope	+53	+38	+53	+55	+47	0

Management indicator species are used to measure effects of management activities on habitat. A discussion of overall effects on wildlife can best be undertaken by focusing on these indicator species. A discussion of specific impacts for those species follows:

Goshawk: Alternative A would benefit this species by maintaining high quantities of mature and old growth conditions in ponderosa pine, spruce fir, and mixed conifer. Alternative PA would benefit this species the most by emphasizing old growth and mature timber age classes.

Alternatives B and C would slightly benefit this species, where in Alternatives B, D, and E habitat capability would be slightly lower.

Pygmy Nuthatch: Alternatives PA and C would significantly benefit the species by maintaining very high amounts of ponderosa pine old growth conditions. Alternative D would benefit this species least where Alternatives B, C, and E would moderately benefit the species.

Turkey: Alternatives A, B, D, and E show a decrease in habitat capability for turkey. This is due primarily to a decrease in early successional stages that produce forage. Alternative PA shows an increase in habitat capability due to high investment levels to bring additional acres in suitable habitat, and improved cover conditions in timber stands used for turkey cover. Alternative C slightly improves habitat conditions for turkey. It should be noted that habitat capability measures the capability of vegetation structure and successional stages to support wildlife populations. It does not measure factors such as disease mortality, poaching, predation, etc.

Red Squirrel - Spotted Owl: All alternatives significantly increase habitat capability for those species by increasing areas in spruce-fir and mixed conifer old growth conditions. Alternative PA provides the greatest amount.

Elk - Mule Deer: Alternative E would have a significant adverse effect on elk and mule deer habitat capability due to reduced acreage in early successional stages in the fifth decade. Alternatives A through D would generally maintain current habitat capability for elk and mule deer. As with turkey, it should be noted that all alternatives would maintain potential elk and deer over existing estimated populations. Alternative PA would have a significant positive effect on elk and deer by increasing suitable habitat acres.

Aberts Squirrel: All alternatives increase habitat capability for this species due to increased acres in the mid- and mature successional stages by the fifth decade.

Hairy Woodpecker: All alternatives increase habitat capability for this species due primarily to increased acreage of mid- and mature successional stages in aspen, mixed conifer, ponderosa pine, and riparian by the fifth decade.

Plain Titmouse: Alternatives A, D, and E would not change habitat capability for this species due to lack of change in existing age classes in pinyon-juniper. Alternatives PA would improve habitat capability for this species most by emphasizing old growth management on at least 18% of each Diversity Unit in the pinyon- juniper type. Alternatives B and C would slightly improve habitat condition for this species. All alternatives would maintain various levels of snag densities.

Antelope: Alternative E maintains existing habitat capability for this species, where all other alternatives increase habitat capability primarily due to expected improvement in range condition by the fifth decade.

Yellow Breasted Chat, Lincoln's Sparrow, Cinnamon Teal, and Lucy's Warbler: Habitat capability modeling for these species shows little or no change between alternatives. This is the result of modeling small amounts of acres and short-term changes in age class distribution. Alternatives PA, C, and D would produce the best results in improvement of riparian conditions and habitat diversity. This would significantly improve habitat for indicator species, Alternative E would result in the least amount of improvement for these species, and Alternative A would adversely affect the Cinnamon Teal due to lack of maintenance for wetlands.

Management objectives contained in Arizona's Wildlife and Fisheries Comprehensive Plan required varying levels of habitat management. Alternatives PA and C meet these objectives to a high degree. Alternatives B, D, and E meet these objectives to a moderate degree. Alternative A fails to meet the objectives adequately.

The PA alternative best resolves all aspects of the overall wildlife issue. All the other alternatives favor certain species over others, but fail to adequately address the entire issue. The alternatives in descending order of issue resolution are PA, C, A, B, D, and E.

ISSUE 9 - TRANSPORTATION

Table 13. Average Annual Road Management Program Characteristics (Period 1-5) for All Alternatives.

	Alternatives					
	PA	A	B	C	D	E
Capital Investment 1/ Arterial/Collector Local Roads (Miles)	3.4	1.2	1.1	1.1	2.7	2.8
Purchaser Credit 2/ (Miles)	102.8	45.2	112.7	78.1	83.3	84.5
Road Obliteration/ Closure 3/ (Miles)	60.4	0.0	2.9	3.8	25.8	3.0
Maintenance Level 4/	A	I	A	I	I	A

1/ - Almost entirely reconstruction activities of existing roads.
2/ - Almost entirely road reconstruction for timber sale, hunting, and recreation access.
3/ - Primarily consists of back-log close-outs of local roads that are not needed, and therefore, closed or obliterated to meet alternative road density objectives.
4/ - A = adequate to meet objectives I = inadequate.

The transportation issue relates to both road and transmission corridors. In all alternatives no new corridors are proposed. New transmission lines would be built in existing windows (See the Transportation and Corridor Map).

The varying objectives of the alternatives affect the road systems by changing the mileage of roads reconstructed/constructed, closed or obliterated, and the level of overall road maintenance.

ROAD RECONSTRUCTION/CONSTRUCTION: Timber harvest generates the most road development activity. Timber purchasers receive credits on the stumpage price for reconstructing or constructing roads needed to get to the sale areas. Generally, new construction would be limited to minor local timber access roads, which would often be closed until another stand entry is needed. Approximately 25% of the road mileage would remain open to improve hunting and other recreation access.

The critical factor is the resultant road density of each alternative. Current local road densities are approximately 2 miles per square mile of total forest area. Alternatives PA and D decrease the open road density relative to the current situation. Alternatives A, B, C, and E increase the density. It follows that Alternatives PA and D would have decreased soil erosion and disturbance to wildlife, relative to other alternatives.

ROAD OBLITERATION: Obliterating unneeded roads poses a special transportation problem. Approximately 50% of the 5,700 miles of roads listed in maintenance level 1 are not needed for management purposes and represent a road obliteration backlog.

All alternatives except A would close a part of the unneeded roads by the end of the second decade. Alternatives PA, C, and D would decrease soil loss the most, and return the most acres to a protective state. Alternative A would result in continued deterioration of these roads and continued environmental impacts.

The PA is the only alternative that promptly and adequately treats all backlog mileages. In descending order, Alternatives D, C, B, and E accomplish less and less backlog obliteration.

MAINTENANCE: Road maintenance in any particular alternative can be classified as adequate or inadequate relative to the alternative objectives. Alternatives PA, B, and C can all be considered to provide adequate road maintenance to provide for Forest user access, comfort, and safety with the PA alternative having the highest standard of maintenance. The other alternatives (A, C, and D) have much lower maintenance standards where user access, comfort and safety are inadequate to meet the need.

This issue is best resolved in Alternative PA. The other alternatives in descending order of issue resolution are D, C, B, E, and A.

ISSUE 10 - PUBLIC INFORMATION

All alternatives address the issue of public information identically. Each alternative will provide for an improvement in developing and disseminating information to the public concerning activities, resource use, publications, and law/restrictions.

The Forest will maintain a full-time public affairs program with a majority of the responsibility assigned to members of the Management Team.

Emerging issues will continue to be monitored and/or addressed. Mechanisms for maintaining the Forest Service's understanding of the dynamically changing public opinions are the strongest in the PA, B, C, and D Alternatives, and the weakest in Alternatives A and E. Complete issue resolution in any alternative may be impossible in light of the fast changing character of the Southwestern constituency.

Alternatives PA, B, C, and E all are equal in resolving this issue. Alternatives A and D resolve the issue to a lesser degree.

ISSUE 11 - UNAUTHORIZED USE

This issue relates to impairment of the public's enjoyment of the National Forest due to damage to resources and facilities, loss of personal property and concerns about personal safety and rights. All alternatives provide law enforcement emphasis that is adequate to address the basic need. The emphasis is to reduce violations and conflicts by increasing public contacts to obtain voluntary compliance of management objectives and regulations. The primary focus is on violations pertaining to off-road vehicle use, timber theft, and recreation use. All alternatives will not obtain complete resolution of this issue, but do have mechanisms that can re-evaluate specific program emphasis as new problems arise.

Alternatives PA, B, C, and D provide equal issue resolution. Alternatives A and E resolve the issues to a slightly lesser degree because of a reduced management ability.

SUMMARY

There are two questions that need to be answered in order to assess an alternative's ability to resolve issues. First, does the alternative resolve, partially resolve, or fail to resolve the concerns originally defined in this planning cycle? Second, considering all aspects of the issue, how do the alternatives rank when compared to each others ability to resolve issues?

Table 14 summarizes how the ID Team felt the alternatives addressed each issue. It's a subjective view, but gives the reader a basis for comparison. A majority of the issues are not one-sided, as public comment reflected opposing opinions. This explains why many issues received a rating of 2. For example, some of the public thought timber harvest levels were too high, while others thought levels were too low. The level of harvest in any alternative only resolves one side of the issue.

Table 14. Summary of Degree of Issue Resolution by Alternative.

ISSUE	PA	A	B	C	D	E
Timber Management	2	2	2	2	2	2
Range Management	1	3	3	2	2	3
Soil and Water	1	3	3	3	1	2
Landownership	1	2	2	2	2	2
Recreation	1	2	1	1	3	3
ORV	1	2	2	1	2	3
Wilderness Management	1	3	3	3	3	3
Wildlife	1	2	3	2	2	3
Transportation	1	3	2	1	2	2
Public Information	2	2	2	2	2	2
Unauthorized Use	2	2	2	2	2	2

1 = Resolves 2 = Partially Resolves 3 = Doesn't Resolve

The following table displays the relative ranking among the alternatives as to which of the alternatives is best in resolving issues. Some alternatives display equal rankings because their respective issue resolution is equal.

Table 15. Relative Ranking of Issue Resolution by Alternative.

ISSUE	PA	A	B	C	D	E
Timber Management	1	6	3	2	4	5
Range Management	1	6	5	3	2	4
Soil and Water	2	6	4	1	3	5
Landownership	1	3	2	2	2	2
Recreation	1	3	2	3	4	5
ORV	1	3	3	2	3	4
Wilderness Management	1	2	2	3	3	4
Wildlife	1	3	2	2	4	5
Transportation	1	5	4	3	2	4
Public Information	1	2	1	1	1	2
Unauthorized Use	1	2	1	1	1	2

1 = Highest issue resolution ranking, 6 = the worst ranking.
Alternatives that resolve the issue equally display the same ranking.

An example of the interpretation of the above tables can be discussed by evaluating the timber management issue. All alternatives only partially resolve the issue, but Alternative PA resolves more of the issue than the other alternatives. Alternative A resolves the issue the least.

Alternative Acreage Distribution

Each alternative would result in a different combination of management prescriptions and different acreages assigned to various prescriptions. Table 16 shows the acres assigned to prescriptions for timber, wildlife, range, and recreation management. The acres displayed are those assigned to that type of prescription. A description of how the prescriptions were developed and used in the FORPLAN model is found in Appendix B.

Table 16. Acreage of Management Intensity by Alternative (M/Acres)

Prescription	ALTERNATIVE Preferred PA	A	B	C	RPA D	Current E
TIMBER						
NH	1,211	1,258	1,215	1,210	1,211	1,259
TL	10	332	3	5	105	0
TN	163	42	182	124	586	0
TC	599	371	603	684	101	744
WILDLIFE						
A1	222	1,483	468	99	1,070	0
A2	25	6	0	340	138	2,003
A3	1,080	153	526	646	762	0
A4	97	204	146	153	0	0
A5	294	34	773	472	0	0
A6	286	121	90	93	36	0
RANGE						
RA	0	0	0	276	0	0
RB	709	1,635	1,302	586	70	0
RC	264	296	409	357	123	2,003
RD	986	71	230	640	737	0
RE	44	1	62	44	1,073	0
RECREATION						
GL	201	1,482	465	88	243	0
GE	0	0	5	0	560	0
GC	26	8	0	352	409	2,003
GH	214	192	62	128	31	0
GM	1,562	321	1,471	1,435	760	0

Timber Intensities:
NH = No Harvest
TL = Low Intensity - No precommercial or commercial thinning, only regeneration cuts.
TN = Moderate Level - No precommercial thinning; 2 or more intermediate cuts; regeneration cuts.
TC = Current Level - Precommercial thinning plus one or more intermediate cuts and regeneration cuts.

Wildlife Intensities:
A1 = Minimum Intensity
A2 = Low Intensity
A3 = Moderatly Low Intensity
A4 = Moderately High Intensity
A5 = High Intensity
A6 = Maximum Intensity

Range Intensities:
RA = No Grazing
RB = Low Intensity
RC = Moderate Intensity
RD = Moderate High Intensity
RE = Maximum Intensity

Recreation Intensities:
GL = Low Intensity
GE = Low Current Intensity
GC = Current Intensity
GH = High Current Intensity
GM = Maximum Intensity

Acres Available

Because alternatives result in different combinations of management prescriptions and different assignments of acreage to management prescriptions, there are differences between alternatives in total acreage available for timber harvest, livestock grazing, developed recreation sites, and minerals exploration and development. Table displays the acreage available for timber harvest, livestock grazing (full capacity acres), developed recreation and minerals exploration and development by alternative.

Table 17. Acreage Available by Alternative

Alternative	Timber Harvest	Livestock Grazing	Developed Recreation	Minerals Locatable	Minerals Leaseable
PA	773,823	1,427,000	1,665	1,887,905	1,887,905
A	740,035	1,427,000	1,665	1,891,805	1,891,805
B	810,529	1,427,000	1,665	1,891,805	1,891,805
C	788,976	1,224,000	1,094	1,761,145	1,761,745
D	787,976	1,427,000	969	1,911,989	1,911,989
E	763,376	1,427,000	969	1,911,989	1,911,989

Harvest Method Acreage

While Table 17 shows the total acreage available for timber harvest in each alternative, the method of timber harvest is often of more interest than the total acreage available. The influence on the environment often varies more between methods of harvest than between harvesting and not harvesting. Table 18 displays the acreage in each alternative devoted to various timber harvesting methods in period 1.

Table 18. Acres of Timber Harvest Methods in Period 1.

Alternatives	Intermediate Tractor	Shelterwood Tractor	Shelterwood Cable	Clear Cut Tractor	Clear Cut Cable	Selection Tractor
PA	59,535	143,969	2,000	3,637	500	37
A	0	26,370	0	29,969	0	37
B	24,082	190,966	0	0	0	37
C	0	50,203	0	57,883	0	37
D	40,270	127,738	0	0	0	0
E	39,849	70,216	0	0	0	0

Shelterwood cuts include the entire set of regeneration and release cuts made under the shelterwood system. That is, they include preparatory, seed and removal cuts.

Only shelterwood or clear cuts are planned for steep slopes (cable). Alternatives B, C, and D, as well as the preferred alternative, include cable logging, but it does not occur in the first period, except in the Preferred Alternative.

In the FORPLAN model, removals of residual overstory from seedling-sapling or poletimber stands in the first period, are displayed as intermediate cuts. These acres have been adjusted so they are included as removal cuts in the shelterwood system.

In the preferred alternative, sufficient acres are scheduled for cable harvest in the first period to maintain a minimum level program.

Wild and Scenic River System

Alternative C maximizes the allocation of miles proposed for Wild and Scenic River Classification by including Leonard Canyon/Clear Creek/Willow Creek, Black River (East and West Forks), and Chevelon Creek. Alternative PA omits Leonard Canyon/Clear Creek as it requires coordination with the Coconino National Forest. The Coconino did not recommend inclusion of the Leonard Canyon/Clear Creek/Willow Creek segment into the National Wild and Scenic River System. PA also excluded Chevelon Creek and the Forks of the Black River as they were not thought to possess outstandingly unique or remarkable characteristics.

The classification as scenic or recreation was determined by separate study in 1981 based on procedures outlined in the February 1970 publication from the Department of Interior and USDA Forest Service titled, "Guidelines for Evaluating Wild, Scenic, and Recreation River Areas Proposed for Inclusion in the National Wild and Scenic Rivers System (Sec. 2, PL 90-542)".

Table 19. Wild and Scenic River Recommendations

Alternatives	Miles Wild	Miles Scenic	Miles Recreation
PA	0	16.0	
A	0	0.0	0
B	0	0.0	0
C	0	93.4	44
D	0	0.0	0
E	0	0.0	0

Resource Outputs

Table 20 displays the alternative and benchmark outputs for all five of the ten year time periods. The benchmarks are included so the alternatives can be viewed in perspective with the minimum level and maximum single resource outputs. The benchmarks do not contain all the constraints that were applied to the alternatives to make them financially and legally feasible. The units of measure are indicated for each output.

Most of the resource outputs shown in Table 20 represent the outputs which have dollar benefit values and are used in the calculation of PNV in the FORPLAN model. Four of the output categories shown do not have dollar benefit values. These are trail construction/ reconstruction miles, grazing capacity, net merchantable timber volume, and unsatisfactory watershed condition.

Table 20. Resource Outputs by Alternatives and Selected Benchmarks

		ALTERNATIVE						BENCHMARK			
Output/Activity		PA	A	B	C	D	E	Min Level	Max PNV Assigned	Max Timber	Max Range
RECREATION		Thousand recreation visitor days per year (MRVD)									
Developed											
Period	1	1,035	1,035	1,035	822	760	773	0	1,035	1,035	1,035
	2	1,365	1,365	1,365	1,052	872	893	0	1,365	1,365	1,365
	3	1,686	1,687	1,687	1,233	1,027	1,060	0	1,687	1,687	1,687
	4	1,988	1,988	1,988	1,357	1,084	1,132	0	1,988	1,988	1,988
	5	2,293	2,293	2,293	1,467	1,122	1,191	0	2,293	2,293	2,293
Dispersed		Thousand recreation visitor days per year (MRVD)									
Period	1	714	840	736	753	891	863	90	757	786	823
	2	915	1,127	947	978	1,200	1,202	90	982	997	1,069
	3	1,132	1,267	1,162	1,221	1,540	1,517	90	1,228	1,249	1,386
	4	1,333	1,403	1,362	1,455	1,647	1,846	90	1,468	1,497	1,543
	5	1,553	1,544	1,564	1,675	1,701	1,846	90	1,708	1,740	1,675
Highway Use		Thousand recreation visitor days per year (MRVD)									
Period	1	203									
	2	243									
	3	304	ALL ALTERNATIVES AND BENCHMARKS ARE THE SAME.								
	4	344									
	5	385									
WILDERNESS RECREATION		Thousand recreation visitor days per year (MRVD)									
Period	1	19	35	35	35	35	35	0	35	35	35
	2	23	44	44	44	44	44	0	44	44	44
	3	26	55	55	55	55	55	0	55	55	55
	4	29	67	67	67	67	67	0	67	67	67
	5	32	75	75	75	75	75	0	75	75	75

Table 20. Resource Outputs by Alternatives and Selected Benchmarks (Continued)

Output/Activity		ALTERNATIVE PA	A	B	C	D	E	BENCHMARK Min Level	Max PNV Assigned	Max Timber	Max Range
TRAIL CONSTRUCTION/ RECONSTRUCTION		Miles of Trail Constructed or Reconstructed per Year (Mile)									
Period	1	10	13	38	40	20	0	0	44	43	34
	2	17	11	33	34	16	0	0	38	37	30
	3	19	11	33	34	16	0	0	38	37	30
	4	17	11	33	34	16	0	0	38	37	30
	5	17	11	33	34	16	0	0	36	37	30
WILDLIFE AND FISH MGMT. ALL MWFUD's		Wildlife fish user days (MWFUD)									
Period	1	1,048	951	971	995	943	953	754	987	993	947
	2	1,059	935	953	977	913	915	696	976	977	930
	3	1,070	919	934	959	883	884	638	964	961	913
	4	1,080	903	916	941	853	851	580	952	945	897
	5	1,091	888	897	928	820	821	520	940	928	880
RANGE MGMT.		Thousand animal unit month per year (MAUM)									
Permitted Use											
Period	1	204	219	220	168	211	221	0	219	219	224
	2	200	202	205	151	217	206	0	202	202	217
	3	200	191	189	151	225	193	0	198	198	225
	4	200	177	182	150	241	192	0	191	191	241
	5	200	174	179	150	249	191	0	190	190	248
Grazing Capacity		Thousand animal unit month per year (MAUM)									
Period	1	204	202	203	156	211	204	N/A	204	204	211
	2	200	191	193	151	217	196	N/A	195	195	217
	3	200	186	189	151	225	193	N/A	195	195	225
	4	200	177	182	150	241	192	N/A	191	191	241
	5	200	174	179	150	248	191	N/A	190	190	248
TIMBER MGMT.											
Net Sawtimber		MBF per Year									
Period	1	99,000	76,594	168,854	139,753	101,619	90,000	0	178,400	173,483	153,000
	2	133,063	70,932	166,785	134,470	115,213	125,885	0	170,164	172,885	153,000
	3	154,041	70,852	163,021	135,394	121,905	147,866	0	169,859	172,383	153,000
	4	145,884	70,000	126,039	116,160	102,631	116,176	0	150,744	149,728	151,712
	5	139,928	70,000	144,477	106,995	129,570	122,199	0	125,382	155,088	112,842
Net Products		MBF/YEAR									
Period	1	20,376	50	1,715	191	2,381	16,000	0	1,331	12,783	15,200
	2	5,284	2,621	2,543	2,470	4,787	4,122	0	4,513	5,951	8,000
	3	15,000	2,430	4,906	3,410	19,095	4,243	0	10,250	8,687	19,285
	4	25,000	6,733	48,768	24,350	48,035	41,974	0	28,299	37,621	25,000
	5	25,000	2,281	24,159	31,881	11,430	34,833	0	51,290	21,024	25,000

Table 20. Resource Outputs by Alternatives and Selected Benchmarks (Continued)

Output/Activity		ALTERNATIVE PA	A	B	C	D	E	BENCHMARK Min Level	Max PNV Assigned	Max Timber	Max Range
Fuelwood PJ		MBF per year									
Period	1	4,570	0	0	4,570	4,570	3,625	0	4,570	4,570	3,110
	2	4,570	0	0	4,570	4,570	3,625	0	4,570	4,570	4,839
	3	4,570	0	0	4,570	4,570	3,625	0	4,570	4,570	5,976
	4	4,570	0	0	4,570	4,570	3,625	0	4,570	4,570	5,976
	5	4,570	0	0	4,570	4,570	3,625	0	4,570	4,570	5,976
Fuelwood Timber By-products		MBF per year									
Period	1	11,138	8,617	17,424	13,103	11,432	10,125	0	17,450	16,621	17,212
	2	14,970	7,980	18,763	15,128	12,962	14,162	0	19,144	19,450	17,212
	3	17,330	7,980	16,156	15,232	13,714	16,635	0	19,109	18,897	16,774
	4	15,846	7,875	13,644	12,502	11,546	13,070	0	15,980	14,677	9,637
	5	10,919	7,875	15,372	9,410	14,454	13,747	0	11,902	16,143	12,695
Net Merch. Timber Vol.		(ASQ 1/)		MCF per year							
Period	1	23,031	14,614	32,802	26,704	20,602	20,047	0	34,502	35,705	32,892
	2	27,638	14,614	32,802	26,704	24,136	24,057	0	34,502	35,705	32,524
	3	32,645	14,614	32,802	26,704	28,207	28,868	0	34,502	35,705	33,325
	4	32,645	14,614	32,802	26,704	28,207	29,895	0	34,502	35,705	34,430
	5	32,645	14,614	32,802	26,704	28,918	29,855	0	34,502	35,705	27,544
LRSY		(MCF per Year)									
		36,813	34,503	38,959	37,385	36,543	36,707	0	39,396	39,521	36,267
SOIL AND WATER MGMT.											
Unsatisfactory Watershed Condition		Thousand acres (M ACRES)									
Period	1	410	543	536	469	458	514	346	495	495	459
	2	205	402	389	253	210	345	0	306	306	234
	3	4	261	242	38	4	157	0	116	118	9
	4	0	126	100	0	0	6	0	50	54	0
	5	0	5	0	0	0	0	0	5	5	0
Water Yield		Thousand acre feet per year (M ACRE FEET)									
Period	1	379	379	379	379	379	379	357	379	379	379
	2	384	376	381	380	379	377	357	386	384	387
	3	387	378	383	385	383	377	357	389	389	380
	4	382	376	379	377	376	372	357	380	382	365
	5	381	375	376	375	366	373	357	379	379	386
50 Year Average		383	377	380	379	377	376	357	383	383	385

1/ - ASQ = Allowable Sale Quantity.

Costs

Table 21 displays the costs of implementing the alternatives and benchmarks for all five of the ten year time periods. They are expressed as average annual figures in thousands of dollars. The benchmarks were included so the alternatives can be viewed in perspective. The benchmarks do not contain all the constraints that were applied to the alternatives to make them financially and legally feasible.

The cost breakdown used in Table 21 is intended to show the difference among alternatives in terms of operations and maintenance dollars and investment. A more detailed cost breakdown by resource area is shown in Table 22 which follows.

Table 21. Average Annual Cost by Alternatives and Selected Benchmarks—M Dollars per Year.

		ALTERNATIVE							BENCHMARK		
Output/Activity		PA	A	B	C	D	E	Min.	Max PNV Assigned	Max Timber	Max Range
O&M EXCEPT ROADS											
Period	1	9,266	8,074	10,214	10,239	8,375	8,730	760	12,283	11,743	13,776
	2	11,638	8,045	11,826	9,985	10,138	10,275	760	11,320	11,782	15,605
	3	11,865	8,072	10,588	9,341	9,679	9,981	760	10,733	10,827	14,398
	4	11,416	8,207	10,363	9,501	9,619	10,278	760	11,102	11,343	16,645
	5	12,154	8,207	11,964	9,939	9,957	11,438	760	11,357	11,598	15,090
O&M ROADS											
Period	1	618	464	624	672	663	678	573	653	649	679
	2	655	464	624	672	663	678	573	653	649	679
	3	655	464	624	672	663	678	573	653	649	679
	4	655	464	624	672	663	678	573	653	649	679
	5	655	464	624	672	663	678	573	653	649	679
CAPITAL INVESTMENT EXCEPT ROADS											
Period	1	1,502	781	1,024	870	1,213	386	0	1,101	1,121	1,224
	2	2,225	580	753	659	1,210	336	0	831	851	1,041
	3	2,198	658	807	625	478	384	0	855	859	941
	4	2,438	647	796	622	478	384	0	844	849	830
	5	1,709	647	796	622	478	384	0	844	849	930
CAPITAL INVESTMENT ROADS											
Period	1	110.5	42	38	37	92	96	0	88	87	96
	2	113	44	40	39	97	101	0	93	91	101
	3	113	44	40	39	97	101	0	93	91	101
	4	113	44	40	39	97	101	0	93	91	101
	5	113	44	40	39	97	101	0	93	91	101

Table 21. Average Annual Cost by Alternatives and Selected Benchmarks--M Dollars per Year. [Continued]

Output/Activity		ALTERNATIVE PA	A	B	C	D	E	Min.	BENCHMARK Max PNV Assigned	Max Timber	Max Range
CONSTRAINED F.S. BUDGET COSTS											
Period	1	11,436	9,345	11,941	11,876	10,342	9,890	1,333	14,125	13,600	15,775
	2	14,571	9,116	13,286	11,415	12,102	11,440	1,333	12,897	13,373	17,426
	3	14,571	9,221	12,102	10,737	10,851	11,144	1,333	12,334	12,426	16,619
	4	14,562	9,345	11,866	10,894	10,851	11,441	1,333	12,692	12,932	18,355
	5	14,571	9,345	13,467	11,332	11,189	12,601	1,333	12,947	13,187	16,800
PURCHASER ROAD CREDIT											
Period	1	2,180	768	2,744	1,432	1,977	1,480	0	2,441	2,475	3,129
	2	2,524	1,288	3,002	2,317	2,096	2,121	0	2,914	3,058	3,038
	3	2,037	1,128	1,954	1,868	1,724	1,909	0	2,596	2,371	2,059
	4	1,756	926	1,799	1,521	1,105	2,012	0	1,904	2,198	1,728
	5	1,991	1,127	2,038	1,343	2,034	1,405	0	2,390	2,935	2,570
FIREFIGHTING FUND											
Period	1	1,357	1,357	1,357	1,357	1,357	927	2,026	1,357	1,357	1,357
	2	1,357	1,357	1,357	1,357	1,357	927	2,026	1,357	1,357	1,357
	3	1,357	1,357	1,357	1,357	1,357	927	2,026	1,357	1,357	1,357
	4	1,357	1,357	1,357	1,357	1,357	927	2,026	1,357	1,357	1,357
	5	1,357	1,357	1,357	1,357	1,357	927	2,026	1,357	1,357	1,357
TOTAL F.S. COSTS											
Period	1	14,973	11,470	16,042	14,664	13,676	12,297	3,359	17,923	17,432	20,261
	2	18,452	11,761	17,645	15,089	15,555	14,488	3,359	17,168	17,788	21,821
	3	17,965	11,706	15,413	13,962	13,932	13,980	3,359	16,287	16,154	20,035
	4	17,675	11,628	15,022	13,772	13,313	14,350	3,359	15,953	16,487	21,441
	5	17,919	11,829	16,862	14,032	14,580	14,933	3,359	16,694	17,479	20,727
NON F.S. COSTS											
Period	1	99	98	98	76	103	96	0	99	99	103
	2	167	165	165	127	163	160	0	168	168	164
	3	167	166	164	127	147	160	0	167	168	144
	4	377	166	164	127	147	160	0	167	168	144
	5	1,882	166	164	127	147	160	0	167	168	144
TOTAL COSTS											
Period	1	15,072	11,568	16,140	14,740	13,779	12,393	3,359	18,022	17,531	20,364
	2	18,619	11,926	17,810	15,216	15,718	14,328	3,359	17,336	17,956	21,985
	3	18,132	11,872	15,577	14,089	14,079	14,140	3,359	16,454	16,322	20,179
	4	18,052	11,794	15,186	13,899	13,460	14,510	3,359	16,120	16,655	21,585
	5	19,801	11,995	17,026	14,159	14,727	15,093	3,359	16,681	17,647	20,871

NOTE: The first five sets of costs cover Forest Service budget costs which were included in the budget constraint. Total Costs include the first five costs and the following costs: Fire Fighting Funds; grazing permittees' investment dollars; and timber purchaser credit for logging roads and additional costs for cable logging. PNV is based on total costs.

Total budgets to implement the alternatives vary due to the budget constraints used in all alternatives. Alternative A has the lowest budget as it was constrained to stay below the current funding level. Operation and maintenance for roads are tied closely to the level of timber harvest. Capital investment costs are highest in the PA, to provide a high level of developed recreation facilities and wildlife improvements. Purchaser road construction is directly tied to timber harvest levels.

Each of the Alternatives may be compared to Alternative E (the current direction alternative) to see relative differences among all alternatives. Compared to current direction, the two most significant differences which are apparent in the alternatives are the dollars spent for "capital investments, except roads" and dollars for "firefighting funds". All alternatives incorporate much higher costs, over current for these two areas. This indicates that the current funding for those areas is seriously deficient.

Additional detail for costs by alternative and selected benchmarks is displayed in Table 22.

The cost breakdowns shown in Table 22 reflect costs for each resource area. The purpose of this table is to show the relative differences among alternatives. It should be noted that these costs do not fully reflect the true production cost for an individual resource. In other words, the joint costs of production are not fully accounted for using these kinds of cost breakdowns. For example, the cost shown for the "sawtimber" category does not reflect the fact that some of the dollars spent actually contribute to the production of other outputs such as grazing, increased water yield, improved wildlife habitat which results in higher WFUD levels, or improved access which may result in increased dispersed RVD's. Almost all of the cost categories shown involve some degree of joint costs such as in the timber example above. Because of this, some caution should be exercised in the interpretation of these costs. To be strictly correct, each alternative must be evaluated based upon the total cost of the alternative, rather than any single cost category.

These cost breakdowns do serve the purpose of more fully explaining the relative differences among alternatives. For example, the cost category for "developed recreation" clearly shows that the Proposed Action alternative emphasizes recreation far more than the Current Direction management. Another clear example of differences among alternatives is shown in the "wildlife" cost category.

Table 22. Resource Costs by Alternative and Benchmark - M Dollars Per Year.

	ALTERNATIVE							BENCHMARK		
Activity	PA	(A)	(B)	(C)	(D)	(E)	Min.	Max. PNV	Max Timber	Max Range
DEV. RECREATION										
Period 1	808	1,092	1,092	765	396	406	0	1,092	1,092	1,092
2	1,383	1,148	1,148	793	438	457	0	1,148	1,148	1,148
3	1,689	1,440	1,140	900	519	546	0	1,440	1,440	1,440
4	1,750	1,609	1,609	947	495	529	0	1,609	1,609	1,609
5	1,769	1,793	1,793	981	477	524	0	1,793	1,793	1,793
DISP. RECREATION										
Period 1	374	607	544	551	321	162	0	587	435	465
2	928	329	497	512	290	178	0	541	523	413
3	738	444	574	598	451	336	0	623	627	537
4	731	498	575	688	484	408	0	721	724	595
5	832	556	737	777	505	408	0	818	822	649
WILDERNESS										
Period 1	12	7	7	7	7	7	0	7	7	7
2	111	9	9	9	9	9	0	9	9	9
3	47	12	12	12	12	12	0	12	12	12
4	50	15	15	15	15	15	0	15	15	15
5	54	17	17	17	17	17	0	17	17	17
WILDLIFE										
Period 1	900	76	128	140	62	97	0	146	160	103
2	736	74	128	134	62	97	0	139	154	96
3	688	70	125	122	59	97	0	127	139	84
4	664	69	125	122	59	97	0	126	137	84
5	664	69	125	122	59	97	0	126	137	84
RANGE										
Period 1	592	514	534	467	729	581	53	569	567	725
2	860	533	564	523	915	644	53	636	634	947
3	695	523	556	520	917	644	53	630	627	960
4	695	522	555	520	917	644	53	630	627	960
5	695	522	555	520	916	644	53	630	627	960

Table 22. Resource Costs by Alternative and Benchmark - M Dollars Per Year.

Activity	ALTERNATIVE PA	[A]	[B]	[C]	[D]	[E]	Min.	BENCHMARK Max. PNV	Max Timber	Max Range
SAWTIMBER										
Period 1	5,816	3,580	7,567	6,478	4,934	4,240	0	9,255	8,558	8,845
2	7,259	3,797	9,162	6,861	6,310	6,297	0	8,424	9,000	8,241
3	6,581	3,343	6,540	5,547	4,921	5,796	0	7,112	6,943	6,441
4	6,693	2,969	5,165	4,873	3,841	5,476	0	6,228	6,535	6,591
5	8,508	3,001	7,148	4,732	5,712	6,383	0	6,298	7,519	5,629
PRODUCTS										
Period 1	345	1	29	3	40	271	0	23	217	254
2	90	44	43	42	81	7	0	75	101	136
3	254	41	83	58	324	72	0	174	147	327
4	424	114	826	413	214	711	0	479	637	424
5	424	37	409	540	194	590	0	869	356	424
FUELWOOD										
Period 1	67	27	55	74	68	58	0	87	85	76
2	171	25	60	80	73	70	0	93	94	89
3	87	25	51	80	76	78	0	93	92	95
4	82	25	43	72	69	67	0	83	74	72
5	67	25	49	62	78	69	0	70	83	82
SOIL AND WATER										
Period 1	240	145	156	165	1,152	199	0	190	207	2,709
2	754	145	160	167	1,466	199	0	200	222	4,516
3	847	145	153	154	736	199	0	168	178	4,186
4	703	145	153	154	702	199	0	167	175	5,140
5	625	145	153	154	702	199	0	166	175	5,139
FIRE PROTECTION										
Period 1	3,319	3,504	3,504	3,504	3,739	3,608	2,026	3,504	3,504	3,504
2	3,504	3,504	3,504	3,504	3,739	3,608	2,026	3,504	3,504	3,504
3	4,207	3,504	3,504	3,504	3,739	3,608	2,026	3,504	3,504	3,504
4	4,051	3,504	3,504	3,504	3,739	3,608	2,026	3,504	3,504	3,504
5	3,965	3,504	3,504	3,504	3,739	3,608	2,026	3,504	3,504	3,504
GEN. PURPOSE/FAO										
Period 1	898	578	788	842	817	836	680	818	807	838
2	956	579	792	845	817	836	680	821	808	838
3	965	578	784	839	817	836	680	815	805	837
4	958	578	784	839	817	836	680	815	805	837
5	955	578	784	839	817	836	680	815	805	837
ALL OTHER										
Period 1	1,661	937	1,734	1,748	1,514	1,926	600	1,744	1,892	1,746
2	1,867	1,239	1,743	1,746	1,518	1,926	600	1,746	1,759	2,026
3	1,334	1,247	2,055	1,755	1,505	1,916	600	1,756	1,808	1,750
4	1,251	1,246	1,832	1,752	2,108	1,920	600	1,743	1,807	1,754
5	1,243	1,248	1,752	1,911	1,509	1,718	600	1,575	1,809	1,753

Table 22. Resource Costs by Alternative and Benchmark - M Dollars Per Year. (Continued)

Activity	PA	(A)	(B)	(C)	(D)	(E)	Min.	Max. PNV	Max Timber	Max Range
	ALTERNATIVE							BENCHMARK		
TOTAL										
Period 1	15,072	11,568	16,140	14,740	13,779	12,393	3,359	18,022	17,531	20,364
2	18,619	11,926	17,810	15,216	15,718	14,328	3,359	17,336	17,956	21,985
3	18,132	11,872	15,577	14,089	14,079	14,140	3,359	16,454	16,322	20,179
4	18,052	11,794	15,186	13,899	13,460	14,510	3,359	16,120	16,655	21,585
5	19,801	11,995	17,026	14,159	14,727	15,093	3,359	16,681	17,647	20,871

Benefits

Table 23 shows the average annual resource benefits for the resources having benefit values for the alternatives and benchmarks. The purpose of this table is to show the differences among alternatives. The values displayed are undiscounted benefits for each of the first five ten-year time periods. This data is useful to evaluate trends over time in resource production and value. This table also contains data on receipts to the U.S. Government, the distribution of revenues to the states, and employment and income generated by each alternative. The values and procedures used for these calculations are shown in Appendix B.

The benchmarks are included so the alternative can be viewed in perspective. The benchmarks do not contain all the constraints that were applied to the alternatives to make them financially and legally feasible.

Table 23. Resource Benefits by Alternatives and Benchmarks - M Dollars Per Year.

Output/Activity	PA	A	B	C	D	E	Min.	Max PNV Assigned	Max Timber	Max Range
	ALTERNATIVE							BENCHMARK		
DEVELOPED REC.										
Period 1	9,834	9,880	9,880	7,852	6,146	6,346	0	9,880	9,880	9,880
2	13,026	13,028	13,028	10,044	7,170	7,426	0	13,028	13,028	13,028
3	16,101	16,101	16,101	11,767	8,024	8,326	0	16,101	16,101	16,101
4	18,986	18,986	18,986	12,963	7,743	8,032	0	18,986	18,986	18,986
5	21,898	21,898	21,898	18,112	7,920	8,289	0	21,898	21,898	21,898
DISPERSED REC.										
Period 1	6,966	7,945	8,754	8,389	7,055	6,022	511	9,129	2,122	7,970
2	11,131	10,412	11,159	11,409	9,292	8,172	511	11,728	11,730	10,336
3	13,789	12,223	13,792	14,248	11,834	10,291	511	14,665	14,712	13,044
4	16,163	13,897	16,156	16,867	12,927	12,383	511	17,415	17,514	14,813
5	18,741	15,634	18,550	19,445	13,731	12,606	511	20,218	20,333	16,460

Table 23. Resource Benefits by Alternatives and Benchmarks - M Dollars Per Year. (Continued)

Output/Activity		ALTERNATIVE PA	A	B	C	D	E	Min.	BENCHMARK Max PNV Assigned	Max Timber	Max Range
WILDERNESS REC.											
Period	1	260	259	259	259	259	258	0	258	258	258
	2	315	323	323	323	323	323	0	323	323	323
	3	356	404	404	404	404	404	0	404	404	404
	4	397	485	485	485	485	485	0	485	485	485
	5	438	550	550	550	550	550	0	550	550	550
WILDLIFE											
Period	1	18,043	16,317	16,738	17,142	16,293	16,427	13,216	17,029	17,137	16,307
	2	18,172	16,008	16,394	16,781	15,714	15,796	11,968	16,770	16,797	15,969
	3	18,298	15,699	16,020	16,420	15,135	15,165	10,920	16,511	16,457	15,671
	4	18,424	15,390	15,646	16,059	14,556	14,534	9,872	16,252	16,117	15,353
	5	18,551	15,080	15,269	15,696	13,976	13,902	8,821	15,993	15,776	15,033
TIMBER											
Period	1	11,810	10,392	22,285	18,937	12,283	11,702	0	23,714	22,550	18,355
	2	15,358	3,290	21,483	16,886	12,852	17,136	0	20,536	20,024	16,810
	3	19,408	8,294	21,414	17,818	12,999	20,122	0	22,290	20,888	18,867
	4	18,432	9,194	15,719	14,737	12,469	14,214	0	18,392	18,472	17,950
	5	15,560	7,835	17,204	12,459	13,290	15,004	0	12,848	16,071	11,704
WATER YIELD											
Period	1	18,597	18,411	18,405	18,405	18,405	18,599	15,539	18,405	18,405	18,404
	2	18,838	18,258	18,525	18,459	18,398	18,501	15,539	18,757	18,630	18,800
	3	18,987	18,360	18,599	18,676	18,595	18,494	15,539	18,907	18,906	18,360
	4	18,738	18,280	18,390	18,305	18,377	18,236	15,539	18,447	18,562	18,706
	5	18,675	18,212	18,242	18,221	18,327	18,316	15,539	18,422	18,384	18,768
GRAZING											
Period	1	1,673	1,658	1,664	1,279	1,743	1,674	0	1,368	1,668	1,726
	2	1,627	1,561	1,583	1,235	1,811	1,603	0	1,601	1,601	1,774
	3	1,637	1,522	1,547	1,239	1,856	1,582	0	1,594	1,594	1,843
	4	1,634	1,454	1,493	1,230	1,992	1,570	0	1,566	1,565	1,971
	5	1,638	1,428	1,469	1,232	2,035	1,568	0	1,557	1,555	2,028
TOTAL BENEFITS											
Period	1	67,236	64,862	78,015	72,763	62,184	61,025	29,036	80,083	72,020	72,900
	2	78,467	67,880	82,495	75,237	65,560	68,957	28,018	82,743	82,133	77,060
	3	88,576	72,603	87,877	80,572	58,847	74,384	26,970	90,472	89,062	84,790
	4	92,774	77,686	86,875	80,646	68,549	69,454	25,922	91,543	91,701	88,264
	5	95,501	80,637	93,182	85,715	69,829	70,235	24,871	91,481	94,567	86,441
RECEIPTS TO U.S. GOVT. M Dollars Per Year											
Period	1	12,406	11,008	22,895	19,377	12,854	12,262		24,323		
	5	16,258	8,891	17,930	12,963	13,922	15,536		13,597		

Table 23. Resource Benefits by Alternatives and Benchmarks - M Dollars Per Year. (Continued)

Output/Activity	ALTERNATIVE PA	A	B	C	D	E	Min.	BENCHMARK Max PNV Assigned	Max Timber	Max Range
DISTRIBUTION TO STATES M Dollars Per Year										
Period 1	3,101	2,752	5,724	4,844	3,214	3,066		6,081		
5	4,064	2,223	4,482	3,241	3,480	3,884		3,399		
EMPLOYMENT	Number of jobs at the end of Period 1 1/							N.F.Base		Total
Period 1	+922	-6	+870	+462	+101	0		3,306		28,655
INCOME	Millions of Dollars (In 1982 4th Quarter Dollars)									
Period 1	+13.3	-1.4	+16.0	+8.7	+1.7	0		52.4		595.2

1/ Employment and income are shown as the change from the existing situation. The existing employment and income are shown under the total column.

Generally, the benefits shown in Table 23 exhibit the same general trends as the resource outputs shown in Table 20. There are several important exceptions, however. First, the RVD outputs shown earlier in Table 20 do not distinguish between "Standard" RVD's and "Less Than Standard" RVD's. Since a "Standard" RVD has a considerably higher dollar benefit value than does a "Less Than Standard" RVD, and the mix of "Standard" and "Less Than Standard" varies a great deal by alternative, the relationship between outputs and total benefit value may vary for different alternatives. Second, the benefit totals for wildlife use are based upon the mix of WFUD's for four different kinds of wildlife use (big game hunting, small game hunting, non-game use, and fishing). Because this mix is different for each alternative, the relationship between outputs in Table 29 and the benefits in this table may be different for each alternative. Finally, the timber benefit total also represents a mix of different sizes and kinds of products. For example, sawtimber taken from the smaller diameter size classes has a significantly lower benefit value than does the larger diameter material. In addition to this difference, the mix of sawtimber products and fuelwood is also different for each alternative. The benefit values and procedures used are shown in Appendix B.

The range benefits are based on permitted livestock use, however, use in excess of capacity is not valued. The timber benefits increase most in the alternatives that emphasize timber management; Alternatives B, C, and PA. Range benefits increase most in Alternative D, which provides the highest level of management for increasing grazing capacity. The amenity emphasis alternatives show less timber benefits, but increased recreation and wildlife benefits which cause the total benefits for these alternatives to be greater than the other alternatives. Water yield benefits are similar for all alternatives since no alternative produces significantly different water yields.

Receipts to the U.S. Government are generated from market goods and are, therefore, greatest in the commodity emphasis alternatives. Distribution to States represents 25% of the total returns to the government. Values and procedures used are shown in Appendix B.

The local employment and income in 1977 for Apache, Navajo, and Greenlee counties, the three counties most affected by Forest activities, are shown under the total in the far right column. The employment and income shown under the National Forest Base are estimates of the number of jobs and income attributable to 1982 activities in the Apache-Sitgreaves National Forests.

The jobs and income represent the direct, indirect, and induced effects in the private and public sectors. The alternatives show projections for changes in employment and income for the end of the first period as a result of changes in Forest activities. Total benefits and the mix of resource benefits vary between alternatives because of different management objectives to address issues.

Present Net Value Analysis

Present net value (PNV) is the criterion used to maximize net priced benefits in planning benchmarks and alternatives. The priced outputs are those that are or can be exchanged in the market place or are based on data used to estimate possible visitor days (wildlife, wilderness, developed, and dispersed recreation use), permitted livestock use, timber products, firewood, and water yield.

The alternatives are designed and analyzed to achieve goals and objectives for priced outputs in a manner that achieves the greatest excess in the value of price outputs in relation to cost of production while meeting all specified constraints and objectives. The alternatives are also designed to achieve any specified non-priced outputs or benefits and to meet constraints at least cost. PNV estimates the market value of resources after all costs of producing outputs and meeting constraints have been subtracted from the value of the expected flow of priced outputs.

Table 24 presents and compares discounted costs, discounted priced benefits, and the present net value of the alternatives, arranged in order of decreasing PNV. The PVC for major cost categories and the PVB for each output is also displayed. The intent is to display what happens to costs and benefits as PNV decreases from one alternative to the next. It is important to note the alternatives were not developed in order of decreasing PNV but are displayed in this fashion to provide a comparative analysis.

Table 24. Value analysis (millions of 1982 4th Quarter dollars discounted at 4%.)

	Max. PNV Assigned	B	PA	C	A	E	D
PVC	439.4	411.9	455.2	371.8	312.3	348.4	367.4
Change Between Alt.		-27.5	+43.3	-83.4	-59.5	+36.1	+19.0
PVB	2188.5	2136.0	2066.4	1966.3	1836.2	1712.3	1679.9
Change Between Alt.		-52.5	-69.6	-100.1	-130.1	-123.9	-32.4
PNV	1749.1	1724.1	1611.2	1594.5	1523.9	1363.9	1312.5
Change Between Alt.		-25.0	-112.9	-16.7	-70.6	-160.0	-51.4
Benefit/Cost	4.98	5.19	4.54	5.29	5.88	4.91	4.57
PVC BY MAJOR COST CATEGORY							
Dev. Recreation	34.3	33.1	34.4	21.6	34.3	12.0	11.4
Disp. Recreation	16.3	14.7	17.2	15.4	12.7	6.8	9.8
Wilderness	0.3	0.3	1.3	0.3	0.3	0.3	0.3
Wildlife	3.4	3.2	19.2	3.3	1.8	2.5	1.5
Range	15.5	13.9	17.7	12.7	13.2	15.8	21.7
Sawtimber/Products	209.1	188.5	179.2	158.8	98.2	143.2	135.4
Fuelwood	2.2	1.3	2.4	1.9	0.7	1.7	1.8
Soil/Water	4.6	4.0	14.4	4.1	3.7	5.0	25.8
Fire Protection	88.7	88.7	93.6	88.7	88.7	91.4	94.7
Gen. Purpose Rds/Fac.	20.7	19.9	27.8	20.7	14.6	21.2	20.7
All Other Costs	44.3	44.3	48.0	44.3	44.1	48.5	44.3
PVB BY OUTPUT CATEGORY							
Dev. Recreation	377.4	377.4	377.4	270.8	377.4	188.6	181.7
Disp. Recreation	345.8	324.3	310.4	335.0	286.5	231.3	259.1
Wilderness	9.6	9.6	8.5	9.6	9.6	9.6	9.6
Wildlife	420.4	409.0	462.3	419.0	400.3	389.7	388.4
Range	40.7	39.8	41.7	31.6	39.2	40.8	47.1
Sawtimber/Products	520.2	506.0	388.0	430.5	257.6	381.3	324.2
Fuelwood	4.3	3.3	3.6	3.6	1.8	3.3	3.5
Water	470.1	406.6	474.5	466.2	463.8	467.7	466.3

Range costs include Forest Service costs and permittee investments. The sawtimber/products category includes timber roads, purchaser credit road construction/reconstruction, and additional user costs associated with cable logging where appropriate. The fire protection category includes the firefighting fund (FFF) as well as fuel treatment maintenance and investments. "Other" costs include administrative and support costs, lands and minerals, and land management planning expenses.

The majority of the "other" costs are fixed overhead and do not change significantly among the alternatives. All of the individual benefit categories are shown. The water benefits are for total water yield rather than for incremental changes from current management. The alternatives are arranged, left to right, in order of decreasing PNV.

As shown in the table, each of the alternatives considered provide priced benefits far in excess of the total costs of management. The ratios of benefits to costs range from a low of about 4.5:1 in Alternative PA, to a high of 5.9:1 in the low budget alternative (Alternative A). Each of the alternatives is thus a highly economically efficient combination of costs and benefits. The most economically efficient allocation is the alternative with the highest PNV (Max PNV Alternative). The maximum PNV Alternative thus represents the maximum potential net benefits which could be attained from the Forest.

Differences in PNV between the Max PNV Alternative and other alternatives are the result of applying different management objectives to various parts of the Forest. The most significant reasons for lower PNV's for the other alternatives are the constraints used to insure that specified levels of management objectives and non-priced benefits are provided in an alternative. An analysis of these types of constraints is shown in Appendix B.

The single most significant determinant of PNV differences appears to be the quality level of recreation outputs, especially developed recreation. The apparent reason for this relationship is two-fold; first, in terms of priced benefits produced per dollar of costs, developed recreation appears to the one of the "best" investments throughout the Forest. Other recreation and wildlife investments are slightly less cost efficient. Second, the quality level of developed recreation ["Standard" vs. "Less Than Standard" service] appears to have a profound impact of the total benefit levels of each alternative.

Since the "Standard" RVD's provide a much greater benefit value for relatively little additional costs, the "Standard" level of service will always be one of the most cost efficient ways to allocate funds on the Forest. The overall result is that the level of recreation benefits (especially developed recreation) determine to a large extent, the relative PNV rankings of the alternatives.

Thus, in any alternative in which additional funds are available for distribution (i.e., the funds are not needed to achieve other specified objectives), "Standard" service levels for recreation will result in a substantial increase in benefit totals. What this means, is that in any alternative in which a reasonable budget constraint is established, specified objectives will be achieved, with all additional funds (if there are any) being allocated to recreation. If necessary, funds required to meet specified objectives (such as fire protection, soil and water management, overhead, etc.) will be "inefficiently" allocated to these uses instead of to recreation. This relationship explains most of the variations in PNV among the alternatives.

Non-Priced Benefits

Nonpriced benefits are those benefits for which no monetary value or price can be determined. Nonpriced benefits include on-site and off-site effects, such as water quality, visual quality, protection of threatened and endangered species, and impacts on local employment. Nonpriced benefits do not significantly affect the priced benefits of the resource outputs modeled for the alternatives. The majority of the changes in costs in the alternatives can be tied to priced benefits, however, the nonpriced benefits play an important role in determining management direction on the Apache-Sitgreaves National Forests. Net public benefits are affected by both the net priced benefits and the nonpriced benefits.

Fire and law enforcement protection costs money, but does not produce any priced benefits directly. The effect of increased expenditures is to reduce potential losses of timber, recreation facilities, and adjacent private property values from fire or vandalism. In all alternatives where protection costs increase, the present net value decreases.

Nonpriced benefits from range management include improved ecological condition of the riparian lands for wildlife, improved soil and watershed condition around over-grazed lands, and improved visual quality of the grasslands.

In comparing the trade-offs among alternatives, it is necessary to consider the entire array of nonpriced benefits, the relationships between priced and nonpriced benefit output levels, and the qualitative values associated with nonpriced benefits as they relate to the quantitative measure of economic efficiency represented by PNV. The judgmental comparisons of alternatives performed within this framework form the principal indicator of the net public benefits associated with each alternative.

Present Net Value Trade-Offs

Table 25 displays the ranking of the alternatives against the Max PNV Assigned Value benchmark. The alternatives are ranked in the order of decreasing PNV from left to right. The comparisons are in millions of dollars (January 1, 1982 value) discounted at 4%. The difference in PNV between alternatives is called the trade-off or opportunity cost, which is the investment opportunity foregone by implementing the alternative instead of the maximum PNV benchmark. The following discussion highlights the major opportunity costs of each alternative when compared to the alternative with the next highest PNV.

Table 25. Comparison of Alternatives with Max PNV Assigned Benchmarks.

	Max PNV Assigned	B	PA	C	A	E	D
				Alternative			
PNV (MM$)	1749.1	1724.1	1611.2	1594.5	1523.9	1363.9	1312.5
Change		-25.0	-112.9	-16.7	-70.6	-160.0	-51.4
Percent of Max PNV Assigned	100	99	92	91	87	78	75

Max PNV Assigned Benchmark

The objective of the Max PNV Assigned Benchmark is to maximize the present net value (PNV) of outputs with market monetary values and assigned monetary values. With the exception of the constraints common to each alternative (nondeclining yield, ending inventory, long-run sustained yield, culmination of mean annual increment, and minimum management requirement) no additional constraints were placed on this benchmark to achieve certain management practices, address issues, retain existing programs, or achieve quality levels. Refer to Appendix B for a complete discussion of constraints applied to all benchmarks and alternatives. The PNV of this benchmark is used as a reference point for evaluating the opportunity costs of achieving the objectives of the alternatives. This benchmark produced the highest PNV of all benchmarks and alternatives because the sole objective of the benchmark was to maximize economic efficiency with the least number of resource constraints. The most economically efficient combination of outputs and costs resulted.

Output levels in any benchmark or alternative which exceed the Max PNV benchmark cause a situation where costs of producing the output exceed the benefits. The Max PNV Benchmark provides a high level of resolution for the timber, recreation, wildlife, and transportation issues but does not do well on resolving the soil and water, grazing, landownership, wilderness, public involvement, and unauthorized use issues.

Alternative B

The objectives of Alternative B are to emphasize resource outputs having market values within a constrained budget of $11.9 million. The emphasized outputs are timber, grazing, and developed recreation. The opportunity cost of implementing Alternative B instead of the Max PNV Benchmark is about $25 million.

So that market value resources could be emphasized within the constrained budget, nonmarket outputs of dispersed recreation and wildlife were limited to 75% of their potential. This ceiling limitation was needed to ensure that sufficient budget was available to produce the emphasized outputs. As a result, dispersed recreation and wildlife outputs and net benefits are lower in Alternative B than in the Max PNV Benchmark. In addition, a smaller portion of the dispersed recreation is managed at the Standard Service Level further reducing net benefits from dispersed recreation. These reductions in dispersed recreation and wildlife net benefits account for all of the opportunity cost between Alternative B and the Max PNV Benchmark.

Alternative PA

The objectives of Alternative PA are to emphasize fish and wildlife habitat improvement, and dispersed and developed recreation within a budget of $11.4 million. The opportunity cost between Alternative PA and Alternative B is about $112.9 million.

The opportunity cost can be attributed to a 5% reduction in net dispersed recreation benefits, and a 12% reduction in net wilderness benefits, a 33% reduction in net timber benefits, and a 9% increase in net wildlife benefits.

The reduction in dispersed recreation benefits is due to less dispersed recreation being managed at Standard Service Level because of the budget constraint.

Wilderness net benefits fell because of the use limitation placed on Mt. Baldy Wilderness to manage it at 100% Standard Service Level which reduced total wilderness RVD's and increased costs of management. The quality of wilderness experience is enhanced by the trade-off.

The reduction in net timber benefits is due to a reduction in output and also increased cost per unit of output in Alternative PA. The increased costs is due to intensified wildlife coordination and wildlife habitat improvements to meet the wildlife objectives of Alternative PA. This increased emphasis on wildlife coordination and improvement is reflected in the increased net wildlife benefits. The reduction in output is due to the budget constraint as well as a requirement to maintain twice the MHR level in old growth.

There was also a 19% cost increase in Alternative PA for facilities, roads, and other. This was to provide resolution of the road maintenance, road closures, unauthorized use, and landownership issues which reach their highest level of resolution in this Alternative.

Alternative C

The objectives of Alternative C are to emphasize resource outputs with nonmarket values of dispersed recreation, wilderness, and watershed condition within a budget of $11.9 million. The opportunity cost of Alternative C is about $17 million when compared to Alternative PA.

So that nonmarket value resources could be emphasized within the constrained budget, market outputs of developed recreation, grazing, and timber outputs were limited to 75% of their maximum potential level. As a result, net developed recreation benefits fell 17%, net dispersed recreation benefits increased 9%, net wilderness benefits increased 29%, net wildlife benefits fell 6%, and net timber benefits increased 30%.

The constraint to hold developed recreation to 75% of its potential is primarily responsible for the opportunity cost. The constraint caused a $106 million reduction in net developed recreation benefits which was not totally offset by increases in dispersed recreation, wilderness, and timber net benefits.

Alternative A

The objective of Alternative A is to manage the Forest at a budget level 25% less than current (Alternative E). The opportunity cost is about $71 million when compared to Alternative C.

Because of the budget constraint, net dispersed recreation benefits fell 14%, net wildlife benefits fell 4%, and net timber benefits fell 42%.

Table 42. Percentages of Each Plant Community on the Forest.

	Percent of Forest Total
Aspen	0.6
Spruce-Fir/Mixed Conifer	10.0
Ponderosa Pine	41.0
Grassland	10.0
Riparian	0.4
Pinyon Juniper	38.0
Total	100.0

Future Trends

Consumptive and non-consumptive use of wildlife in the future is expected to increase and meet or exceed supply.

The Forest Service will be requested to improve the quality of big game winter range on the Apache-Sitgreaves National Forests as more adjacent winter range is lost to development.

Non-consumptive uses of wildlife such as viewing, bird watching and photography will increase as consumptive uses become more restrictive.

Table 43, displays projected demand of fish and wildlife on the Apache-Sitgreaves National Forests in thousands of Recreation Visitor Days (RVD's).

Table 43. Projected Demand of Fish and Wildlife on the Apache-Sitgreaves National Forests in Thousands of RVD's. (Based on Arizona Comprehensive Wildlife Plan 1981).

	1984	1990	2000	2030
Hunting	156	212	371	1087
Fishing	400	544	952	2789
Non-Consumptive	556	756	1323	3876
Total	1112	1512	3646	7752

Table 44 displays projected supply of fish and wildlife under current management on the Apache-Sitgreaves National Forests in thousands of RVD's.

Table 44. Projected Supply of Fish and Wildlife Under Current Management.

	1984	1990	2000	2030
Total RVD's (Hunting, Fishing, Non-Consumptive)	953	953	915	821

Threatened and Endangered Species

The Endangered Species Act requires that all Federal agencies protect and manage threatened and endangered species and their habitat to achieve recovery.

Recovery plans have been established for the Peregrine Falcon, Bald Eagle, and the Apache Trout. The Forest has wintering habitat for the Bald Eagle and one known active Peregrine Falcon eyrie.

Management to meet the objectives of the Recovery Plan for the Apache Trout has been a major objective of the Forests' wildlife program. Objectives obligate the Forest to establish and maintain 15 self-sustaining populations of pure Apache Trout.

Federal and State listed species which occur or are suspected to occur on the Forest, are listed in the following Table (per Fish and Wildlife Service letters of March 31, and April 30, 1985).

Table 45. Federal or State Classified Species.

Species	STATUS Federal*	State**	Acres/Miles of Essential Habitat for Species
BIRDS			
Peregrine Falcon (Falco peregrinus)	E	Gr. 3	4,020 acres
Bald Eagle (Haliaeetus Leucocephalus)	E	Gr. 2	3,500 acres
Osprey (Pandion haliaetus carolinensis)	S	Gr. 3	
Black Hawk (Butteogallus Anthracinus)	S	Gr. 3	
Buff Breasted Flycatcher (Empidonax Fulvifrons)	S	Gr. 3	
Veery (Catharus fuscescens)	S	Gr. 3	
American Redstart (Setophaga Ruticilla)	S	Gr. 3	
Snowy Egret (Egretta Thula)	S	Gr. 4	
Black Crowned Night Heron (Nycticorax Mycticorax)	S	Gr. 4	
Spotted Owl (Strix Occidentalis)	C	Gr. 4	
Blue-Throated Hummingbird (Lampornis Clemenciee)	S	Gr. 4	
Pine Grosbeak (Pinicola Enucleator)	S	Gr. 4	
Gray Catbird (Dumetella Carolinensis)	S	Gr. 3	
Black Footed Ferret (Mustela Niguipes)	E	Gr. 1	
MAMALS			
Spotted Bat (Euderma maculata)	C		
River otter (Lutra canadensis)	S	Gr. 2	
Western Jumping Mouse (Zapus princips)	S	Gr. 3	
Water Shrew (Surex palustnus)	S	Gr. 4	

Table 45. Federal or State Classified Species. (Continued)

Species	STATUS Federal*	State**	Acres/Miles of Essential Habitat for Species
INVERTEBRATES			
False Ameletus Mayfly (Ameletus falsus)	C		
White Mountains Water Penny Beetle (Psephiuus montanus)	C		
REPTILES			
Narrow-Headed Garter Snake (Thamnophis rufipunctatus)	C	Gr. 3	
FISH			
Spinedace (Meda fulgida)	P	Gr. 3	
Apache Trout (Salmo Apache)	T	Gr. 3	91 miles
Little Colorado River Spinedace (Lepidameda Vittata)	P	Gr. 3	3 miles
Loach Minnow (Tiaroga Cobitis)	C	Gr. 3	
Roundtail Chub (Gila Robusta Grahami)	C	Gr. 3	
Gila Chub	—		

*(E) Endangered - A species or subspecies in imminent danger of becoming extinct in the wild.

*(T) Threatened - A species likely to become endangered unless current trends are reversed.

*(P) Proposed - A species proposed for listing as threatened.

*(C) Candidate - A species proposed for listing.

*(S) Sensitive - Those plant and animal species identified by the Regional Forester for which continuation of species viability is a concern.

**Group 1 - Animals are those known or suspected to have been extirpated from Arizona, but which still exist elsewhere.

**Group 2 - Animals whose continued presence in Arizona is now in jeopardy, and extrication from the State is highly probable if no recovery efforts are made.

**Group 3 - Animals whose continued presence in Arizona could be in jeopardy in the foreseeable future. Serious threats exist to habitats they occupy and their populations.

**Group 4 - Species or subspecies for which there is a moderate threat to the habitats they occupy.

Future Trends

The future trends for threatened and endangered species is to remove them from the Federal List by achieving recovery.

Current activities provide for protecting and maintaining Threatened and Endangered classified species. Recovery activities for Apache Trout are minimal. The proposed action will achieve a quicker rate of recovery for Apache Trout through direct habitat improvement.

Plants

There are no known threatened or endangered plant species on the Forest. Wild onion (allium gooddingii), Bugbane (cimicifuga arizonica), Arizona Willow (salix arizonica), and Grama Grass Cactus (pedio cactus papyracanthus) have been nominated as threatened or endangered on the Federal Register. Table 46 lists the sensitive plants for the Forest.

Table 46. Sensitive Plants Known or Suspected to Occur on the Apache-Sitgreaves National Forests.

Species	Category*
Wild Onion (Allium goodingii)	C
Bugbane (Cimicifuga arizonica)	1
Arizona Willow (Salix arizonica)	2
Coryphantha missourisio	2
Var. martonnii	2
Senecio quaerens	2
Grama Grass Cactus (Pediocactus papyracanthus)	2

Candidate (C) - A species proposed for listing as Threatened.

*Category 1 - Nominated for Federal Register as "taxa for which the U.S. Fish and Wildlife Service has sufficient research on hand to support the biological appropriateness of their being listed as Endangered or Threatened".

*Category 2 - Nominated for Federal Protection as, "taxa for which further biological research and field studies will be necessary to determine the status".

Fish

There are about 475 miles of cold water streams. There are 1,800 surface acres of reservoirs out of the 3,962 total surface acres, that support cold and/or warm water fish species.

The aquatic ecosystem provides habitat for 28 species of fish, of which 16 are classified as game species, and 16 species are of significant management concern as a result of Federal or State listing (Apache Trout, Loach Minnow, Little Colorado River Spinedace, Roundtail Chub, spinedace, and Gila Chub).

Water quality is amenable to fish life in the majority of the streams, but excessive temperatures and unsatisfactory watershed condition on certain streams adversely impact the aquatic resource.

Current Use and Management - In 1984, the fishing resource on the Forest provided 400,000 RVD's (Based on Arizona Comprehensive Wildlife Plan, 1981).

Habitat management of the aquatic ecosystems which support the fishery resource has been primarily coordinated with other resource activities. Protection and management of streamside vegetation through coordination with timber harvest and livestock grazing activities are major considerations.

Resource and Recreation - Management objectives are established in coordination with the cold water Fishery Management Plan developed by the Arizona Game & Fish Department.

Future Trends

General assumptions concerning future fishery management on the Apache-Sitgreaves National Forests are listed below:

Fishing pressure will exceed natural reproduction, and must be supplemented by stocking. As fishing pressure continues to increase, specific fish habitats will become over utilized because of their low productivity potential.

Uniform distribution of fishing pressure on fish habitats can more effectively utilize limited production potential.

Table 47. Fishery Habitat on the Apache-Sitgreaves National Forests.

	Number	Miles	Acres
STREAMS			
Cold Water	60	458	
Warm Water	3	18	
LAKES			
Cold Water	24		1,700
Warm Water	2		82
APACHE TROUT STREAMS			
Existing Population	15	66	
Candidate Stream	5	25	

Riparian Areas

Riparian areas are wetland ecosystems that have a high water table because they are close to a surface or subsurface water. Riparian areas usually occur in transition between aquatic and upland ecosystems, but have distinct vegetation and soil characteristics. Riparian areas are probably the most critical ecosystems for multiple use management because:

Domestic livestock prefer these areas and concentrate in them.

Scenic values are very high.

The majority of the developed campgrounds are in, or directly adjacent to, riparian areas because people are attracted to water and lush vegetation. Road densities in the riparian areas are due to gentle grades and easy construction.

Riparian corridors support the greatest local diversity of plant and wildlife species.

the majority of rare, unique, and/or "listed" species (Federal, State, and/or Forest Service) are closely associated with riparian habitat.

They are generally more productive per acre of biomass (plant and animal) than other areas.

The three basic requirements for wildlife habitat (food, cover, and water) are often met in these areas. The fisheries resource (aquatic ecosystems) is associated with this area.

Roads along major stream courses create direct conflicts with other resources.

Stream channels and associated riparian vegetation are fragile components, the "weak-links" of good watershed condition.

The Forest has 3,962 acres of open water and 10,101 acres of riparian forest, for a total of 14,063 riparian acres.

Deteriorated areas are characterized by the absence of shrub and tree species or the lack of regeneration along streambanks. Streambanks are unstable, stream temperatures are elevated, aquatic community diversity is reduced, fish habitat is depleted, and terrestrial wildlife habitat is extremely limited. Conditions do not improve naturally due to continued grazing.

Disturbance by logging activities in the past has been relatively minor becuase few timber sales have been located near riparian

areas. Developed recreation sites have locally affected riparian habitat due to human presence and direct loss of habitat. In localized areas, fishing activity has caused ground cover to deterioriate and the soil to compact along streambanks and lake shores.

Riparian habitat is especially important for wildlife and fish. A partial inventory indicated problems with excessive grazing by domestic livestock in riparian types. A more substantive analysis cannot be made until the inventory is completed. Heavy browsing by elk has thwarted attempts to re-establish willows in some higher elevation types.

RANGE

The diversity of vegetation types on the Apache-Sitgreaves National Forest provide for a wide range of opportunities for the grazing of domestic livestock. Table 48 below, describes the mixture of vegetation types occuring on the Forest.

Table 48. Major Vegetative Types, Acreages, and Capacities.

VEGETATION TYPE	FULL CAPACITY	POTENTIAL CAPACITY	NO CAPACITY	TOTAL	EXISTING CAPACITY AUM's
Ponderosa Pine	614,104	49,218	143,791	807,113	61,723
Mixed Conifer/Spruce Fir	98,066	9,007	72,384	179,457	12,900
Aspen	5,215	87	5,380	10,682	679
Pinyon-Juniper (Above Rim)	232,125	14,174	95,310	341,609	35,452
Pinyon-Juniper (Below Rim)	267,574	15,356	119,000	401,930	32,422
Riparian	5,247	106	4,566	10,101	641
Prairie Grass	39,056	11,163	0	50,219	5,210
Mountain Grassland	175,591	3,914	22,936	202,441	55,321
TOTAL	1,437,158	103,027	463,367	2,003,552	204,348

Current Use - Livestock grazing on the Apache-Sitgreaves is a major use with 97% of the Forests acreage under permit.

Table 49. Permitted Grazing - Updated 1985.

Livestock Type	Number	AUM's
Horses	52	286
Burros	45	99
Sheep	11,867	8,668
Cattle	23,251	204,766
TOTAL	35,215	213,819

The majority of the livestock are permitted on the Forest during the summer months, mid-May to mid-October. The major type of livestock operation is a cow/calf using the Forest during the summer months, and wintering either on the Forest, private land, State land, or a combination. Table 50 displays dependency of livestock operators on various ownerships for forage.

Table 50. Permittee Forage Dependency Percentages by Ownership Class. Source ERS Forage Enterprise Budget Study.

Ownership	Percentage Dependency
NFS	46
BLM	3
State	2
Deeded	39
Other	10

Table 51. Summary Status for Allotments.

Mgmt. Intensity Level	# of Allots.	# of Sat. Mgmt.	# of Unsat. Mgmt.	Corrected By Imprvd. Mgmt.	Corrected By Adjust Stocking	% Structural Improvements Complete 40%	40-60	60-80	78
A	1	1						X	
B	27	19	8	6	2		X		
C	58	53	5	3	2			X	
D	40	40						X	
E									
Total	126	113	13	9	4				

Approximately 50,000 acres of pinyon-juniper has been modified by mechanical methods and fire to increase forage production by maintaining the areas in a seral grassland (prairie grassland). As the overstory regrows, the forage production is decreased. Because most

of these treated openings are critical wildlife winter range, these areas should be retreated to maintain a seral grassland stage.

The overstory of pinyon-juniper will continue to increase with a resultant decrease in forage grasses, forbs, and browse. Because most of the pinyon-juniper type is critical wildlife winter range, it is important to maintain openings.

Reconstruction of allotment fences, waters and facilities will continue to be a high priority. Many existing range improvements are over 30 years old, and reconstruction funds will need to receive priority consideration in future management direction and planning.

Competition for available forage between domestic livestock and wildlife exists on wildlife winter range.

New vegetation forage improvement practices may be allowed when not in conflict with other priority uses.

Permittees may have to assume a larger role in structural and nonstructural improvement maintenance.

Future Trends

The projected future use for permits for livestock grazing is difficult to predict due to market fluctuations and unknown nature of proposed grazing fee. It is anticipated based on prior use, that actual use will continue to equal or exceed the amount of grazing made available. The potential supply of and projected demand for grazing range from 213,000 AUM's in period 1 to 249,000 AUM's in period 5.

TIMBER AND FUELWOOD

Land Suitability

Timber on the Forest has been managed under two timber management plans; one for the Apache National Forest and one for the Sitgreaves National Forest. Timber on the Apache National Forest has been managed on a non-declining yield basis. Because of this, the timber yield for any decade will not be less than the yield for the previous decade. The Sitgreaves Plan was not based on non-declining yield. Because the Forest was suffering large mortality losses at the time the plan was written (1967), a departure from non-declining yield was planned to allow the Forest to capture the volume that would otherwise be lost.

It was anticipated that the sawtimber yield on the Sitgreaves would be reduced 63 percent in 1986. However, this period of accelerated harvest apparently improved growing conditions because current yield

predictions indicate that no decrease in timber production is needed. The calculated annual allowable cut for the combined Forest is still the same as the annual allowable cut calculated in the combined timber management plans for the two Forests.

The average annual allowable cut cannot exceed the long-term growth capability of the Forest. This ensures that the Forest will be managed on a sustained yield basis.

The Allowable Sale Quantity for the Land Management Plan is determined primarily by the number of acres allocated to timber management. Criteria for determining lands capable of and suitable for allocation to timber management are as follows:

Non-Forest-Land not currently or historically stocked with commercial species of trees to at least 10% of the minimum values listed in the reforestation table that follows, is classed as non-forest.

Table 51A. Timber Productivity Classification

Potential Growth (cubic ft/Ac/Yr)	Forest Lands Tentatively Suitable for Timber Production		Forest Lands Not Scheduled for Timber Production	
	Acres	Million Cubic Ft/Yr	Acres	Million Cu. Feet/Year
Less than 20	68,371	1.03	2,450	0.04
20-49	380,152	13.31	13,681	0.48
50-84	354,154	23.91	12,747	0.86
85-119	7,023	0.72	263	0.03
120-164	222	0.03	0	0
165-224	607	0.12	29	0.01
225+	0	0	0	0
Total	810,529	39.12	29,170	1.42

	Forest Lands Tentatively Suitable for Timber Production		Forest lands not scheduled for timber production	
	Cubic Feet/ Acre/Year	Million cubic Feet/Year	Cub. Ft./ Acre/Year	Million Cu/Ft/Yr
Average potential growth	48	39.12	49	1.42
Current average net growth	38	31.01	38	1.11
Allowable sale quantity for plan period	34	27.3	34	0.99

Capable - Land capable of producing crops of industrial wood on a sustained yield basis is classified as capable forest land.

Available - All productive forest lands that have not been legislatively or administratively withdrawn from timber production are considered available for timber production.

Suitable - Available and capable forest lands are considered suitable for timber harvest if the technology is available to harvest without irreversible resource damage to soil productivity or watershed conditions. If an area cannot meet these conditions by use of ground skidding equipment or skyline equipment, it will be classed as "technologically not suited" for timber production.

Regeneration Potential - Productive forest lands are also considered suitable for timber production only if regeneration can be assured within 5 years of final harvest.

The criterion used to determine if an area has been reforested (natural or artificial) within five years after final harvest is that the stocking must at least meet the minimum specified in the following table.

Table 52. Minimum and Optimum Levels for Reforestation.

Cover Type	Cu. Ft. Site Productivity	Min. 1/ Trees/ Acre	Optimum 2/ Trees/Acre W/O Pulp	Optimum 2/ Trees/Acre With Pulp	% of 1/100th Acre Plots That are Stocked Minimum	% of 1/100th Acre Plots That are Stocked Optimum
Ponderosa Pine	<49	120	120	275	70	100
	49-84	130	175	275	70	100
	85+	145	175	325	70	100
Spruce/Fir	<49	120	200	350	75	100
	49-84	150	230	350	75	100
	85-110	275	350	400		
	110+	315	400	450		
Douglas Fir	<49	120	160	300	75	100
Blue Spruce White Fir	49-84	150	260	300	75	100
	85+	200	275	325	75	100
Limber Pine Bristle Cone Pine, Misc. Conifers	<49	120	120	275	70	100
	49-84	130	175	275	70	100
	85+	145	175	275	70	100

1/ Minimum stocking standards are based on no precommercial thinning and no commercial thinning for pulpwood.

2/ Optimum stocking standards based on no precommercial thinning. The first column assumes no pulpwood entry, but does assume commercial thinnings for sawlogs. The second column is based on a pulpwood thinning and sawlog thinning. These numbers are surviving trees 5 years after seed cut or planting.

Areas where these standards cannot be met are deferred until the technology is available to ensure regeneration. Salvaging dead and dying trees is permitted in these areas. Slopes over 40 percent planned for cable logging must also meet the following Region 3 constraints:

Cut per acre must be 3 MBF or greater.
Maximum yarding distance not to exceed 1,800 ft. (slope distance).

To determine land to be allocated as suitable for timber management, we start with the total forest acreage, subtract acres that are non-forest, not capable, not available, and not suitable. The remainder is considered tentatively suitable. Tentatively suitable lands are then run through an economic screen in the FORPLAN computer model to determine if timber management would be profitable. Those acres that are profitable and not allocated to an incompatible use are then classified as suitable. Suitable acres may vary by alternative.

The following table provides a complete breakdown of the Timber Land Use Classification for the Apache-Sitgreaves National Forests.

Table 53. Timber Land Use Classification (Listed by acres)

Classification	Acres
Apache-Sitgreaves National Forest	2,011,824*
Non Forested Land	290,607
**Not Capable	721,335
Capable But not Available	90,923
Physically Unsuitable	43,515
Inadequate Information	54,915
Tentatively Suitable	810,529

*Includes approximately 8,272 acres on the Gila National Forest, administered by the Apache-Sitgreaves National Forest.

** This is primarily pinyon-juniper woodlands. It also includes 110,175 acres in wilderness or primitve areas or proposed additions to the primitive areas.

Of the tenatively suitable acres, 670,426 acres are ponderosa pine; 123,604 acres are mixed conifer; 11,454 acres are spruce-fir; and, 5,045 acres are aspen. The aspen area does not include aspen stands with conifer understories because procedures used in the timber inventories dictated that such stands be classified according to their conifer component.

The old timber management plan called for 948,510 acres to be managed for timber production.

The difference between the tentatively suitable forest acres in the Land Management Plan and the area managed for timber in the old timber management plans is 137,981 acres.

The first difference is that all the forested acres below the Rim and in roadless areas were included for timber management in the old plans. Only 17,600 acres below the Rim are now considered tentatively suitable. This difference amounts to 54,915 acres.

All slopes over 40% were classified as marginal land in the old plans. All marginal land was included as tentatively suitable when skyline logging was developed in this area. Of this area, 37,315 acres have now been determined to be physically unsuitable because of low reforestation potential.

Since the old timber management plans were completed, 15,974 acres of otherwise suitable timber land has been added to the Wilderness system. Administration recommendations have proposed adding 8,713 acres of otherwise tentatively suitable timber land to the Blue Range Primitive Area. Since the Forest is required to maintain the wilderness character of this land until Congress acts on the area, it is considered withdrawn from suitability until such time as Congress does act.

The old timber plans also included 2,215 acres of lands on cinder cones which cannot be harvested, using current technology, without unacceptable soil damage.

The total of the noted differences is 123,117 acres. This still leaves a difference of 14,864 acres.

This difference may be due to the method of area determination used. The 1975 plan for the Apache National Forest was based on acres calculated by photo point sampling. The acres for the current plan were determined by mapping stands on photos and then transferring the stands to 1:24,000 scale topographic maps. The maps were planimetered for acreage. Since these are very different methods, some differences in acreages would be expected.

Timber land use classification has undergone many significant changes since the 1975 plan was prepared. During harvest plan preparation, we have tried to remove from timber management, those lands that are not suited for timber management such as areas with unstable soils, land not capable of being regenerated within 5 years, etc. More than any other factor, interpretation of suitable acres seems to account for the difference between plans.

Timber lands are managed under even-aged or uneven-aged systems. The vast majority of lands are managed under the even-aged system. The uneven-aged system is used to meet specific objectives for visual quality, wildlife habitat, etc.

Stands are regenerated naturally under both systems. If natural regeneration is not successful, the areas are planted. The regeneration activity is used to bring about a balance of age classes across the Forest. It will require over 200 years to achieve an equal distribution of age classes (regulation).

The present age class distribution of timber on tentatively suitable lands is as shown in Table 54.

Table 54. Present Age Class Distribution of Timber on Tentatively Suitable Lands.

Age Class (Years)	Acres	Percent
*1 - 40	145,429	17.3
41 - 60	372,261	45.9
61 - 80	0	0
81 - 100	51,767	6.4
101 - 120	50,808	6.3
121 - 140	102,933	12.7
141 - 160	53,376	6.6
161+	33,955	4.2

*The timber inventory consolidated the 1-20 and 21-40 age classes into a single age group. The figures in this table represent the age of that portion of a stand that would be managed. For instance, a well stocked seedling stand with an overstory of overmature sawtimber would be classed in age group 1-40 since this is the portion of the stand that would be managed for future growth. This could be misleading to a casual observer, since the larger trees attract the most attention.

The following table shows the amount of timber harvested from this land base during the period of 1974 through 1983.

Table 55. Ten Year Production (sold) on Apache-Sitgreaves N.F.

Year	Net Merchantable Sawtimber Volume (MBF)	Pulpwood* Volume (MBF)	Fuelwood** Volume (MBF)
1974	73,520	17,622	Not Available
1975	74,682	15,164	Not Available
1976	87,786	17,369	Not Available
1977	82,713	17,139	Not Available
1978	82,848	22,906	2,855
1979	87,658	15,413	2,935
1980	58,323	20,175	1,908
1981	79,077	11,652	1,342
1982	78,629	4,956	2,661
1983	85,335	2,951	14,288

*Pulpwood is actual volume cut on long term sale.
**Fuelwood was not reported separate until 1978.

Commercial timber harvesting techniques have been traditionally limited to tractor logging on slopes less than 40%. The Forest has recently been preparing one sale annually with a portion of the sale designated as requiring cable (skyline) logging. The Forest has sold only one sale requiring cable logging. These sales will provide a limited amount of vegetation diversity on the 40% and steeper slopes.

The commercial forest land on the Forest has been managed using the shelterwood cutting method. In the previous 25 years, the shelterwood method has proven to be efficient and effective in naturally regeneraing most forest types that occur on the forest. The shelterwood method has been applied to all forest types except aspen. Other cutting methods have been used, but only at a minor level. Clear cutting has proven to be optimum in the aspen and spruce-fir types, and for control of dwarf mistletoe in severely infected stands.

Timber stands on the Forest have not been converted to even aged management and not all stands will be converted. However, as more stands are converted to even aged management with different age classes featured and as planned regeneration cuts are made, the age class distribution is expected to improve and become more evenly distributed than at present.

Uneven aged methods while useful in certain specific stands have in general, been ineffective in controlling dwarf mistletoe and have favored conversion of ponderosa pine stands to white fir, douglas fir, or spruce on mixed conifer sites.

Generally, past management in the Forest has favored timber stands which are greater than 100 acres in size. The average stand size on the Apache is approximately 80 acres, while average stand size on the Sitgreaves is 200 acres.

In the past, broad stocking level guides have been applied over the commercial forest land. In 1979, more specific stocking levels by forest type and site index were developed and implementation was required. These guides were modified and updated in 1984. The acreage where stocking levels have been applied is still small, but if their use is continued, growth per acre should improve across the forest.

Utilization standards have been improving. Presently, sawtimber is utilized to a 6" D.I.B. (diameter inside bark) top, and a 10 foot long log. Pulpwood is utilized to a 4" D.I.B. and a 10 foot length.

As these standards improve, the Forest will capture a greater proportion of the growth potential on acres entered for commercial harvests.

Long Range Sustained Yield

Calculated long-range sustained yield for the Forest, under current management, is 36,787 MCF annually. Of this, about 21,500 MCF are currently harvested.

Damaging Agents

Dwarf mistletoe is a serious problem and is reducing growth in a large portion of the Forest. In many stands, the growth rate is being reduced by one half or more below potential due to mistletoe.

Current growth losses to dwarf mistletoe are estimated to be 60-90 million board feet per year (Forest Pest Management Report R3 75-10). Pine stands infected with dwarf mistletoe increased from 41% of the Forest, to 52% from 1954 to 1984. Present management would be expected to continue these trends.

Another cause of serious growth losses is the Forest's history of large disasterous fires. Historically, approximately 1,000 acres of commercial forest land is burned annually. Generally these fires can be attributed to the lack of past slash treatment practices.

Timber Stand Improvement and Reforestation

The Forest has had a large program of timber stand improvement. Approximately 20,000 acres are accomplished per year. Precommercial thinning has had priority over all other types of improvement work. The objective is to do only one precommercial thinning in a stand with subsequent thinnings for a commercial product. (See Table 56 for recent history of acres treated).

Natural regeneration is expected to occur after the regeneration cut is applied to timber stands in 90% of all cases. Planting is done in conjunction with site preparation on areas deforested by fire or clearcutting and 10% of seed cuts. High sites capable of producing the most timber over time have the highest priority for artificial regeneration.

The backlog of reforestation acres which was identified in 1975 has been planted.

Table 56. Thinning and Reforestation

	Precommercial Thinning Acres	Reforestation Acres
73	24,305	1,431
74	22,732	1,749
75	31,884	824
76	19,261	1,338
77	20,864	1,450
78	17,872	1,858
79	22,489	2,762
80	30,514	2,536
81	25,422	1,773
82	16,808	1,268

The following table displays RPA targets for timber stand improvement and reforestation for the Forest.

Table 57. Current Targets (RPA - Regional Plan)

	TIME PERIOD					
Annual Target/Unit of Measure	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Reforestation Acres	3,386	4,319	4,960	5,495	6,089	6,297
TSI Acres	13,323	8,614	7,170	7,178	1,005	1,350

RPA targets for reforestation appear to exceed reforestation needs.

Sawtimber

Merchantable Volume - Eight sawmills with a combined annual mill capacity of 130,000 MBF are dependent on timber from the Apache-Sitgreaves National Forest. This is based on current practices wherein some mills work two shifts and some work one shift. In addition to those mills, there are four smaller portable mills which depend on the Forest for their timber. Their combined capacity is less than 2,000 MBF. Annually 2,000 to 5,000 MBF of sawtimber is purchased by local mills from the Tonto National Forest, and 3,000 to 5,000 MBF from the Gila National Forest.

The annual volume available on the Apache-Sitgreaves National Forest is 89,000 MBF. Assuming a maximum of 15,000 MBF imported from other National Forests, this still leaves a shortfall of 32,000 MBF of timber for presently available mill capacity.

Future Trends

In the period 1970 through 1984, demand equalled or exceeded supply in all but 3 years. In 1980, 1982, and 1984 there was one sale offered in each year that did not sell. Demand is expected to increase as the U.S. economy improves. The projected future demand for sawtimber is 163 MMBF.

The mills in the area have the capacity to utilize approximately 160,000 MBF if all mills worked two shifts. Based on growth and yield modeling, it appears that the maximum level of sawtimber that could be produced is about 165 MMBF per year.

Pulpwood

There is a long-term contract (expiration 1989), which furnishes most of the roundwood material for the Snowflake Paper Mill. This contract requires several National Forests to annually offer 150,000 cords of pulpwood for this mill. Approximately 60% of the remaining volume under this contract is on the Apache-Sitgreaves National Forest. Harvest rates experienced in the past indicate that only a fraction of the remaining volume will be removed prior to expectation date.

Current Timber Management Plans have an annual planned harvest level of 30,000 cords of pulpwood.

Future Trends

Currently, the maximum capacity of the pulp mill in Snowflake is 150,000 cords (75 MMBF) of pulpwood per year. Historically, the mill has only achieved this capacity once, and normally uses 105,000 to 120,000 cords per year. Supply for this mill is from several National Forests and private lands in Arizona. A limited amount of pulpwood has been harvested on National Forest lands in New Mexico.

There are tentative plans for a new pulp mill at McNary, but at this time there is no way of projecting what demands, if any, this will generate for National Forest timber. It is estiamted that future roundwood use in period 5 could be as high as 51,300 MBF or 102,000 cords per year on the Apache-Sitgreaves National Forests.

Based on growth and yield modeling, it appears that the maximum production of pulpwood that could be produced averages about 35,000 cords per year for the 50 year planning period. However, there could be problems in the second and third decades when pulpwood production could fall to 10,000 and 10,000 cords per year, respectively.

Fuelwood

The Forest has experienced a heavy demand for fuelwood since the mid-1970's, especially on the Lakeside and Heber Districts. Demand varies depending upon accessibility to Payson, Phoenix, and the Show Low-Lakeside areas. The Alpine District and portions of the Chevelon and Springerville Districts do not receive the heavy impact of fuelwood cutting experienced by the Districts closer to these population centers.

The preferred fuelwood on the Forest is alligator juniper. The majority of dead alligator juniper has been removed from the Forest, especially on the Heber and Lakeside Districts. Both Districts have continuing problems of poaching green alligator juniper.

The Forest has had a permit system since the mid-1970's, and the demand on both Heber and Lakeside District varies from three to over four thousand fuelwood permits per year.

In FY 82 the Forest issued 11,189 permits for free use fuelwood with an estimated volume of 50,208 MBF (100,416 cords). The actual harvest from these permits is estimated at 19,500 MBF (39,161 cords). In addition, the Forest sold 7,758 MBF (15,518 cords) of green fuelwood for both commercial and personal use sales.

The Forest does not have data on how much dead and down fuelwood is available, or the annual sustainable harvest level for non-commercial species such as oak, juniper, and pinyon. However, there are approximately 225,000 acres of pinyon-juniper lands suitable for fuelwood harvest.

Future Trends

Fuelwood demand prior to 1975 increased at approximately the same rate as the population growth. In 1979, tha demand increased faster, presumably due to increased heating costs, and has remained constant for three years. In FY 81, the Forest issued or sold permits equaling 129,000 cords (actual harvest from these permits is estimated at 55,000 cords). It is expected that this level will increase with the projected population growth. In 1990, therefore, the fuelwood demand should be approximately 60,000 to 75,000 cords per year.

It appears that the maximum annual production of fuelwood on the forest averages about 43,000 cords. This includes pinyon and juniper, and presupposes maximum production levels of sawtimber and pulpwood, which create slash that could be used as fuelwood. Preferred species like alligator juniper would definitely be in short supply.

Outputs for fuelwood projected by the RPA program are much lower than the estimated demand.

Table 58. Current Timber and Fuelwood Targets (1980-85 RPA - Regional Plan)

Target/Unit of Measure	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Timber Offered MMBF	100	107	120	141	141	141
Fuelwood and Products MMBF	4.5	7.5	9.0	10.0	10.0	10.0

Estimated demand for fuelwood exceeds long-term sustainable harvest levels. When the backlog of accessible dead and down material is removed for fuelwood or disposed of through burning, decay, etc., demand will probably exceed supply, especially for preferred fuelwood species.

If current fuelwood management continues, large alligator juniper and oak can be expected to disappear. Popular pinyon-juniper areas will be cut over until there is no more available fuelwood on them. Use will then spread to less popular areas, and the cycle will repeat. Lower production and damage to the resource would be the ultimate result.

Diversity

Diversity implies environmental variety--the kind, number, proportion, and distribution of plants and animals and the different associations. Forest management primarily affects the relative proportion and distribution.

Social, consumptive, or ecological considerations give greater importance to some plant and animal species than to others. Species with extremely low populations, limited distribution, high aesthetic qualities, or high consumptive and recreation values commonly take precedence over others. Some plant and animal species, while not possessing the above characteristics, indicate the quantity and quality of habitat on the Forest and can reflect population levels and trends of other species.

Diversity is a term describing the distribution and abundance of different plant and animal communities and species within an area. Diversity includes such elements as the quantitative aspects of plant and animal community composition, distribution, and structure. Table 59 lists the Forest vegetative types.

Table 59. Vegetation Types by Acres

Type	Acres
Spruce-fir	17,[illegible]
Mixed conifer	102,150
Ponderosa pine	007,113
Pinyon-juniper	743,[illegible]
Mountain Grass	200,441
Prairie Grassland	30,219
Aspen	10,[illegible]
Riparian	10,101
TOTAL	2,000,502

Diversity must be maintained to sustain production of the Forest's many resources and services. Age classes must be balanced in all forest types including youngest and oldest trees, woody species in riparian areas, and vegetation in openings and meadows if maximum diversity is to be maintained. In addition, every area has a unique pattern of landscape diversity based on topography, climate, and other factors that are inherent physical characteristics of diversity. Increased diversity in plant communities provide an increasing number of habitat niches that, in turn, support more animal species. A forest with a high degree of diversity in communities and successional stages provides habitat for a wide variety of wildlife.

Forests are dynamic ecosystems. Any change in vegetation structure or composition will favor some wildlife species over others. Such changes can affect the number and type of wildlife species and their use of the changed habitat.

Aspen and pinyon-juniper woodland are key habitats for many wildlife species. Maintaining and managing these types is important for habitat diversity. Generally, aspen and pinyon-juniper are overmature as a result of limited cutting and fire suppression in the past. They need management to create early seral conditions.

The forest is predominately uneven-aged. Stands are being managed to bring them into even-aged management over time. Overmature trees are being harvested as part of normal intermediate cuttings. Maintaining even flow at current levels and meeting or exceeding projected RPA target levels is currently possible because of large areas of pole timber growing into sawtimber sizes and the harvest of residual overmature trees.

Stand diversity is established and maintained through integrated stand management to provide suitable habitat for wildlife on lands suitable for timber production, while maintaining or enhancing timber resource production and timber age class distribution to achieve desired diversity. Timber harvest is the most cost effective method to achieve the desired diversity. Other methods include prescribed burning, wildfires, and treatments using appropriated funds. These methods are limited because of high cost, air pollution problems from smoke, and high risk of unplanned loss of other resources.

Even-flow at RPA levels or higher can be maintained through a combination of removals of residual overmature trees over young stands, regeneration cuts, and thinning in even-aged stands.

Riparian communities are usually defined by the presence of plants associated with surface water or high water tables. In terms of biological production, riparian areas may be the most important element in maintaining diversity but occupy the smallest land area. While only 0.5 percent of the Forest supports riparian habitat, nearly one-third of the wildlife species find conditions suitable for all or part of their habitat needs. Therefore, riparian zones are subject to special management considerations. Constraints on activities in riparian areas have been directed at maintaining and/or improving these areas.

Some plant communities exhibit late successional conditions. Evidence of this condition is easily recognized in old growth timber stands. Past timber harvest activities have reduced the acreage of old growth vegetation. As this area has been reduced, animal species depending on these conditions have also been reduced. Existing plans did not include retention of old growth as an objective.

Snags are a specific habitat element which are importatnt to a wide variety of wildlife species. Wildfire, lightning strikes, insect and disease mortality, and natural mortality increase snag density. Fire suppression and pest management, as well as firewood cutting, may decrease the number of snags in the future unless this resource is managed.

Snag densities of two or three snags per acre represent the biological limit of most of the dependent species' ability to utilize snags and provides a base line for snag management.

Future Trend

In order to protect and perpetuate other plant and animal communities and ensure as much diversity as possible, the Forest has imposed various administrative restrictions. Off-road vehicle closures, fencing, timber and firewoood harvest, intensification of range management and visual quality management has been utilized to protect and enhance diversity. It is expected these mitigation measures will continue in the future.

SOIL AND WATERSHED

Watershed

Of the 25 major watersheds on the Forest, 19 are rated in satisfactory or better condition, and 6 are rated in unsatisfactory condition. Unsatisfactory watersheds are those watersheds where the vegetation protecting the soil surface has been removed to the point that accelerated erosion is occuring and some peak flood flows are being affected.

Table 60. Watershed Condition by Fifth Code Watersheds.

WS#	WS NAME	ACRES	HYDROLOGIC CONDITION OPT./SAT. ACRES	HYDROLOGIC CONDITION UNSAT. ACRES	SOIL CONDITION OPT./SAT. ACRES	SOIL CONDITION UNSAT. ACRES	TOTAL W/S CONDITION OPT./SAT. ACRES	TOTAL W/S CONDITION UNSAT. ACRES 1/
097	Coyote Creek	26,775	15,863	10,912	26,775	0	15,863	10,912
098	Little Colorado	182,453	169,890	12,563	182,453	0	169,890	12,563
099	Mineral Creek	45,593	43,886	1,707	45,412	181	43,886	1,707
103	Silver Creek	53,150	26,708	26,448	52,606	550	26,708	26,448
104	Show Low Creek	106,432	39,461	66,971	105,761	671	39,461	66,971
105	Cottonwood Dodson	124,546	23,454	101,092	124,546	0	23,454	101,092
107	Phoenix Park	48,096	10,586	37,512	48,098	0	10,586	37,512
108	Clear creek	116,484	57,832	58,652	116,484	0	57,832	58,652
110	Chevelon Creek	199,055	102,238	96,817	199,055	0	102,238	96,817
111	Black Canyon	133,399	36,447	96,952	133,399	0	36,447	96,952
Total Little Colorado		1,035,991	526,365	509,626	1,034,589	1,402	526,365	509,626
129	Middle Gila	19,859	13,162	6,697	13,291	6,568	13,162	6,697
134	Upper San Francisco	37,189	24,838	12,351	37,186	0	24,838	12,351
135	Pueblo Creek	1,292	1,292	0	1,231	61	1,231	61
136	Middle San Francisco	15,820	3,440	12,380	7,303	8,517	1,506	14,314
138	Upper Blue	69,628	62,071	7,557	59,101	10,527	51,971	17,657
139	Middle Blue	206,090	184,955	21,135	101,431	24,659	166,924	39,166
140	Lower Blue	93,042	70,502	22,540	75,642	17,200	66,541	26,501
141	Lower San Francisco	113,638	65,070	48,568	86,884	26,754	64,655	48,983
142	Eagle Creek	156,922	100,978	55,944	107,607	49,255	89,193	69,759
Total Upper Gila River		713,480	526,308	187,172	569,939	143,541	478,091	234,408
162	Upper Black River	147,234	143,787	3,447	147,234	0	143,787	3,447
163	Lower Black River	79,741	75,090	4,651	79,692	49	75,090	4,651
164	White River	2,388	2,388	0	2,388	0	2,388	0
165	Canyon Creek	16,403	16,299	104	16,403	0	16,299	104
172	Carrizo Creek	3,909	2,577	1,332	3,909	0	2,577	1,332
173	Upper Tonto Creek	3,399	3,394	5	3,399	0	3,394	5
Total Salt River		253,074	243,535	9,539	253,025	49	243,535	9,539
FOREST TOTAL		2,002,545	1,296,208	706,337	1,857,553	144,992	1,248,891	753,654

1/ These acres reflect the best estimates of unsatisfactory condition based on available information. Past management changes may result in improved watershed conditions during the first period.

There are significant acres of unstable soils on the Apache-Sitgreaves. These soils are derived from three different parent materials which influence soil properties and thereby influence land management. Soils associated with cinder cones, in some cases, are thin, highly erosive, and have limited amounts of available soil moisture for reforestation. Soils associated with sandstone tuff of the Datil Formation are highly erosive and have implications affecting road construction activities which expose this weakly cemented bedrock. Finally, the soils associated with Gila Conglomerate formation (Alpine and Clifton Districts) are thin, highly erosive, and currently exceed soil movement tolerences as computed by the USLE (Universal Soil Loss Equation). These soils rely heavily on vegetative ground cover (litter and plants) for protection. Generally, livestock grazing and poorly located/maintained roads are the primary sources of non-point pollution because of soil movement through the Forest.

The quality of the water that is produced on the Forest is good to excellent, however, some problems do exist. Water quality standards for sediment, temperature, and bacteriological parameters are occasionally exceeded, usually during times of extreme flow conditions (peak and minimum flow events). Suspended sediment/turbidity can be attributed both to natural erosion processes and ground disturbing activities. High water temperatures are a result of insufficient vegetative cover to effectively shade stream water from direct solar radiation (especially critical during times of very low flow). Communities on the Forest with inadequate or non-existent sewage treatments plants and overland flow are the main causes of bacteriologicial water quality problems.

The West Fork of the Little Colorado River above Government Springs has been classified by the Arizona Bureau of Water Quality Control for unique water status. This classification was based on the high quality water in this stream and its contribution to exceptional recreation opportunities and ecological significance of the area.

Flood damage on the Forest has historically been to roads and road crossings throughout the Forest. Damage to camping and picnic areas has been limited to the Black River, Blue River, and Eagle Creek drainages. Floods of recurrence intervals of 7-20 years can be expected to produce major extensive damage to roads and other facilities located within floodplains. Plans for relocating previously flooded recreational facilities have been made, and will be relocated as money becomes available. The Clifton Ranger Station has been flooded twice and has now been moved to a safer temporary location.

A permanent location for the Ranger Station has not yet been determined. All flooded facilities including picnic areas, campgrounds, and Clifton Ranger Station, were built in the flood plain (before the advent of flood plain mapping). The downstreem communities of Clifton, Show Low, Snowflake, and Taylor, have been built in flood plains and have experienced flooding to some degree on a regular basis. On the National Forest, many flooded facilities were also built before the advent of floodplain management.

Three small municipal water companies obtain water from the Forest. They are Alpine, Bubbling Springs, and the Town of Eagar. Water for all three comapnies is derived from springs or a combination of springs and wells.

The Forest provides 44 potable water systems for public and administrative use. These systems are tested regularly in accordance with the Safe Drinking Water Act. All applicable substantive and procedural requirements are met. A list of major reservoirs on the Forest can be found in the following table.

Table G1. Major Reservoirs within the Apache-Sitgreaves National Forests (50 Ac. Ft. capacity and greater, and excluding single use irrigation reservoirs).

Reservoir Name	Capacity Ac.Ft.	Surface Area Acres	Owner	Major Uses
Nelson	831	100	AG&F - USFS	Fishery, Recreation
Mexican Hay	821	164	Lyman Water Co.	Irrigation, Fishery
Colter	724	100	Lyman Water Co.	Irrigation, Fishery
River	1,609	127	Round Valley Water Users	Irrigation, Fishery
Tunnel	694	44	Round Valley Water Users	Irrigation. Fishery
Bunch	612	44	Round Valley Water Users	Irrigation, Fishery
Carnero	375	65	Fish Creek Irrigation	Irrigation, Fishery
Lee Valley	400	45	AG&F	Fishery, Recreation
Norton	232	56	Fish Creek Irrigation	Irrigation, Fishery
Wiltbank	205	26	Fish Creek Irrigation	Irrigation, Fishery
Geneva	150	57	Fish Creek Irrigation	Irrigation, Fishery
White Mountain	2,390	450	Round Valley Water Users	Irrigation, Fishery
Woodland	140	23	Woodland Irrigation	Irrigation, Fishery
Rainbow	1,200	154	Show Low Irrigation	Irrigation, Fishery
Scott	1,450	75	Show Low Irrigation	Irrigation, Fishery
Show Low	6,200	200	Phelps-Dodge	Transfer, Fishery
Fools Hollow	3,217	149	AG&F	Fishery, Recreation
Little Mormon	1,400	125	Silver Creek Irrigation	Irrigation, Fishery
Telephone		23	USFS	Wildlife
Lake of the Woods	120	20	Private	Fishery, Recreation

Table 61. Major Reservoirs within the Apache-Sitgreaves National Forests (50 Ac. Ft. capacity and greater, and excluding single use irrigation reservoirs). [Continued]

Reservoir Name	Capacity Ac.Ft.	Surface Area Acres	Owner	Major Uses
Bear Canyon	1,430	63	AG&F	Fishery, Recreation
Chevelon Canyon	8,540	200	AG&F	Fishery, Recreation
Willow Spring	3,654	150	AG&F	Fishery, Recreation
Woods Canyon	1,013	50	AG&F	Fishery, Recreation
Black Canyon	1,581	78	AG&F	Fishery, Recreation
Luna Lake	1,390	94	Luna Irrigation Dist. AG&F	Irrigation, Fishery
Crescent	5,800	175	AG&F	Fishery, Recreation
Big Lake	9,300	532	AG&F	Fishery, Recreation
Basin	138	60	AG&F, USFS	Wildlife
Sierra Blanca		41	Private	Fishery
Merlyn Reservoir	57		USFS	Wildlife

The Forest will be involved for the next decade in adjudication of water rights on the Salt River, Little Colorado River, and the Upper Gila River. At the conclusion of these adjudications, the Forest will have a realistic idea of how water rights may affect our Forest programs. The Forest has sufficient water for current management. Water use for Forest management will increase only slightly from the present until 2030. Increased water use will be limited by the difficulty of obtaining water rights.

The need to maintain instream flows for many streams on the Forest is recognized. However, it is felt that in sites, water appropriations are not the best strategy for maintaining these needs. Most of the streams are in fully appropriated river basins. The downstream appropriations provide some assurance that new diversions will not be approved by the Arizona Department of Water Resrouces. Other streams are remote and inaccessible, so future diversions are precluded.

The Forest produces an average of 379,000 acre feet of water annually. Most of the water produced on the Sitgreaves Forest and the northern part of the Apache Forest flow into the Little Colorado River.

Water from the East and West Fork of the Black River flows into the Salt River storage reservoir system and is used in the Phoenix metropolitan area. Water in the San Francisco River, Blue River, and Eagle Creek flow into the Gila River and is used primarily by downstream appropriators. Water from the Forest is used in communities throughout the Forest as well as for Forest activities such as recreation, livestock, wildlife, and fire suppression. Most communities throughout the Forest depend on wells, while only three small communities depend on surface water.

Future Trends

Demand for water will always exceed supply, except for those exceptionally wet years when the amount of water produced is greater than downstream storage capacity. There are limited opportunities on the Forest for increasing water yield and improving timing of flow through vegetation management.

National Forest administrative demands for water are very small compared to downstream user demands, yet they are vitally important to proper management. The demand for more water developments on the Forest will continue to increase as demands for Forest recreation increase. This will necessitate additional water rights, some of which may be acquired by application from the State, while others may have to be purchased from other water users. A State water right for each new surface development and each new spring development will be needed for future campgrounds, range waters, and wildlife habitat projects. Federal reserved water rights will also continue to increase slightly for such uses as administrative sites, fire suppression, and road watering during construction.

Anticipated future water needs for Forest management purposes will require approximately 5 new water developments per year. Sufficient water rights are probably already held by the Forest. Many of the projected new uses will require a severance and transfer of an existing water right, others may require new water right appropriation.

MINERALS

The potential for mineral discovery, both energy and non-energy, is low on the Apache-Sitgreaves National Forest.

Well Over 100,000 acres of National Forest System lands are leased for oil and gas. The number of acres leased fluctuates annually. In spite of the large number of acres leased, only occasional seismic exploration activity has actually occurred. In 1985 public meetings attended by a local utility concerning proposed geothermal development on private lands near Nutrioso indicates the same potential probably exists on the adjacent National Forest System lands. Recently there has been an active gold mine on the Clifton Ranger District, however, production was marginal. A "Picture rock"

(Coconino Sandstone) mine is operated on the Heber Ranger District. The only other minerals known to be relatively plentiful, are common variety minerals.

Minerals identified as having some potential for occurrence on the Forests are identified below.

Table 62. Areas of Mineral Potential by Mineral Type and Rating 1/

Mineral Type	Rating	Potential Area 2/
LOCATABLES (Apache N.F.)		
Precious and base metals (i.e., gold, copper)	B4	South 1/2 Apache N.F.
Manganese	B4	Southern boundary of Apache north of Clifton
Zeolites	B4	Alpine/Nutrioso Area
LOCATABLES (Sitgreaves N.F.)		
Coconino Sandstone	A1	South and West portions of Chevelon District.
Limestone	YX	Chevelon and Heber R.D.
LEASEABLES (Apache N.F.)		
No known non-energy leasable minerals.		
LEASEABLES (Sitgreaves N.F.)		
No known non-energy leasable minerals.		
ENERGY MINERALS (Apache N.F.)		
Oil and Gas	B4	North end. Specifically N.E. corner.
Geothermal	B4	Central and Northern portion of Apache and south tip, west of Clifton.
ENERGY MINERALS (Sitgreaves N.F.)		
Oil and Gas	B4	Most of Forest.
Uranium	B4	Significant portion of Forest.
Coal	B4	Pinedale Area. Northside of Lakeside R.D.
COMMON VARIETY (Apache N.F.)		
Cinders	A1	Springerville R.D.
Pumice	B4	S.W. corner, Clifton R.D.
Rock	A1	Forest-wide
Sand	B4	Potentially Forest-wide

Table 62. Areas of Mineral Potential by Mineral Type and Rating 1/ (Continued)

Mineral Type	Rating	Potential Area 2/
COMMON VARIETY (Sitgreaves N.F.)		
Cinders	A1	Lakeside R.D.
Rock	A1	Forest-wide
Sand	B4	Forest-wide
Clay	B4	East side - Heber R.D.

1/ Ratings are defined in Table 63.

2/ "Potential" indicates that there is a possibility the mineral might occur within the identified area.

Table 63. Mineral Potential Ratings - Criteria.

Rating	Expected Mining Activity to Year 2030	Geologic Mineral Favorability
A1	Production	Demonstrated Favorable
A2	Development	Demonstrated Favorable
A3	Exploration	Demonstrated Favorable
A4	Prospecting	Demonstrated Favorable
B1	Production	Theoretically Favorable
B2	Development	Theoretically Favorable
B3	Exploration	Theoretically Favorable
B4	Prospecting	Theoretically Favorable
YX	Prospecting	Can't Predict

Table 64. Annual Common Variety Production

User	Cubic Yards
Arizona Department of Transportation	20,000
County Road Agencies	3,000
Commercial Producers	35,000
Personal Use	10,000
Forest Service Use	
Construction & Maintenance	5,000
Timber Sales	40,000
TOTAL	113,000

Table 65. Common Variety Pits

STATUS	NUMBER
Open, under special use permit	24
Available, not under permit	43
Open, but should be closed	61
Closed, satisfactorily restored	33
*Non-existing, identified potential source	37
	162 (Sub-total)

*An average of 4 new pits were opened each year from 1975-1980.

Table 66. Outstanding and Reserved Mineral Rights & Mineral Withdrawals

Minerals Reserved by Others	
ACQUIRED LANDS	
Apache National Forest	202.93 acres
Sitgreaves National Forest 1/	157,438.05 acres
TOTAL	157,640.98 acres
DISPOSED OF LANDS	
Minerals Reserved by U.S.	
Apache National Forest	0 acres
Sitgreaves National Forest 2/	2,056.19 acres
TOTAL	2,056.19 acres
Withdrawals	
Wilderness Areas	23,359 acres
Adminstrative Site Withdrawals	4,086 acres
Recreation Site Withdrawals	25,024 acres
Roadside Zone Withdrawals	5,143 acres
River & Water Project Withdrawals	26,061 acres
Research Watershed Withdrawals	2,740 acres
Botanical, Research Natural Area Withdrawals (Phelps Cabin)	432 acres
Coal Withdrawals	89,045 acres
TOTAL	175,890 acres

1 / Bulk of this acreage is Aztec Sections.
2 / All coal reserves.

Access - With the addition of two wilderness areas in 1984 totalling 16,280 acres, access for mineral exploration has decreased. The Blue Range Primitive Area as well as the proposed additions and deletions, are all administratively managed as wilderness. Access within the Blue would be comparably restrictive; however, exploration can continue. The rest of the two forests are generally considered open to exploration activities except for withdrawn areas (see Table 66). For protection of other resources, various restrictions can be placed on mineral exploration on a case by case basis. Interest has been expressed toward consideration of various rivers/creeks for Congressional Wild and Scenic River designations or for administrative designation as Special Management Areas. Either action could prompt a decision to withdraw these areas from mineral entry therefore restricting access for exploration.

Future Trends

The interest in minerals is generally expected to increase nationally, so the trend will no doubt be the same on the Apache-Sitgreaves. Since the Forest is not highly mineralized, the impact will probably be less than many Forests. The possibility of discovery does exist, particularly on the southern part of the Apache National Forest. Exploratory activity is expected to be greatest in this area. Lands leased for oil and gas will continue at about the same level until some exploratory drilling indicates a resource exists.

Sources of common variety minerals on private lands within or adjacent to the National Forest are said to be nearing final exploitation with no identified significant new sites. With the increasing land values on these private lands, it should be anticipated that more presure will be felt to develop future pits on the National Forest.

LANDS AND SPECIAL USES

There are approximately 503 special use permits (non-recreation) in effect on the Forest (see Table 67). Approximately 30 new permits are issued each year. There are eight commercial electronic sites, two of which are becoming heavily used (Greens Peak and Porter Mountain). It is anticipated that their capacity may be reached in the second decade. Greens Peak and Porter Mountain are predominately low power electronic sites. Requests have been made to permit high power broadcast installations at both sites. Generally, low power uses and high power broadcast uses are not compatible. Currently, no existing electronic site is available to meet the demand for high power broadcast uses.

Unauthorized uses exist in several areas. Some of these could be legitimately resolved through special use permits, land exchange, or the Small Tracts Act.

Future Trends

As the State's population increases and local populations expand, so will requests for special uses. The demand for local broadcast services (radio) will require high power electronic sites be made available either on private land or National Forest System lands. Unauthorized uses will continue to occur.

Special Uses

Table 67. Special Uses (1984)

KIND OF USE	CASES	ACRES PERMITTED
Agriculture	13	663.0
Community	13	247.8
Industrial	65	932.8
Public Information	6	.6
Research	23	150.9
Transportation	138	5,742.7
Utilities, Communications	94	5,060.2
Water Uses	151	5,253.4

Table 68. Electronic Sites.*

Electronic Site*	Acres	Space for Additional Users
Greens Peak	5	Yes (Low Power Only)
Porter Mountain	6	Yes (Low Power Only)
Brookbank	3	Yes (Low Power Only)
Long Hollow	.5	No
AT&T Site	2	No
Sizer Knoll	.1	No
Gobbler Peak	.4	No
South Mountain	.6	No

*With Commercial Users

Land Acquisition

The current land exchange program is minimal. Most effort is concentrated on ongoing cases rather than initiating new exchanges. However, there are numerous opportunities for beneficial exchanges. Table 69 shows the approximate acres of land available for disposal and acres identified for acquisition. The communities of Show Low, Pinetop, and Lakeside are within the Forest boundary and they anticipate adjoining National Forest lands will be available for acquisition to accommodate expansion needs.

Table 69. 1984 Acquisition.

CLASSIFICATION	ACRES
Desireable (private)	27,576
Base for Exchange (public)	12,060

Future Trends

The State's growing population and the popularity of the private land within the Forest boundary for development will dictate an active exchange program. Other acquisition methods will seldom be utilized.

Rights-of-Way

Lack of legal access is not a serious problem on most of the Apache-Sitgreaves. There are 4 roads totalling 3.4 miles of known right-of-way needs. Some additional demands may surface, but the current program of road right-of-way acquisition should suffice.

There has been no effort to acquire trail rights-of-way. Approximately .8 miles of trail right-of-way needs are known. Problems have not surfaced because most of the rights-of-way needed are in low-use remote areas where landowners have felt very little impact from public use.

Future Trends

A past aggressive right-of-way acquisition program along with cooperating local agencies are reasons there are few miles of rights-of-way still needed. This approach will continue. New roads across private land will require legal access, however, this situation is not anticipated to occur. Trail rights-of-way acquisition will remain a low priority.

Land Line Location

Resolving unauthorized uses, harvesting timber, and identifying National Forest lands for the public, are all important reasons for land line location work. Current funding allows a very modest program, primarily as needed to meet Forest targets. At the current rate, the total needs will not be met in the 50 year planning horizon. In addition, maintenance needs of posted lines increases every time a survey is completed. Currently, maintenance is not an adequate portion of the total program.

Future Trends

Theoretically the land line requirements will become minimal. However, due to historically poor funding to maintain existing boundaries many lines will have to be resurveyed. Even a current level of an acquisition program will require a land line program. Cost/Share projects will continue to be encouraged.

Corridors

No new major road or transmission corridors are anticipated during the first planning period. At the present time, there are three major transmission corridors across the Forest. Window areas are where future transmission corridors or pipelines can best be accommodated, which represent areas parallel to existing corridors.

Table 70. Corridor Exclusion and Avoidance Areas.

Exclusion Acres	Avoidance Acres	Window Acres
210,769	1,183,180	1,909

Future Trends

New power plants are projected to be built north and east of the Forest so new power transmission corridors are likely. However, new corridors on the Apache-Sitgreaves are not projected before the second decade. Depending on where the power plants are built, new corridors may be accommodated through expansion of existing corridors. A new corridor to service a possible pulp mill at McNary may be proposed.

Research Natural Areas (RNA's)

The Apache-Sitgreaves National Forest has one designated RNA, Phelps Cabin Research Natural Area (312 acres). Research Natural Areas (RNA's) are managed to provide and protect natural diversity in all of its forms. The area typifies important forest, shrubland, and grassland types having special or unique characteristics of scientific interest or importance. Research Natural Areas are established for non-manipulative research, observation and study.

Proposed Research Natural Areas include the North Fork of Thomas Creek (500 acres) for Englemann spruce, Escudilla Mountain (909 acres) for Arizona Fescue and Mountain Muhly, Hayground Creek (316 acres) for blue spruce, and Wildcat Canyon (513 acres) for pinyon-juniper.

Future Trends

Additional potential Research Natural Areas may be identified and established to meet national and Regional goals.

Wild and Scenic Rivers

Segments of Eagle Creek, Black River, East Fork of the Black River, West Fork of the Black River, and Chevelon Creek have been inventoried by the National Park Service as potential Wild and Scenic Rivers. Leonard Canyon, Clear Creek, and Willow Creek are other river segments with potential for Wild and Scenic River designations.

Eighty-five percent (85%) of the Black River and eighty-four percent (84%) of Eagle Creek are not under Forest Service jurisdiction. Therefore, Eagle Creek was not considered further as the owners of the 84% have no desire for the Creek to be studied for inclusion.

However, the 15% of the Black River on the National Forest can be combined with other study segments (East and West forks) to make a more viable option for analysis. Combining the main stem of the Black River with the East and West Forks provides an additional option for consideration; however, the relatively short length (16 miles) of the main stem does not preclude it from being a viable option by itself. After excluding Eagle Creek, 85% of the Black River, and the portion of Chevelon Creek on private land, approximately 146 miles of streams are eligible for Wild and Scenic River classification. Candidate streams have been studied by the I.D. Team and recommendation for inclusion into the Wild and Scenic Rivers System are found in the Alternatives Chapter.

Each creek/river was broken down into segments for study purposes. Each segment as listed in the following table, represents a unique entity possessing similar characteristics which are addressed individually.

Table 71. Wild and Scenic Rivers.

BLACK RIVER AND EAST/WEST FORKS				
Segment Description	N.F. Miles	Wild	Scenic	Recreation
1. Black River (main stem)	16		16	
2. East Fork - Confluence with West Fork to Diamond Rock Campground	7			7
3. East Fork - Diamond Rock to Three Forks	4			4
4. East Fork - Three Forks to source (Spence Springs)	13			13
5. West Fork - Confluence with East Fork to Thompson Ranch	13	6	3	4
TOTALS	53	6	19	28

Table 71. Wild and Scenic Rivers (Continued).

CHEVELON CREEK

Segment Description	N.F. Miles	Wild	Scenic	Recreation
1. Woods Canyon Creek - Woods Canyon Lake to confluence with Willow Springs Creek	5.4		5.4	
2. Willow Springs Creek - Willow Springs Dam to confluence with Woods Canyon Creek	3.2		3.2	
3. Chevelon Creek to Chevelon Dam	14.2		14.2	
4. North Forest Boundary to Chevelon Lake	15.7		15.7	
TOTALS	38.5	0	38.5	0

LEONARD CANYON, CLEAR CREEK, WILLOW CREEK

Segment Description	N.F. Miles	Wild	Scenic	Recreation
1. Leonard Canyon - Knoll Lake to Clear Creek	20.2		20.2	
2. Clear Creek - Confluence with Leonard Canyon to Forest Boundary	18.1	18.1		
3. Willow Creek - Wiggins Crossing to Clear Creek	16.6		16.6	
TOTALS	54.9	18.1	36.8	0

Future Trends

The Apache-Sitgreaves National Forests presently have no classified Wild and Scenic Rivers. Existing as well as normally expected future resource management practices will have minimal effects on the river segments currently eligible for the Wild or Scenic classifications. Segments would not be affected to the point where no classification could be assigned.

Special Areas

The increased use of the trails along the Mogollon Rim combined with more intensive resource activities will require greater coordination needs for protection of the historic sites and route of the General Crook Military road. No significant additional increase in use is anticipated due to designation of the General Crook Trail as a National Historic Trail. Increases in use will be related more to special publication materials and new signing and related recreation/interpretive developments.

The Escudilla Demonstration Area was established in the 1970's as a focal point for environmental education. It is located on the Alpine Ranger District approximately 15 miles south of Springerville, Arizona. Units within the area are: Terry Flat, Scenic Backdrop, Alpine Watershed, and Top of Escudilla (a majority of this unit is in the Escudilla Wilderness).

The overall objective of the area is to demonstrate integrated management of resources including scientific and educational use while recognizing existing management practices. (A copy of the Escudilla Demonstration Area Plan is available in the Forest Supervisor's Office.)

PROTECTION

Air Quality

The concept of Air Quality Related Value (AQRV) was established for Class I areas. Federal land managers were given an affirmative responsibility to protect AQRV's in Class I areas, which for the Forest Service are wilderness areas in existence in 1977. The only Class I air quality area on the Forest is Mt. Baldy Wilderness Area (7,079 acres). Air quality related values are monitored in the Mt. Baldy Wilderness area. Prevention of Signficiant Deterioration permit applications are reviewed to determine the potential effect increased emission for major stationary sources will have on AQRV in the Mt. Baldy Wilderness Area.

Emmission levels that are a result of Forest management practices will remain fairly constant during the next 20 years. Emmissions created by urban development, copper smelters, and coal fired generator plants will continue to increase. This increase will not be dramatic, but could systematically decrease air quality on the Forest. Much of this reduction in air quality will be in the form of reduced visibility. Reduced visibility could detract from the recreation or wilderness experience. The amount of reduced visibility will be dependent upon the extent State and Federal laws are enacted and administered.

Fire

Large and catastrophic wildfires have occurred over extensive areas of the Apache-Sitgreaves National Forest during the last 25 years. During the 1950's, many large costly fires occurred including the Dudley Fire, 21,000 acres. During the 1960's few, but very costly fires occurred including the Hatchery Fire. The 1970's have again seen an increase in large fires, the Carrizo - 1,650 acres (56,790 acres including Fort Apache Indian Reservation - FAIR); Bull Flat - 2,250 acres (5,550 acres including FAIR); Day - 3,618 acres; Willow - 2,850 acres; and the Twin Fire - 1,100 acres.

During the 10 year period of 1973 through 1982, approximately 18,200 acres were burned by "C" class (over 10 acres) or larger fires. Of this 1,820 acres annually burned, it is estimated that 1,200 acres are in the suitable timber acres and the timber resource has been damaged substantially.

Much of the past loss can be attributed to substantial accumulations of slash following harvest and thinning operations. Some hazard reduction was accomplished in the period prior to 1975, but it was not sufficient to decrease the area lost to fire. Since 1975, a greater effort has been made to substantially reduce the slash hazard.

Interior boundaries are with private landowners and are primarily associated with rural communities. Nearly all are in areas of high hazards and risks which constitute a high potential for large disastrous fires. The rural communities involved are Alpine, Nutrioso, Greer, Pinetop, Lakeside, Show Low, Linden, Pinedale, Clay Springs, Overgaard, Heber, and Forest Lakes.

No resource values have been assigned to fires less than 10 acres in size or fires in the pinyon-juniper, and grass and shrub fuel models. An average resource value loss of $602.00 was assigned to the acres burned in the timber fuel model. This figure was developed utilizing the Fire Management Analysis. For years 1970 through 1979 annual average acres burned was 2,760; of this 1,788 acres in the pinyon-juniper class, and larger Timber fuel model, total value lost in 1982 dollars is $1,386,180.

Future Trends

The number of person-caused fires is expected to increase to 120 per year or 1-1/2 times the current average by 2030. This is anticipated because the 1980 population living within 1 hour travel time from the Forest will increase by 250%. The number of lightning caused fires will remain about the same.

An increase in both the number of fire and acreage burned is anticipated due to increased acitivites on the forest and reductions in the fire budget. Reductions in the fire budget and personnel will necessitate the need for multi-resource personnel to respond to fires. To some extent this increase will be offset by increased fuelwood use and continuing prescribed broadcast burning and activity fuel reduction projects.

Insect & Disease

The objective of Insect and Disease management is to integrate forest pest management with the environmental, biological, and economic concerns of all the Forest resources.

Currently, an aerial survey is annually conducted on all timbered lands on the Forest. The Forest Pest Management section of the Regional Office is responsible for these detection surveys. The aerial surveys are checked by ground surveys tc confirm insect or disease problems. The aerial survey for the Apache-Sitgreaves National Forest covers more than 887,000 acres of timbered lands. This survey covers all classes of timber land (wilderness, roadside zone, recreation areas, etc.).

Prevention is a continuing program on the Forest. Forest personnel are alert for any unusual insect or disease activities as they conduct their normal work activities. Aerial surveys can only detect damage that has occurred, while Forest personnel can often discover the beginning of a new problem.

The majority of suppression activities have been for control of dwarf mistletoe. Dwarf mistletoe is a wide spread problem on the Forest, and cutting of infested trees is the only control method. In all timber harvesting activities, (i.e., sawtimber and pulpwood) and precommercial thinning, control of mistletoe is a primary objective.

Current growth losses to dwarf mistletoe are estiamted to be 60-90 million board feet per year (Forest Pest Management Report R3-75-10). Ponderosa pine stands infected with dwarf mistletoe increased from 41% of the forest to 52% from 1954 to 1984. Present management could be expected to continue this trend.

An increasingly severe spruce bark beetle population on the White Mountain Apache Reservation could easily cross over onto the Forest at any time. The old growth timber in the Mt. Baldy Wilderness and adjacent timber stands would be very susceptible to attack.

At present, mountain pine beetle and ips are causing widely scattered mortality. The potential exists for locally heavy infestations, which could cause significant mortality and growth loss.

Incidence of root rot appears to be increasing. Root rot appears to have the greatest potential for mortality and growth losses in plantations. This would also represent a large dollar loss since reforestation is our most costly cultural treatment.

Rodents have caused tree plantation damage on a localized level. Some control measures have been instituted to protect individual plantations.

Energy

Energy is consumed in the production of goods and services from the National Forest. Primary consumptive uses are logging, road construction recreation, and administration of the National Forest. Present use is estimated at approximately 4 trillion BTU's per decade.

Future Trends

The Forest will continue to experience a large increase in recreation use as well as a slight increase in timber produced. In spite of measures to reduce energy use through more efficient vehicles, the amount of energy consumed will increase to approxiamtely 5 trillion BTU's per decade by the fifth decade.

FACILITIES AND TRANSPORTATION

The Forest is responsible for construction, maintenance, and administration of arterial, collector, and local roads. At present, there are 297 miles of arterial roads with Forest Service primary responsibility, 267 miles of arterial roads within the State Highway System, 490 miles of collector roads, 960 miles of local service roads, and 593 miles of local terminal roads currently assigned Forest Road Numbers and maintained. It is estimated another 5,700 miles of local roads exist on the Forest not currently assigned Forest road numbers. Approximately 3,000 miles of these roads are not needed for Forest management and will be planned for obliteration.

Those roads identified as needed intermittently, will be closed to public access during periods of non-use. The problem of additional roads cropping up as a result of fuelwood gathering, hunting, and off-road vehicle use will continue.

Eighty to ninety percent of the existing arterial and collector roads are in fair condition and generally conform to standards. There is a need to upgrade the remainder of the existing arterials and collectors to adequate standards. The local system is presently being brought to standard through timber sales. Unrestricted use on many roads, especially during periods of unstable road conditions, necessitates reconstruction periodically to maintain investments.

Road signing conditions range from adequate to poor. Some areas of the Forest have more signs than needed.

Table 72. Road Maintenance by Maintenance Level.

Maintenance Level	Miles
1	5,700*
2	593
3	975
4	475
5	297

*3,000 miles of this total is planned for obliteration.

Table 72A. Road Construction/Reconstruction Schedule.

Road No. & Name	Mileage	Road Standard	Est. Cost M$
300 Rim Rd. (FR 86 - HWY 260)	49.0	S.L. Aggregate	500
300 Rim Rd. (HWY 260 - FR 34)	11.0	D.L. Bituminous	1,750
300 Rim Rd. (HWY 260 - FR 86)	5.0	D.L. Bituminous & D.L. Aggregate	390
504 Heber-Mormon X-ing	26.0	S.L. Aggregate	
34 Wallace	22.0	D.L. Bituminous	2,200
45 Lakeside-Vernon	16.8	D.L. Aggregate	1,300
86 Black Canyon	3.0	D.L. Bituminous	
87B Greer Lakes	1.7	D.L. Aggregate	180
87 Badger Creek	2.0	D.L. Bituminous	180
115 Big Lake	2.6	D.L. Aggregate	350
285 Water Canyon	2.0	D.L. Bituminous	225
24 Buffalo	6.5	D.L. Bituminous	250
567 Red Hill	9.0	D.L. Aggregate	325
275 Stone Creek	3.5	S.L. Aggregate	275
249 3 Forks	0.75	S.L. Aggregate	75
249E Log Landing	6.0	D.L. Aggregate	75
276 Diamond Rock	2.5	S.L. Aggregate	180
Joe Tank	3.0	S.L. Aggregate	125
475 Juan Miller	5.0	S.L. Aggregate	45
217 Eagle Creek	5.0	S.L. Aggregate	180
		S.L. Aggregate	125

D.L. - Double Lane

S.L. - Single Lane

Future Trends Transportation

Based upon recent trends, traffic volumes related to Forest visitor use will continue to increase. Primarily, arterial and collector systems will carry the bulk of this volume, but there will also be an increased use of local roads for hunting and dispersed recreation activities. As use continues to rise, demand for better road standards on the arterial/collector systems will also increase. Public pressure for better road management of the local road systems will continue with emphasis on reducing open road densities and road costs.

Administrative Facilities

A summary of buildings and structures by primary use is contained in Table 73. Buildings and structures are inspected annually and maintenance performed where necessary, based upon available funding, with health and safety items receiving priority. Dams are inspected annually in conjunction with State officials for conformance to health and safety standards. Needed work is accomplished by the special use permittees with the Forest cooperating where appropriate.

Table 73. Summary of Buildings and Structures.

		GROSS SQUARE FEET			
Building Category	Buildings	Number of 1,000	Under Buildings	Number of 1,000	Over
House	5	3,258	23	33,344	
Duplex			6	11,578	
Mobile Home	58	29,784	6	7,320	
Barracks	5	1,120	8	18,541	
Office	1	465	7	16,533	
Service	3	1,592	11	42,586	
Storage	16	3,552	8	19,909	
Others	14	1,260	2	17,162	
Leased	7				
TOTAL	102	41,031	71	167,573	

Table 74. Facility Construction/Reconstruction Needed Period 1-5.

District	Name	Est. Cost M$
Chevelon	Chevelon Housing	260
Lakeside	Lakeside Sewer	100
Lakeside	Lakeside Warehousing	250
Lakeside	Administrative Site Paving	80
Alpine	Alpine Housing	350
Alpine	Blue Camp Crew Quarters	80
Springerville	Greer Crew Quarters	80
Lakeside	Pinedale Garage	25
Lakeside	Lakeside Office	50
Chevelon	Dutch Joe Lookout	183
Springerville	Big Lake Sewer	500
Heber	Heber Crew Quarters	100
Heber	Administrative Site Paving	80
Lakeside	Lake Mountain Lookout	50
Chevelon	Chevelon Office	100
Clifton	Clifton Administrative Site	200
Heber	Administrative Site Fences	25
Chevelon	Administrative Site Fences	25
Chevelon	Promontory Lookout and Cabin	185
Chevelon	Administrative Site Paving	80
Chevelon	Woods Canyon Well	50
Heber	Canyon P.T. & Heber Water Systems	80
Springerville	Phelps Cabin	40

Future Trends

Building maintenance if continued at present levels, will contribute to reduced building life, and increased costs for construction/ reconstruction in future years. The need for additional facilities will remain low, but reconstruction or replacement of existing structures will occur as design life is reached. Use of modular structures in place of conventional construction will occur.

With some minor exceptions, the condition of the structures is fair to poor. The administrative structures at Lakeside, Heber, and Chevelon are 18 to 20 years old and are in fair condition. The remaining structures on both forests are 30 years plus old, and are generally in poor condition.

4. Environmental Consequences

OVERVIEW

Environmental consequences are the effects and impacts of implementing an alternative on the physical, biological, social, and economic environment. This chapter displays outputs by alternative and describes the direct and indirect environmental consequences that result from alternatives considered in detail. Direct environmental effects are defined as those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity but are significant in the foreseeable future.

Analysis and evaluation of the consequences provide the analytic basis for comparison of alternatives. Alternatives considered in detail in developing the Apache-Sitgreaves National Forest Land and Resource Management Plan are described in Chapter 2.

Environmental consequences of the alternatives result from application of various combinations of management prescriptions. In each alternative, the mix of prescriptions produces different levels of resource outputs, including recreation, wildlife habitat, timber and fuelwood production, water yield, watershed condition, and grazing capacity. The interaction between the level of outputs and location of their production and timing results in distinct environmental consequences. This mix represents the short-term use of the environment.

Environmental consequences for all alternatives are limited and/or mitigated to some extent because of Forest-wide management requirements imposed to ensure long-term productivity of the land. These requirements are contained in standards and guidelines and apply to all management prescriptions. The alternatives considered in detail do not significantly reduce long-term productivity. See Chapter 4 of the Plan for the detailed Forest-wide Management Requirements and Management Area Prescriptions. Chapter 5 of the Plan contains the monitoring requirements that assure long-term productivity is maintained while meeting the goals and objectives.

Net public benefits (NPB) are derived from resources with market and assignable prices as well as resources and conditions for which prices cannot be determined (see Chapter 2 for more detailed discussion of NPB). Examples of priced components that contribute to the NPB are timber production, acre/ft of water yield, forage produced, and cords of firewood harvested. Examples of nonpriced components that contribute to the NPB are acres of visual quality, amount of soil lost, acres of threatened or endangered wildlife habitat enhanced or maintained, or the quality of a wilderness experience.

Nonpriced benefits include quantitative and qualitative outputs and effects. Quantitative and qualitative outputs and effects are crucial in understanding the whole picture of environmental consequences and NPBs. For example, watersheds are described both in terms of how much water they yield, and in terms of satisfactory or unsatisfactory condition. Quantitative and qualitative outputs are discussed in this chapter and in Chapter 2. The relationship between resource outputs and environmental qualities and consequences is explained, and where relevant, the ties between the quantitative and qualitative aspects are included.

Predicted outputs for the planning period were developed using FORPLAN. Additional detail on predictions of multi-resource interactions for each alternative is included in planning records on file at the Forest Supervisor's Office and in Appendix B.

The alternatives considered in detail resulted in little or no significant impact on several components of the environment. The components of the environment that are not significantly affected by the alternatives are listed below. These are not discussed further in Chapter 4.

Ground water recharge
Prime farmlands
Wetlands
Flood plains
Noise levels
Urban quality
Regeneration of timber stands 5 years after final harvest
Native American religious freedom

Environmental consequences are estimated by resource element for each alternative. Short term uses and long term productivity, as well as direct, indirect, and cumulative effects are addressed in the first part of each resource discussion. The effects discussed are the net effects of each alternative on a particular resource. For example, the minerals section displays how the minerals resource is affected by the alternatives and not how other resources may be affected by minerals activities. The discussions reflect the net impact of management activities within an alternative and individual effects of various activities are normally not displayed. For example, the effects on soils from an alternative are the net effects from timber harvest, grazing, minerals, and watershed improvement projects. This approach provides a useful evaluation among alternatives.

In some cases, the level of output or activity is displayed as a surrogate for the environmental effect. In these cases, there is a direct relationship between the level of activity and the environmental consequences of the alternative. For example, displaying a higher timber harvest in one alternative than in another alternative implies consequences because of the increased level of activity.

Relationship Between Short-Term and Long-Term Productivity

Short-term uses are those that occur annually while long-term productivity refers to the capability of the Forest to continue producing goods and services to the end of the 50 year planning period and beyond. Short-term uses are timber and fuelwood harvest, all recreation uses, livestock grazing, mineral extraction, and special land uses.

Soil and water are the primary resources upon which productivity is based. Short-term uses that damage soils and soil water relationships impair long-term productivity. Management requirements provide for protection of long-term productivity by requiring that impacts on soils and water from short-term uses be mitigated and/or that short-term uses enhance soil productivity and water yield and quality.

Irreversible and/or Irretrievable Commitments

Irreversible and irretrievable resource commitments are noted where appropriate. Irreversible commitments are resource uses that affect the nonrenewable resources--soils, minerals, and cultural resources. Such commitments of resources are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at great expense, or the resource has been destroyed or removed. The irretrievable commitments represent opportunities foregone for the period during which resource use or production cannot be realized. These decisions are reversible, but the production opportunities foregone are irretrievable. Irretrievable losses are calculated by subtracting selected outputs of the Alternatives from the alternative with the highest output in Period 1.

Adverse Environmental Effects That Cannot Be Avoided

Probable adverse environmental effects that cannot be avoided are discussed. Unavoidable adverse effects result from managing the land for one resource at the expense of the use or condition of other resources. Management requirements in prescriptions mitigate most adverse effects by limiting the extent or duration of effects. Alternative formulation eliminated alternatives that would have resulted in excessive impacts.

SECTION A
RESOURCE
CONSIDERATIONS

RECREATION

Dispersed Recreation

The dispersed recreation resource is measured in terms of the level of dispersed recreation visitor use, the variety of recreational opportunities available, and the quality of the recreation experience. The level of these factors vary among alternatives.

Dispersed recreation use is measured by estimating the number of recreation visitor days (RVD's) projected for each alternative. RVD's are defined in the Glossary. Estimates of RVD's for each alternative are based on past use, population projections, access, facilities provided, and the variety of opportunities provided.

Recreation capacity and variety of experiences are measured by the acres in various recreation opportunity spectrum (ROS) classes. The ROS is a classification system that classifies land characteristics such as extent of access - and how those characteristics influence recreation activities. Acreage of the Forest available for certain uses is another method of assessing recreation opportunities.

Using factors calculated by Forest Service recreation researchers, the annual capacity for dispersed recreation in each ROS class was determined then added together to equal the total dispersed recreation use capacity for the entire forest. None of the alternatives project use that exceeds the forests capacity of 3,675 MRVD's within the 5 planning periods.

Table 75. Average Annual Dispersed Use (MRVD's) (Does not include Highway Use)

	Alternatives					
Period	PA	A	B	C	D	E
1	714	840	736	753	891	863
2	915	1,127	948	978	1,200	1,203
3	1,132	1,267	1,162	1,221	1,540	1,517
4	1,333	1,403	1,362	1,455	1,647	1,846
5	1,553	1,544	1,564	1,675	1,701	1,846
50 Yr. Avg. Annual Use	1,129	1,236	1,154	1,216	1,395	1,455

Alternatives D and E allow a higher number of dispersed recreation visitor days than any of the other alternatives due to lack of developed recreation sites. This high use occurs along with a less than standard management level by the Forest Service, which results in the deterioration of desirable settings. These settings are predominately waterbased, therefore, water quality and the associated fishery resource would also deteriorate. The fishery resource in most waterbased settings is a principal attraction of recreation use. The high use, lack of management, and corresponding deterioration of the desirable settings result in a lesser quality of recreation experiences as well as a reduction in the variety of possible activities.

The other four alternatives (PA, A, B, and C) are very similar in the number of RVD's produced, A being the highest and PA the lowest with only a 9% difference. The principal effect of these alternatives is that the availability of desired settings for recreation use is restricted. A much higher management level is implemented (PA the highest and A the lowest of the four) to constrain use in specific dispersed areas to levels at or below their determined capacity. This constraint on use causes some users to go elsewhere off the forest; however, for the remaining users, 84% in PA and 91% in Alternative C, the dispersed recreation opportunities available are greater in number (variety) and are at a higher experience level than Alternatives D and E. In addition to the maintenance of recreation variety and experience levels other resource qualities such as water quality and fisheries are also maintained and even enhanced.

Alternative A is slightly different than PA, B, and C, in that it turns away slightly less potential recreation visitors and therefore experiences slightly greater impacts to the desirable recreation settings, however, effects on variety and experience levels are minimal.

The variety of recreation opportunities is reduced in Alternative B over those in PA, A, and C, not due to the intensity of recreation management but due to a higher management intensity of the timber resource which, through road construction, reduces the acres in the semiprimitive-motorized ROS class. This change from the semi-primitive-motorized class to the roaded-natural class reduces the variety of recreation opportunities in that a greater number of acres is needed in the semiprimitive ROS classes to accommodate its compatible activities than is required in the roaded-natural ROS class. This change between ROS classes is significant due to the change occurring in timbered semiprimitive-motorized areas which aren't well represented on the Forest. The same change in ROS classes in Alternative B due to timber management also occurs in Alternatives D and E.

Table 76 displays the effect of each alternative on ROS classes, whether acres of classes increased slightly (+), increased significantly (++), remain unchanged (NC), are decreased slightly (-), or are decreased significantly (--). Significant change is 10% of the current (1985) acreage.

Table 76. ROS Class Changes by Alternative.

	Alternative					
ROS Class	PA	A	B	C	D	E
Primitive	NC	NC	NC	NC	NC	NC
Semiprimitive Non-motorized	NC	NC	NC	NC	NC	NC
Semiprimitive Motorized	-	-	--	-	--	--
Roaded Natural	+	+	++	+	++	++
Rural	NC	NC	NC	NC	NC	NC
Urban	NC	NC	NC	NC	NC	NC

Dispersed facilities in Alternatives D and E, such as parking areas, trailheads, corrals, and dispersed camp areas are maintained at minimal levels while some are closed, which reduces experience levels and in a few cases, affects the variety of opportunities.

Experience levels are enhanced and the variety of opportunities maintained in Alternatives PA, A, B, and C (slightly less) as facilities are adequately maintained and new ones built.

Construction of 50 miles of new trails over 2 decades in Alternatives PA, A, B, and C, and 25 miles in Alternative D near the high use areas, increases recreation opportunities in certain areas and better distributes use resulting in a positive effect on experience levels. Alternative E builds no new trails, therefore, causes overuse of the few trails near the high use areas which reduces the experience level.

All alternatives except E maintain trails at a level necessary to maintain desirable experience levels and variety of recreation opportunities. No trail maintenance in Alternative E would reduce experience levels and restrict access to portions of the forest that provide a variety of activity opportunities.

Alternatives PA, A, B, and C (C is slightly less) provide for the construction of new trails, higher maintenance levels of existing trails, and associated trail heads, therefore are responsive to the dispersed recreation SCORP objectives of the four affected counties.

Cross country ski routes can be signed as well as roads suitable for snowmobile trails. Alternatives D and E are not responsive to any of the county dispersed recreation SCORP objectives.

ORV Management

User conflicts between four-wheelers, hikers, motorcyclists, three-wheelers, horseback riders, snowmobilers, and cross country skiers have increased in recent years commensurate with increased demand for dispersed use.

In all alternatives, over 80% of the Forest remains without site specific ORV restriction/closure orders. However, an additional 12% (approx. 250,000 acres) outside of the wilderness and primitive areas is managed to maintain their primitive and semiprimitive non-motorized ROS classes. These areas are defacto ORV closures as they are inaccessible by motorized vehicle.

There are other management actions responsive to user conflict resolution. All alternatives have specified activity areas where one use is emphasized. There are approximately 1,460 acres in all alternatives with motorized snow travel restrictions in order to resolve conflicts between cross country skiing and snowmobiling.

Under all alternatives closures and/or restrictions could technically be implemented in response to the localized ORV conflicts that are currently recognized or anticipated. However, only Alternatives PA, A, B, and C have the funding level to enforce ORV restrictions. Alternatives B and C have funding levels of sufficient quantity to be more responsive if conflicts occurred at a higher than projected level. Alternatives PA, A, B, and C fully resolves while Alternatives D and E only partially resolves those conflicts associated with developed recreation sites. The roaded-natural ROS class acreage increases in Alternatives B, D, and E. Therefore, this added accessibility increases the opportunity for conflict compared with Alternatives PA, A, and C. Over-all road densities are reduced in Alternatives PA and D which would also lessen the opportunity of conflicts. Road obliteration projects are proposed in all alternatives except A, while PA has a much more aggressive program than the others (B, C, D, E).

Alternative PA resolves the issue. In descending order, relative to PA, Alternatives C, D, A, B, and E resolves the issue.

Developed Recreation

Effects of alternatives on the developed recreation resource are measured in three ways: by actual use (quantity), variety, and quality of experience.

Projected demand for developed recreation based on the States estimated population growth is 1,035 MRVD's in the first period and 2,293 MRVD's in period 5.

Projections for developed recreation activities best provided by the private sector such as organization camps, downhill ski areas, and summer cabin use are also expected to rise. Many of these types of activities are provided off of National Forest System Lands.

Table 77. Average Annual Developed Recreation Use - MRVD's

	Alternative					
Period	PA	A	B	C	D	E
1	1,035	1,035	1,035	822	760	773
2	1,365	1,365	1,365	1,050	872	893
3	1,686	1,686	1,687	1,233	1,027	1,060
4	1,988	1,988	1,988	1,357	1,084	1,132
5	2,293	2,293	2,293	1,467	1,122	1,191

This table indicates use provided for by both the Forest Service and private sector on National Forest System Lands.

Alternatives PA, A, and B totally meet estimated demand for all of the forest's traditional outdoor recreation activities. In these alternatives, all use at developed sites is managed at the standard service level which translates into adequate user safety and protection as well as properly maintained and serviced facilities.

These alternatives also extend the length of the season. The alternatives affect the specific environment in which they are located in various ways. Obviously the construction of new sites (698 acres) and expansion of some existing sites requires the cutting of trees and other vegetation as well as disturbing soil and other natural features. In most cases, however new developed sites are planned in areas where concentrated use has already caused adverse impacts to soils and vegetation.

Alternative C ranges in the portion of demand satisfied from 79% in period 1 to 64% in period 5. As with PA, A, and B, use in Alternative C is also managed at the standard service level with the same positive effects. The 125 acres impacted by the construction of new sites has the same effects proportionately as Alternatives PA, A, and B. Most of the users that represent the unmet demand will resort to dispersed use rather than not recreating at all. Alternative C aggressively manages the desirable dispersed recreation settings, therefore impacts from the misplaced developed site users are minimal.

Table 78. Additions to Public Sector Campground and Picnic Area Capacities (PAOT)

	Alternative					
Period	PA	A	B	C	D	E
1	1,050	1,050	1,050	830	0	0
2	565	565	565	375	0	0
3	1,520	1,520	1,520	1,100	0	0
4	1,275	1,275	1,275	855	0	0
5	725	725	725	465	0	0
TOTAL	4,585	5,135	5,135	3,625	0	0

Existing Sites = 4,935 PAOT

Alternatives D and E do not construct new sites, expand existing sites, or adequately rehabilitate existing sites, therefore over time, the gap between supply and demand widens. This situation pushes users into dispersed areas which are also inadequately managed. The effects of this spillover are addressed for Alternatives D and E in the Dispersed Section. Developed recreation use that does occur is managed at a mix of standard and less than standard service levels in period 1, eventually decreasing to less than stan- dard management in period 5. Less than standard management means inadequate law enforcement, minimal provisions for visitor safety, and minimally maintained and serviced facilities. Remaining sites are only open for the summer season (Memorial Day to Labor Day) therefore, the variety of recreation opportunities are reduced.

With the expanding population in the Southwest and in particular Arizona, there is an increased demand for downhill skiing. In spite of the good skiing conditions at existing ski areas in Arizona, many skiers drive to ski areas out of the State. One reason could be that State ski areas do not provide a desirable designation resort experience; another may be the lack of skiing variety as all of the State's ski areas are quite far from each other. A proposed ski area on South Mountain would provide the destination resort experience opportunity, as private land at the base is planned to provide those types of accommodations and services. A proposed ski facility at Green's Peak being approximately 15 miles from the Sunrise Ski Area would add skiing variety for the general area.

Adverse effects to the operation on the nearby Sunrise Ski Area on the White Mountain Indian Reservation are not anticipated. Studies indicate multiple ski areas in a localized area increase the variety of skiing opportunities, therefore enhances the marketability of all ski areas involved.

The construction of the ski areas where proposed will reduce the acres in the semiprimitive-motorized class by approximately 600 acres. This reduces the availability of certain experience levels of some activities for residents of Alpine as well as visitors, however, overall this effect is minimal.

Past studies indicate there is potentially one other suitable location for a downhill ski area on the Forest, Auger Canyon on the Alpine District. Auger Canyon is less accessible than South Mountain and does not have readily available utilities in place. Green's Peak also does not have readily available utilities, nor have private land close enough to accommodate associated development as with South Mountain and Auger. Green's Peak would require the use of National Forest system lands for base facilities and needed associated development. However, Green's Peak in combination with Sunrise would likely be utilized by skiers that prefer the amenities the more populated Pinetop/Lakeside/Show Low area offers.

Due to the high funding level for new facility construction in alternatives PA, A, and B, SCORP objectives in all 4 counties are nearly satisfied. There would be better access for the handicapped, new campgrounds would better accommodate travel trailers and motor homes, new boat ramps would be built or current ones improved on Crescent, Big Lake, Luna, and Scotts Reservoirs, new picnic facilities are planned, and additional facilities near waterbound opportunities would be built. Alternative C would only partially meet the SCORP objectives for developed recreation, however, as with alternatives PA, A, and B, existing sites would be rehabilitated, therefore certain improvements such as handicapped facilities could be added. Alternatives D and E fail to meet any of the SCORP developed site objectives. The objective of providing full RV hookups is not met in any alternative.

Adverse Effects

Adverse effects on dispersed recreation which cannot be avoided include: 1) temporary disruption of some dispersed use in timber sale areas during harvest; 2) disruption of wildlife because of increases in dispersed recreation activities; 3) increased user conflicts because of increased use coupled with reduced service levels in Alternatives D, E, and (to a lesser degree) A; 4) deterioration of desirable settings (streams, lakes, Rim vistas) due to increased use coupled with reduced management intensity in alternatives D and E; 5) and reduction in variety of recreation opportunities in alternatives B, D, and E, and quality of experiences in Alternatives D and E.

Adverse effects on developed recreation which cannot be avoided, include: 1) increasing user conflicts and deterioration of sites and nearby heavily-used dispersed areas when use exceeds capacity in Alternatives D and E; 2) minor reductions in available outputs such as timber and wildlife habitat from construction of sites; 3) and

reduction in the variety of recreation opportunities due to the loss of 600 acres in the semiprimitive-motorized ROS class due to the development of the proposed ski areas at South Mountain and Green's Peak

Irreversible and Irretrievable Commitments

There are nc irreversible effects on dispersed recreation.

The difference between Alternative D, which produces the highest dispersed recreation outputs, and other alternatives in the first period, is irretrievable and is shown in Table 79.

Table 79. Irretrievable Commitments in Dispersed Recreation - MRVD's

	Alternative					
	PA	A	B	C	D	E
Avg. Annual Difference	177	51	155	138	-	28

Alternative PA represents the largest irretrievable commitment, 177 MRVD's per year in the first period.

There are no irreversible effects on developed recreation from any alternative, since site productivity is preserved, all structures could be removed and the site restored to its original purpose. In actual practice, developed sites will continue to be used beyond the planning period unless they are destroyed by catastrophic events such as fire or flood. Therefore, the land developed for this single resource use represents an irreversible effect.

The difference between Alternatives PA, A, and B which all produce the largest number of developed RVD's and the other alternatives is an irretrievable loss and is shown in Table 80.

Table 80. Irretrievable Commitments in Developed Recreation - MRVD's

	Alternative					
	PA	A	B	C	D	E
Avg. Annual Difference	-	-	-	215	275	282

Differences between PA and Alternatives C, D, and E reflect the added emphasis being placed on developed recreation.

WILDERNESS MANAGEMENT

Alternatives PA, C, and E recommend that 23,659 acres be deleted from the Blue Range Primitive Area and 20,031 acres with higher wilderness values be added to the primitive designation. The proposed deletion involves areas with an intermixed landownership pattern as well as roads, therefore possessing lower wilderness values.

All of the alternatives propose managing the existing Blue Range Primitive Area as well as the proposed addition, as wilderness until Congressional action is taken and different direction is received. No Congressional action is anticipated that would change current direction through out the first planning period.

None of the alternatives propose any additions to the Forest's wilderness system acreage, with the exception of the Blue Range Primitive Area.

Alternative PA is the only alternative that manages any wilderness recreation use at the standard service level (all areas beginning in Period 2) which translates into managing use within capacity on the Mt. Baldy Area, therefore improving wilderness values. Alternative PA in period 2 provides for limits of acceptable change inventories in all areas managed as wil- derness which better ensures the maintenance of wilderness values for all wilderness management areas. Recreation use on the Mt. Baldy Wilderness will be reduced to capacity through better distribution of use, relocation of trailheads, and the possible incorporation of a permit system. Therefore, even with the improved wilderness funding level, the volunteer program will be expanded including the implementation of a wilderness information specialist program.

Alternative PA as well as Alternatives A, B, and C construct new trailheads where needed, upgrade existing trailheads and relocates the two Mt. Baldy trailheads to better areas. Alternatives A, B, and C could create adverse effects because use is attracted to the trail- head and the wilderness area without a complementing level of wilderness visitor management. This would result in a lower wilder- ness experience level. Volunteers would be relied upon in Alter- natives A, B, and C to upgrade the standard of management.

Trails are adequately maintained to protect the wilderness values and maintain experience levels in all Alternatives except E. Inadequate trail maintenance in Alternative E will restrict access over time, particularly in the Blue Range, therefore decreasing opportunities as well as experience levels. Alternative A will require some volunteer trail work to meet the same level of maintenance as Alternatives PA, B, C, and D.

Use within all areas managed as wilderness is substantially below the capacity except on the Mt. Baldy Wilderness. However, there will be concentrated use areas in all alternatives except PA that will not be managed to maintain the wilderness values. In these concentrated use areas under Alternatives A, B, and C, the quality of experience would steadily deteriorate.

Alternatives D and E provide the same less than standard management as A, B, and C, and in addition, do not have any provisions for maintenance or new construction of wilderness trailheads. This situation on Mt. Baldy would become more intense as use would still be concentrated at the wilderness boundary. Wilderness values as well as general waterbased recreation opportunities would steadily decrease.

Table 81. Average Annual Wilderness Use (MRVD's)

	Alternative	
Period	A, B, C, D, & E	PA
1	35	19
2	44	24
3	55	26
4	67	29
5	75	32

Grazing will continue in all primitive and wilderness management areas in all Alternatives. Conflicts between recreation use and range management can be resolved in the PA alternative. Grazing will be managed generally at Management Intensity B.

None of the alternatives significantly change the threat to wilderness from wildfire, insect, or disease from areas adjacent to the wildernesses. None of the alternatives significantly change the threat to lands adjacent to wilderness areas from wildfire, insect or disease in wilderness.

Irreversible and Irretrievable Commitments

The acres of wilderness withdrawn from mineral entry require an irretrievable commitment of any mineral resource present in those areas. The extent of this commitment cannot be estimated. The average difference in wilderness use to the end of the fifth period between Alternatives PA and all other alternatives, 29.4 MRVD's per year, is irretrievable.

VISUAL RESOURCES

The Forest has been inventoried to determine (1) its scenic quality, (2) how many people see it, and (3) at what distance it is visible. After an analysis using these inventories, one of the following visual quality labels (VQO's) were assigned: retention, partial

retention, modification or maximum modification. A VQO of preservation was automatically assigned to the wilderness and primitive areas. Definitions of VQO's are contained in the Glossary.

All alternatives contain management requirements to maintain VQO's at current levels. Retention and partial retention comprise approximately 67% of the total Forest acres and preservation approximately 11%. The remaining 22% is classified modification or maximum modification.

Management activities such as road construction, range and wildlife habitat improvements and timber harvesting have the greatest potential to affect the visual quality of the Forest. These activities will be adjusted to the extent necessary to meet visual quality objectives. Exceptions may occur when responding to insect and disease objectives.

Alternative B, with its emphasis on commodity production, will have the greatest potential impact on visual quality. The majority of roads constructed will be temporary. Sale areas will be designed to maintain visual quality.

Alternatives C, A, and PA, will potentially provide the highest level of visual quality. Visual impacts will be a primary factor in the design and location of management activities and some projects will be undertaken with the sole purpose of enhancing visual quality. Visual quality will not change significantly from existing levels under any of the alternatives.

Adverse Environmental Impacts

Unavoidable adverse effects are generally temporary and occur during project implementation. The effects of large fires will be visible until burned areas are revegetated. Following such fires, stands often will exceed optimum sizes and visual variety will be reduced.

Irretrievable Commitments

Irretrievable commitments resulting in decreases in visual quality will occur as a result of road construction where cuts and fill pose unusual problems. Exact locations and impacts on visual quality of activities associated with mining, utilities, and oil and gas exploration and development cannot be predicted. These activities may cause irretrievable effects when denial or mitigation is not possible.

CULTURAL RESOURCES

All activities involving land disturbance require cultural resource clearances. Each alternative has the requisite budget to accomplish this work. All alternatives provide for consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation to determine protection and/or mitigation requirements where cultural sites cannot be avoided. All alternatives provide for

the annual nomination of at least one cultural site to the National Register.

Alternatives PA, B, D, and E have the highest level of ground disturbance and therefore have the highest potential for damage to sites. Inadvertent losses are irreversible and cummulative through time.

The protection of known cultural resources from natural deterioration, pilfering and vandalism, and the interpretation of cultural resources for public information and education varies by alternative. The Proposed Action as well as Alternatives B and C have specific monitoring programs designed to protect known sites.

Alternative A provides funds to allow recreation and fire technicians to monitor some of the more significant sites. Natural deterioration will continue which is an irreversible and cummulative loss of cultural information. However, there would be a reduction of loss from pilfering and vandalism due to the increased monitoring levels.

Alternatives D and E will monitor sites only as a result of provisions contained in approved cultural resource clearance reports for specific financed projects. Therefore, the chance of irreversible losses from pilfering and vandalism will be greater in Alternatives D and E.

Alternative PA has an increased budget beginning in period 2. This will result in a program which exceeds minimum legal requirements. The Forest's cultural resource overview can be updated and expanded. Additional acres will be surveyed in areas outside specific future projects. These survey opportunities will be prioritized, first to provide for improved management in information and second to enhance knowledge of the resource base.

An increased cultural resource interpretation program is the result of the relatively high recreation programs in Alternatives PA, A, B, and C. The additional budget in Alternative PA in period 2 will also allow for an improved interpretation program. Alternatives D and E have no interpretation program other than what might be accomplished with volunteers.

WILDLIFE AND FISH

Wildlife species on the Apache-Sitgreaves National Forests satisfy their basic life requirements (breeding, feeding, resting) within the various plant successional stages in plant communities. Some species such as the goshawk, require mature old growth timber stand conditions for breeding, but will use early successional stages as part of

its feeding territory. Mule deer use early successional stages for foraging, and dense timber stands for cover.

Management indicator species (MIS) are used to measure effects of management activities on habitat. Primary factors in selection of MIS's were to indicate the condition of habitat necessary to maintain viable populations of all vertebrates, and to provide species diversity. The following are the selected MIS's for the Apache-Sitgreaves National Forests: Abert squirrel, elk, mule deer, antelope, goshawk, pygmy nuthatch, turkey, red squirrel, spotted owl, yellow-bellied sapsucker, plain titmouse, Lincoln's Sparrow, Lucy's Warbler, yellow breasted chat, hairy woodpecker, cinnamon teal, and macro-invertebrates.

Habitat Factors

A variety of biotic and physical factors affect habitat diversity and the population levels and effectiveness of the habitat for each MIS. Some factors can vary by land management decisions and actions, others, such as caves and talus slopes, do not. The following list those factors (effects) that vary between land management alternatives: 1) size of vegetation communities; 2) edge; 3) vegetation structure and successional stages; 4) special habitats (snags and old growth); 5) big game forage and cover; 6) riparian areas including aquatic habitat); and, 7) roads and urban development.

The effects of each management practice on wildlife habitat were determined by (1) analyzing the effects on the seven factors described above, and (2) the effects on the management indicator species, described in the section "Comparison Between Alternatives."

Size of Vegetation Communities

The size of vegetation communities strongly influences the number of species present. Although specific research data for stand size species relationships for the Apache-Sitgreaves National Forests are lacking, the best estimate is that species diversity approaches a maximum if the average stand size is 80 acres.

Alternative B will have the greatest amount of timber management activity. The greater the amount of timber management activities, the greater the potential for regulation of smaller stand sizes (80 average) thereby improving wildlife species diversity. The relative potential for each alternative to achieve large quantities of small stands, (80 acre average stand size) is as follows in order of decreasing potential: B, PA, E, C, D, and A. The estimated acres of annual timber harvested by alternative are shown in Table 82.

Table 82. Average Annual Acres of Timber Harvest by Alternative (50 year average).

Alternative	Acres
PA	24,209
A	9,302
B	27,973
C	19,148
D	18,080
E	21,477

Edge

The shape of stands influence the amount of edge and the degree of contrast between stands. The greater the contrast between stands, the greater the habitat diversity.

The amount of edge habitat in an area is a function of edge width, the length of edge, and its configuration. The width and length measurements can be used to determine the area of edge. An abrupt narrow edge yields less edge habitat than a wider edge. Configuration is the arrangement of edges in a pattern.

The major influencing factor on contrast is the kind of regeneration method used in tree stands. Edge is influenced by the kind of regeneration method and the acreage of timber harvested. Relative potential to produce edge and contrast is to evaluate the relative amounts of regeneration methods used. The following regeneration systems are listed in decreasing order as to their potential to produce edge and contrast: Clearcut, Shelterwood, Selection.

The potential for each alternative to produce relative amounts of edge and contrast, therefore species diversity, is rated on the amounts of clearcutting and shelterwood removal cuts within each alternative. Both clear cuts and removal cuts involve the complete removal of tall forest structure providing the opportunity for edge and contrast between stands. Based upon this criteria, the following alternatives are listed in decreasing order of potential to produce edge quality: B, PA, D, C, E, and A.

Alternatives that have a strong potential for edge contrast such as B and PA would improve habitat conditions for Management Indicator Species such as deer and elk because edge can provide cover next to forage areas such as a clear cut.

Vegetation Structure and Successional Stages

Three thousand acres or 30% of any 10,000 acre area under even-aged silviculture with 5 structural stages, a 100 year rotation cycle, and a high degree of horizontal vegetation diversity were assumed sufficient to provide most of the year-round food needs for deer and elk. Three thousand acres under even-aged silviculture were assumed sufficient also, to provide, through induced openings ecologically equivalent to the grass/forb/shrub stage, most of the year-round food needs for approximately 60 deer.

Ten thousand acre units and 20% of the timber stands in vertical structure were considered maximum to provide habitat for one breeding pair of goshawks or other hawks. The remaining 80% of timber stands would be in either horizontal structure or a mix of horizontal and vertical structure.

Vertical structure generally favors late succession species, whereas horizontal structure favors early successional species.

The percentage of vertical and horizontal structure within a timber stand directly affects the habitat needs for various wildlife species. Table 83 shows the relative amounts of vertical or horizontal vegetation structure by land management alternative.

Table 83. Percent of Forest in Vertical or Horizontal Vegetative Structure by Alternative.

Alternative	Vertical	Horizontal
PA	26%	74%
A	27%	73%
B	19%	81%
C	21%	79%
D	21%	79%
E	24%	76%

Alternatives B, D, and E strongly favor early successional species such as deer and elk, while maintaining minimum levels of habitat for late successional species such as the goshawk. Alternatives PA, A, and C favor early successional species and have an increased emphasis on late successional species such as the goshawk.

Special Habitats (Snags and Old Growth)

Snags are an integral component of the Forest ecosystem and fulfill all or part of the habitat requirements for approximately 35 species of wildlife in the Apache-Sitgreaves.

There exists a direct relationship between the breeding density of secondary cavity nesting species and the number of quality snags in the ecosystem. Lack of suitable nesting cavities is the primary factor limiting the population of secondary nesting species.

Table 84. Snag Numbers Needed to Maintain Woodpeckers at Designated Levels.

	Snags Required/100 Acres to Support Percentage of Population % of Maximum Potential		
Species	100	70	40 1/
Yellow Bellied Sapsucker	150	105	60
Hairy Woodpecker	150	155	60
Average	150	130	60

1/ The 40% level is considered the minimum that will support a self-sustaining population.

A minimum of 60 snags per 100 acres is needed to support primary cavity nesters.

Secondary Cavity Nesters

An average of 221 snags per 100 acres are recommended for secondary cavity nesters such as the pygmy nuthatch.

Table 85. Snag Numbers Needed to Maintain Both Average and Maximum Breeding Densities.

	Nesting Pairs/100 Acres	
	at 173 Snags per 100 Acres	at 268 Snags per 100 acres
Species	Average Density	Maximum Density
Pygmy Nuthatch	28	43

Maintaining 60 snags per 100 acres will maintain a 40% population level of primary cavity nesters. However, approximately 200 snags per 100 acres are needed for secondary cavity nesters.

Special Habitats

Table 86 displays the area within a Diversity Unit which will have 1.8 snags per acre by alternative.

Table 86. Percent ·· Unit with 1.8 Snags

Alternative	% of Diversity Unit With 1.8 Snags
PA	55
A	70
B	40 (minimum)
C	50
D	50
E	40 (minimum)

Cavity nesting Management Indicator Species such as the hairy woodpecker, yellow-bellied sapsucker, pygmy nuthatch, and plain titmouse would benefit most from Alternatives A and PA and least from Alternatives B and E.

Alternative A would have the greatest percentage of each diversity unit with snag densities of 1.8 snags per acre, mostly due to low timber harvest activities. Alternatives B and E would have the lowest snag quantities, whereas Alternatives C and D would have moderate snag quantities. The PA would have slightly higher snag densities than Alternatives C and D.

Old Growth

Unsuitable forest land and forested wilderness areas have the potential to produce old growth stands unless catastrophic fire, insects, or diseases kill the trees. The Minimum Management Requirements (MMR's) require that at least 3% of the capable forest lands throughout the Forest be retained in old growth. Old growth prescriptions on tentatively suitable acres actually exhibit old growth characteristics for approximately 40% of their rotation. Since the average rotation is 180 years, two and one-half (2.5) acres need to be allocated to old growth management so that at least 1 acre meets old growth characteristics at any given time. Some seed/sapling stands would be managed for old growth to maintain a continuous supply over time. These stands do not have old growth characteristics by the end of the fifth decade, and will take many decades before old growth characteristics begin to dominate the stand. In addition, all suitable timber lands have some value for old growth when the overstory trees are over 120 years old.

Table 87 shows the percent of each Diversity unit that will be managed for old growth.

Table 87. Percent of Diversity Units Allocated to Old Growth Prescriptions by Alternative.

Alternatives					
PA	A	B	C	D	E
18	20	9	20	13	9

The major short-term and long-term effects of old growth would be the decrease in harvested timber volumes. The short-term effect is only on stands currently close to meeting old growth characteristics and not harvested in the first decade. The long-term effect of old growth is the loss in harvested timber volume by delaying the seed cut from 110 years or 120 years (stand age) to 150 years plus (stand age). The loss in productivity over the long-term (50 years) is approximately 15% for those acres. The loss is generally in terms of mortality and stem decays.

Allocating acres to old growth is not an irreversible commitment of resources. There is an irretrievable loss associated with growth foregone when the rotation is extended to 150 or 180 years with no harvest after 110 to 120 years.

Integrated stand management would minimize any potential adverse effects of allocating acres to old growth prescriptions. Species such as the spotted owl and goshawk would benefit most from Alternatives PA, A, and C, and least from Alternatives B and E.

Big Game Forage and Cover

Big game range is an important issue on the Apache-Sitgreaves, with emphasis on winter range. Winter range is considered a limiting factor for the deer and elk due to its limited acreage. Both forage and cover are used as habitat factors for big game ranges. The quality and quantity of food and cover are also important.

Cover, hiding and thermal, is provided in the following vegetative conditions:

Hiding Cover	Thermal Cover	Forage Areas
Saplings Young Trees over 80 basal area Shrubs Topography	Trees more than 40' high crown closure exceeding 70%.	Meadows Clearcuts Seed Cuts Open mature timber stands. Open poletimber stands.

Approximately 40% of each 10,000-acre forested unit of land should be a combination of hiding and thermal cover.

Table 88 displays the percent of big game forage to cover ratios by alternative.

Table 88. Big Game Forage to Cover Ratios by Alternative.

Alternative	Forage:Cover Ratio	Elk Use Potential
PA	40:60 to 70:30	At least 90%
A	30:70 to 70:30	At least 80%
B	30:70 to 70:30	At least 80%
C	40:60 to 70:30	At least 90%
D	40:60 to 70:30	At least 90%
E	30:70 to 70:30	At least 80%

Alternatives PA, C, and D would provide big game forage and cover ratios to maintain high levels of big game habitat capability where alternatives A, B, and E would maintain a lower quantity of big game habitat capability.

Uneven-aged timber management was considered, but not favored as an alternative because its application on a forest-wide basis would result in single uneven-aged stand conditions that would not meet big game requirements for forage areas. Horizontal diversity would also be too low for a variety of species.

Riparian Areas (Including Aquatic Habitat)

Riparian areas on the Apache-Sitgreaves create well-defined habitat zones within the much drier surrounding areas, and make up a minor proportion of the overall area. Livestock over grazing generally has the greatest impact on herbage cover including shrub and hardwood regeneration.

Levels of habitat and water coordination with timber harvest, allotment management, developed recreation sites, and road location have a direct effect on riparian condition and potential improvement in riparian areas. Riparian areas in all Alternatives are expected to be in satisfactory condition by the fifth decade. However, to measure the effects of each alternative in the short-run, Table 89 displays that the percent of acres of optimum riparian condition in the second decade.

Table 89. Comparison of Percent of Optimum Acres in Satisfactory Riparian Condition by the Second Decade.

Alternative	Percent
PA	100
A	78
B	79
C	86
D	88
E	72

Alternative PA would result in the greatest improvement in riparian condition, stand structure, and composition. Alternatives C and D would have the next best improvement due to high investment levels. The other Alternatives would provide lesser amounts of riparian area improvement with Alternative E providing the least improvement in riparian condition and habitat diversity.

Roads

Big game habitat effectiveness, or the freedom from human disturbance, is important for wildlife to effectively benefit from any improved habitat.

This freedom from disturbance, habitat effectiveness, is affected by the additional area accessed by roads and by the way roads are managed. Roads constructed for future resource use may remain open after the activity is completed, or may be closed to general use. Impacts on habitat effectiveness were determined by whether local roads are generally open or closed.

Alternative A would not obliterate roads. Alternatives B, C, and E would close and obliterate a moderate amount of roads. Alternatives PA and D would obliterate and close a high amount of roads. See Table 120.

Table 90 estimates habitat effectiveness of each alternative due to transportation system effects on big game habitats. These ratings are based on the amount of roads to be obliterated plus the amount of acres to be closed to motorized vehicular traffic.

Table 90. Habitat Effectiveness or the Freedom from Human Disturbance of Wildlife.

Alternative	Rating
PA	High
A	Low
B	Low
C	Moderate
D	High
E	Moderate

Summary of Significant Benefits or Significant Adverse Effects on MIS's

Table 91 quantifies the change in habitat capability of each alternative as compared to existing levels.

Table 91. Percent Change in Trend From Existing Potential Habitat Capability for Indicator Species Expected by the Fifth Decade by Alternative.

	Alternative					
Indicator Species	PA	A	B	C	D	E
Goshawk	+31	+17	- 4	+ 3	- 7	- 3
Pygmy Nuthatch	+83	+71	+37	+42	+25	+41
Turkey	+18	- 2	- 2	+ 1	-11	- 7
Red Squirrel	+86	+75	+57	+59	+43	+49
Spotted Owl	+74	+64	+15	+26	+19	+23
Elk	+22	+ 2	- 3	+ 4	- 3	-18
Aberts Squirrel	+91	+58	+53	+59	+31	+58
Hairy Woodpecker	+77	+64	+20	+20	+16	+21
Yellow Bellied Sapsucker	+17	+83	+75	+68	+50	+75
Plain Titmouse	+23	0	+ 4	+ 6	- 2	0
Mule Deer	+22	+ 2	- 3	+ 4	- 3	-18
Antelope	+53	+38	+53	+55	+47	0

Alternative PA would best provide a natural distribution of potential habitats for the widest variety of species. Under Alternative PA, there would be an increase in forage and water in areas currently deficient. An increase in the amount of late succession habitat (old growth) would be distributed throughout the Forest. Alternatives PA, A and C show an increase for elk and deer. Alternatives B, D, and E show a decline for elk and deer. The decreases result from a reduction in acres of early succession stages that are used for forage. However, the decrease would be offset by increased levels of habitat improvement and coordination in Alternative PA.

This would have the effect of bringing more acres into suitable habitat and would maintain higher habitat population capabilities than estimated numbers of big game currently on the Forest.

Management Indicator Species can be used to measure the quantity, quality, and distribution of vegetation successional stages which in turn provides a component of diversity. Alternative PA would provide the best distribution of timber age classes resulting in increased positive benefits for most of the Management Indicator Species, and would result in improved diversity over the other alternatives.

Alternatives A, B, and C would provide for moderate increases in distribution of habitat and a moderate increase in habitat capability. The moderate increase would result from a reduction of early succession age classes as the Forest begins to balance age class distribution.

The decrease in habitat capability in Alternatives D and E would not be offset by habitat improvement and coordination. Lower levels of management in Alternative E would result in increased habitat capability for some late succession species and a significant loss of early succession habitat. Habitat diversity and distribution would also be in a downward trend.

The following is a summary by MIS, of significant effects on the species by alternative.

Goshawk: Alternative A would benefit this species by maintaining high quantities of mature and old growth conditions in ponderosa pine, spruce fir, and mixed conifer. Alternative PA would benefit this species the most by emphasizing old growth and mature timber age classes.

Alternative C would slightly benefit this species, where in Alternatives B, D, and E habitat capability would be slightly lower.

Pygmy Nuthatch: Alternative A would significantly benefit the species by maintaining very high amounts of ponderosa pine old growth conditions. Alternative D would benefit this species least where Alternatives B, C, and E would moderately benefit the species.

Turkey: Alternatives A, B, D, and E show a decrease in habitat capability for turkey. This is due primarily to a decrease in early successional stages that produce forage. Alternative PA shows an increase in habitat capability for turkey due to high investment levels to bring additional acres in suitable habitat, and improved cover conditions in timber stands used for turkey cover. Alternative C slightly improves habitat conditions for turkey. It should be noted that habitat capability measures the capability of vegetation structure and successional stages to support wildlife populations. It does not measure factors such as disease mortality, poaching, predation, etc.

Red Squirrel - Spotted Owl: All alternatives significantly increase habitat capability for these species by increasing acres in spruce-fir and mixed conifer old growth conditions. Alternative PA provides the greatest amount.

Elk and Mule Deer: Alternative E would have a significant adverse effect on elk and mule deer habitat capability due to reduced acreage in early successional stages in the fifth decade. Alternatives A through D would generally maintain current habitat capability for elk and mule deer. As with turkey, it should be noted that all alternatives would maintain potential elk and deer over existing estimated populations. Alternative PA would have a significant positive effect on elk and deer by increasing suitable habitat acres.

Aberts Squirrel: All alternatives increase habitat capability for this species due to increased acres in the mid- and mature successional stages by the fifth decade.

Hairy Woodpecker: All alternatives increase habitat capability for this species due to increased acres in the mid- and mature successional stages by the fifth decade and management for snag densities.

Yellow-Bellied Sapsucker: All alternatives increase habitat capability for this species due primarily to increased acreage of mid- and mature successional stages in aspen, mixed conifer, ponderosa pine, and riparian by the fifth decade.

Plain Titmouse: Alternatives A, D, and E would not change habitat capability for this species due to lack of change in existing age classes in pinyon-juniper.

Alternative PA would improve habitat capability for this species most by emphasizing old growth management on at least 18% of each Diversity Unit in the pinyon-juniper type. Alternatives B and C would slightly improve habitat conditions for this species. All alternatives would maintain various levels of snag densities.

Antelope: Alternative E maintains existing habitat capability for this species, where all other alternatives increase habitat capability primarily due to expected improvement in range condition by the fifth decade.

Yellow Breasted Chat, Lincoln's Sparrow, Cinnamon Teal, and Lucy's Warbler: Habitat capability modeling for these species shows little or no change between alternatives. This is the result of modeling small amounts of acres and short-term changes in age class distribution. Alternatives PA, C, and D would produce the best results in improvement of riparian conditions and habitat diversity. This would significantly improve habitat for indicator species, Alternative E would result in the least amount of improvement for these species, and Alternative A would adversely affect the Cinnamon Teal due to lack of maintenance for wetlands.

Fish Habitat

Alternatives contain different levels of fish habitat improvement and coordination with other resource activities that affect riparian and aquatic habitats. Activities included in Alternatives to specifically improve fish habitat include structural improvements to provide cover, improve the pool-riffle ratio, fish barriers to protect threatened Apache Trout, and non-structural improvements to stabilize streambanks and provide stream shading. Coordination would vary with the primary considerations for fish habitat being associated with range management, timber management, and transportation management.

Alternative PA would provide significant improvement in fish habitat both in the short and long term due to high investment levels for improvements and coordination with range and other wildlife programs.

Alternative B would provide improvement in streamside vegetation due to high intensity of livestock management in the long term. Alternatives B, C and D would provide moderate improvement due to investments in the short and long term. Alternative A and E would provide low to moderate improvement due to funding levels. Some areas would decline in habitat capability for fish.

Comprehensive Plan

Management requirements contained in Arizona's Wildlife and Fisheries' Comprehensive Plan required varying levels of habitat management. Table 92 displays the success of each alternative in meeting Comprehensive Plan objectives.

Table 92. Attainment of Arizona's Comprehensive Plan Objectives.

Alternative	Rating
PA	High
A	Low
B	Moderate
C	Moderate
D	Moderate
E	Moderate

Threatened and Endangered Species

Under all alternatives, conserving Federally listed threatened and endangered species and their habitats would receive special management consideration. Sensitive species and State listed species not included on Federal lists would receive management to at least maintain habitat necessary to support minimum viable populations and to prevent their placement on Federal lists. Management activities would be in accordance with approved recovery plans and/or Arizona's Wildlife and Fisheries Comprehensive Plan.

The wintering bald eagle, the peregrine falcon, and the Apache Trout are the only known threatened or endangered wildlife species. See Table 45, for complete list of T&E plus sensitive species.

Habitat management in all alternatives would consist of annual vehicular closures of the areas around nesting habitat during the breeding seasons, construction of fish barriers for Apache Trout population protection, and habitat improvement on Apache Trout streams. Alternatives PA, C, and D would provide for additional rehabilitation of riparian areas by planting woody riparian species. They would also provide for identifying and protecting winter eagle roosts. Alternative PA would also restrict public use around peregrine falcon nest sites during the breeding seasons.

Resource activities involving vegetation disturbance require on-the-ground investigation for sensitive candidates, and T&E species to assure their protection. All alternatives would afford protection for T&E, sensitive, and candidate species and attempt to meet recovery plan objectives.

There are no significant short-term uses that would affect long-term productivity of T&E species, no irreversible or irretrievable commitments of the resource, and no unavoidable adverse effects. These findings are documented in the Biological Assessment available for review in the planning record. The Biological Assessment is incorporated by reference for purposes of analysis in the EIS and Forest Plan.

Wildlife Recreation and Demand

The demand for recreational use, including wildlife, corresponds with trends in human population levels. Arizona has experienced rapid population growth in the past decade and the trend is expected to continue. Wildlife recreation demand will rise accordingly. Management practices by alternative vary in their responses to meeting this demand.

The potential to meet demand over time is limited due to a finite resource base and other constraints such as habitat improvement funding levels and the need to meet management requirements for other resources.

Wildlife habitat would be improved under all alternatives, but would not improve fast enough to keep up with projected demand. The consumptive recreation demand for deer and elk would continue to exceed supply. Beyond the year 2000, demand for hunting bear and turkey would exceed supply. Nonconsumptive uses of wildlife would increase at a faster rate as consumptive uses become more limited. Small game hunting would increase in popularity and would require maintenance and habitat improvement for these species.

The quantitative effect of each alternative on the supply of wildlife recreation is summarized in Table 93, percent of change is presented as a comparison of fifth decade potential to existing levels of wildlife and fish user days (WFUD's).

Table 93. Percent Change in Existing Supply of Wildlife Recreation.

	Alternatives					
	PA	A	B	C	D	E
WFUD's	+11	-7	-8	-3	-14	-13

Irreversible and Irretrievable Commitment

Certain habitat types such as old growth involve extended time frames for recovery (160 years plus). Considering these time frames, there are no irretrievable commitments of resources. Threatened and endangered habitats are not reduced below existing status under any alternative, and populations of all species would remain above "minimum viable population" levels.

Losses in wildlife recreation opportunity and ecological diversity are irretrievable under alternatives that reduce natural habitat carrying capacity. A comparison of wildlife recreation opportunity that is irretrievably lost by the end of the first decade is presented in Table 94 (Comparison is to the MWFUD's available under Alternative PA for Decade 1).

Table 94. Irretrievable Loss of Wildlife Recreation Opportunity (MWFUD's)

	Alternative					
Decade	PA	A	B	C	D	E
1	0	974	771	532	1,054	954

Recovery of riparian ecosystems can be accomplished depending on the extent of change and availability of species for restoration. The effects of reduced riparian diversity on species found in riparian areas is irretrievable. Alternatives with more positive changes would result in a lower risk of irreversible loss and a lower amount of irretrievable loss. Although not quantified specifically for riparian areas, an irretrievable loss in wildlife recreation opportunity in the first decade occurs under alternatives with decreased habitat capability.

RANGE

Table 95 shows the acres of full capacity, potential capacity, and no capacity range on the Apache-Sitgreaves National Forests.

Table 95. Rangeland Classes on the Apache-Sitgreaves National Forests.

	Acres
Full Capacity	1,427,000
Potential Capacity	103,027
No Capacity	473,525

In 1983 permitted use was 230,124 Animal Unit Months (AUM's) and capacity was 204,348 AUM's (1985 permitted AUM's are 213,819). The maximum potential grazing capacity determined from the Maximum Range Benchmark is approximately 249,000 AUM's by the fifth decade.

The objective of all alternatives would be to bring permitted use of the forage resource in balance with capacity at different time periods, and to improve range condition where possible. All alternatives would attempt to maintain a viable livestock industry while protecting the long-term productivity of the range resource. For all alternatives, the permittee would be expected to participate with the Forest Service in maintaining structural improvements in working order, and to supply labor to rebuild structures that need replacing.

Capacities and Permitted Use

Permitted use is determined for each alternative through utilization surveys and range allotment analysis. Permitted use and capacities are maintained in balance for the allotments by increasing or decreasing numbers of livestock, by changing the management intensity levels, and by initiating changes in livestock class, season of use, and rotation patterns. Table 96 shows grazing capacity and permitted use of the first through fifth decades for each alternative.

Table 96. Permitted & Capacity (MAUMS) for all Alternatives in Period 1 and 5.

		Alternatives					
Period	Output	PA	A	B	C	D	E
1	Permitted Use	204	219	220	168	211	221
	Capacity	204	202	203	156	211	204
2	Permitted Use	200	202	205	155	217	208
	Capacity	200	191	193	151	217	196
3	Permitted Use	200	191	195	153	225	193
	Capacity	200	186	189	151	225	193
4	Permitted Use	200	177	182	150	241	192
	Capacity	200	177	182	150	241	192
5	Permitted Use	200	174	179	150	248	191
	Capacity	200	174	179	150	248	191

Management Intensity

The changes in AUM's shown in Table 96 shows how permitted use can be balanced with capacity under different time frames under different alternatives. The PA (Preferred Alternative) balances permitted use and capacity in the first decade. The D alternative balances in the second decade etc. The PA, however, is a slight reduction from current (Alternative E).

Table 97. Grazing Management Intensity in M Acres by Alternative.

Management Intensity Level	Present	PA	A	B	C	D	E
		Alternatives					
A (no livestock)		10	10	10	10	213	10
B (some livestock)		497	1166	923	482	40	114
C (extensive)		191	210	290	253	87	800
D (intensive)		704	50	170	458	524	513
E (max. livestock)		35	1	44	31	776	0

The changes in acres shown in Table 97 reflect the changes (effects) of the different alternatives on management intensities. In the preferred alternative (PA), there is a shift to D level (intensive management on more productive sites from current (E) alternative). There is also a shift to B level management on the less productive sites.

Capital Investment

Intensive management requires the flexibility provided by fences and water distribution. This is why capital investments are important to the management levels included under the alternatives.

To maintain management levels, existing range improvement structures must be replaced as they reach the end of their economic life span. Additional new structures are needed when improved management systems are to be implemented. The general priority for capital investments are (1) replace existing structures, (2) retreat existing non-structural improvements, (3) construct additional new structures, and (4) initiate new non-structural forage improvement projects.

Under alternative D, all existing structures will be replaced as needed and the highest number of new structures will be constructed. This will permit a higher level of grazing management systems. Under the preferred alternative, most existing structures will be replaced as needed but fewer new structures will be constructed. Emphasis for improved grazing management systems will be on allotments with more productive site capability. On the less productive sites, management intensity would remain static or slightly reduced compared to Alternative D. Alternative C would provide the lowest level of structures. Alternatives A, B, and E would provide a moderate level of replacement and new structures resulting in an extensive level of management.

Irreversible and/or Irretrievable Commitments

The loss of some existing structures along with lower management intensity levels in alternative A, B, C, and E due to less funding, contributes to the irretrievable loss of grazing capacity. This results from the loss of management opportunities originally gained through the placement of structures. Table 98 displays the total of replacement and new structures by both Forest Service and permittees.

Table 98. The Number of Structures by Alternative Constructed - Replaced Per Decade.

	Alternatives					
Decade	PA	A	B	C	D	E
1	1,321	1,307	1,329	976	1,462	1,208
2	1,755	1,513	1,561	1,279	2,117	1,593
3	1,727	1,454	1,511	1,256	2,126	1,593
4	1,725	1,448	1,506	1,254	2,126	1,593
5	1,725	1,448	1,506	1,254	2,126	1,593
	8,253	7,170	7,413	6,019	9,957	7,580

Maintaining pinyon-juniper lands as seral grasslands and savanna woodlands for management purposes is an irretrievable loss of firewood production. An offsetting effect is the increased carrying capacity created by maintaining an earlier successional stage.

Retreatment of openings in seral grassland and savanna woodland would be accomplished in all alternatives except A. Alternative A would not emphasize maintenance of induced openings in the pinyon-juniper type.

The PA will provide for fuelwood harvest in the pinyon-juniper type in order to reduce tree stocking density which will increase forage production.

Transitory Range

The vegetative overstory types such as ponderosa pine and pinyon-juniper affect the understory forage production. As the crown canopy increases, the understory forage production decreases. The basal area of the growing stock level in suitable timber land affects forage production. There is an irretrievable loss in forage production as basal area is increased.

In pinyon-juniper, the understory forage production would be decreased over time in alternative A as the overstory regrows because all areas will not be retreated.

The difference between the highest AUM capacity alternatives and all other alternatives for the first decade represents an irretrievable loss of AUM capacity. Table 99 displays the irretrievable loss of capacity by alternative for the range resource. Alternative D is used as the standard against which all alternatives are measured.

Table 99. Annual Irretrievable Loss of Range Capacity.

(Period 1 MAUM's)	Alternatives					
Output	PA	A	B	C	D	E
Highest Output					211	
Output of Alternatives	204	202	204	156	211	204
Irretrievable Loss	7	9	7	55	0	7

Grazing capacity would be the lowest in Alternative C due to low investment levels and acres assigned no grazing and the highest in Alternative D due to high investment levels and management levels. Alternatives D and PA include a high range investment and management levels for the pinyon-juniper type. Alternative B would have a high investment level in pinyon-juniper above the Rim, and a low level for pinyon-juniper below the Rim. Alternative E maintains a current level of investment. Alternatives A and E would have a low range investment level in the pinyon-juniper type.

NATURAL AREAS

Natural Areas reviewed and recommended in the Alternatives are research natural areas, and all are botanical.

Proposed Research Natural Areas include the North Fork of Thomas Creek, Escudilla Mountain, Hayground Creek, and Wildcat Canyon. The Thomas Creek area is 500 acres of Englemann Spruce forest. The Escudilla Mountain area is 909 acres of Arizona Fescue and Mountain Muhly. Hayground Creek, featuring blue spruce, contains 316 acres. The 513-acre Wildcat Canyon area is pinyon-juniper.

There would be no adverse or irreversible environmental effects. Irretrievable effects result from withdrawal from mineral leasing and development, and resource outputs either reduced or lost as a result of special area designation.

Special Interest Administrative Areas

Special Interest Administrative Areas are areas that don't have quality as Natural Areas or Research Natural Areas, but are considered unique and require special administrative consideration. These areas include the East and West Forks of the Little Colorado River and the Sandrock Allotment on the Clifton District.

TIMBER AND FIREWOOD

Timber

The alternatives affect the timber resource by the intensities of timber management applied and the acreage managed for timber production. The effects are characterized by changes in the character and productivity of timber stands. The acreage of suitable timber lands, age class distribution, long-term sustained yield, and the health of the stands are all affected by the alternatives.

Suitability

Using the criteria for determining tentatively suitable timber acres (38 CFR 219.14), 810,529 acres were classified as tentatively suitable for timber production. See Chapter 3 for a discussion of suitability determination. Each alternative uses a different proportion of the tentatively suitable acreage to achieve the outputs, goals, and objectives of the alternative. These acres are called suitable acres. Table 100 shows the suitable acres for each alternative.

Table 100. Suitable Timber Acres by Alternative in M Acres

Alternative					
PA	A	B	C	D	E
781.4	740.0	810.5	789.0	788.0	763.4

Alternative B would use all of the tentatively suitable acreage for timber production and would produce the highest level of timber outputs. Alternatives C and D use the second and third highest percentages of tentatively suitable acres, 97%. Alternative PA uses 96% of tentatively suitable acres, but produces more timber than Alternative D.

Alternatives A and E use the least acreage (91% and 94%, respectively), and produce the lowest timber outputs.

There are no irreversible commitments of resources resulting from suitability classification. There are irretrievable commitments due to the loss of commercial forest products during the first decade from those lands currently classified as unsuitable, which may change to suitable during the next revision of the Forest Plan.

Growth Rate and LTSYC

The President's Revised Statement of Policy, PL 96-514 (December 12, 1980), requires that the productivity of suitable forested land be maintained or enhanced to minimize inflationary impacts of wood product prices and to permit a net export of forest products by 2030. The Statement recognizes that it will take time to achieve these goals. It requires that by Decade 5, growth on commercial timber lands be brought to and maintained, where possible, at 90% of the long-term sustained yield capacity (LTSYC).

Long-term sustained yield capacity of wood fiber output is equivalent to growth over time. Growth in Decade 5 and LTSYC are compared in Table 101. If timberland does not have a high growth rate by Decade 5, the Statement of Policy goal will not be achieved.

Table 101. Average Annual Long-Term Sustained Yield Compared to Achievement of 90% of Potential Growth in the Fifth Decade by Alternative.

	Alternative					
Outputs	PA	A	B	C	D	E
Growth (MCF)	35,436	28,821	36,560	31,950	26,245	32,713
LTSYC (MCF)	36,813	34,503	38,959	37,385	36,543	36,707
% of LTSYC	96	84	94	85	72	89

LTSYC is the highest nondeclining yield from suitable lands consistent with multiple use objectives of each alternative and the specified management intensity. LTSYC is based on the assumption that the Forest is in a fully managed condition. It is a function of the amount and productivity of suitable acres and the management intensity of prescriptions assigned and scheduled for an alternative.

LTSYC is a measure of the long-term timber productivity resulting from each alternative. The maximum LTSYC for the Forest is 39.0 MMCF.

Table 102. LTSYC by Alternative in MCF

Alternative					
PA	A	B	C	D	E
36,813	34,503	38,959	37,385	36,543	36,707

Irretrievable commitment of potential productivity compared to maximum LTSYC would be made in Alternatives PA, A, C, D, and E because the growth rates would be less than potential, foregoing future growth to achieve noncommodity output and multiple-use objectives and budget savings.

Age Class Distribution

An effect of management alternatives on the timber resource would be the distribution of age classes in the suitable timber areas. Equal acreages in the first six classes would be considered ideal from a timber standpoint. Uniform distribution of age classes provide higher and more uniform sustained yields, more variety and diversity of habitats that would be stable over time, and a higher level of health and vigor in the Forest. Table 103 shows the age class distribution of the alternatives.

Table 103. Age Class by Distribution at Decade 20 in Acres*.

	Alternative					
Age Class	PA	A	B	C	D	E
1 - 20	9,842	38,727	1,439	7,784	0	11,809
21 - 40	42,624	23,799	62,421	75,582	98,744	39,348
41 - 60	150,712	92,463	127,211	102,083	61,059	119,238
61 - 80	84,868	121,933	89,890	43,960	169,119	79,680
81 - 100	204,545	177,670	327,262	272,137	227,627	205,705
101 - 120	102,891	143,533	151,221	101,014	223,627	157,276
141 - 160	0	0	0	56	0	0
161 - 180	0	0	0	0	0	0
181 - 200	0	0	0	0	0	0
201 - 220	0	22,886	0	22,886	883	6,669
221 - 240	22,084	3,482	0	0	3,482	8,922
241 - 260	0	0	0	0	0	0
261 - 280	13,990	19,629	12,586	12,586	13,447	15,038
281+	178,452	217,399	172,770	172,770	188,687	201,846

*Acres include all forested acres, not just suitable acres. Acreages in the 200+ years age class are unsuitable and are allocated to "no harvest" prescriptions.

All alternatives represent more diversity than the present situation, but no alternative achieves regulation (even distribution of age classes on areas managed for timber production).

Uneven-aged management was considered and allocated to specific areas. It was not proposed as a full alternative, considered in detail, due to its effect on diversity. The full-age class distribution would occur on each acre, but eventually all acres would support the same stand condition with little diversity between stands.

Acreages recently regenerated, but retaining an overstory are displayed by the overstory age. This is the reason that acreages in the 1-20 age class are so small. When the overstories are removed, the acres will move to the age class of the understory. By that time, the understory is usually in the 21-40 age class.

See Wildlife and Diversity for effects on habitat diversity.

Each alternative makes a long-term commitment when a timber harvest occurs, changing the stand age. This commitment may or may not have a significant impact depending on how many acres exist in that age class and how many are being changed to another age class. The objective for changing the age classes in all alternatives would be to obtain a fully regulated Forest, with maximum age class diversity and an even flow of timber products.

Species Mix

Prescriptions developed for the tentatively suitable acres retain the current species mix of ponderosa pine, mixed conifer, aspen, and spruce fir, except a prescription converting mixed conifer to aspen covers approximately 2,500 acres). This is considered insignificant in terms of timber production, but is a significant improvement for wildlife.

Reforestation

Site Preparation

Site preparation is done in conjunction with both natural reforestation and artificial reforestation. The objective of site preparation is to create sites where tree seedlings have a good chance for survival. Site preparation requires removing competing vegetation and exposing mineral soils. Seeds and seedlings planted in organic matter and duff dry out and die.

Site preparation can be accomplished by either mechanical methods, chemical methods, or prescribed fire. Some site preparation occurs as part of logging and slash disposal activities but the most common mechanical method is disking. The limited amount of chemical site preparation involves the use of herbicides. An environmental analysis is made following NEPA procedures and other legal requirements for each proposed herbicide project. All projects use only approved herbicides. These constraints reduce the potential for adverse effects. Herbicides are planned for use after other means of site preparation have proved unsuccessful or create other undesirable environmental effects. Broadcast burning can also be used to kill some types of competing vegetation and to expose mineral soil.

The acres of site preparation vary by acres harvested (seed cut or clear cut) and vegetative type harvested. Table 104 shows the site preparation acres by alternative for both natural and artificial reforestation.

Table 104. Site Preparation Acres for Decades 1-5 by Alternative

Type/Decades		Alternative					
		PA	A	B	C	D	E
Site preparation for natural reforestation	1	22,630	3,785	29,911	0	0	0
	2	0	0	0	0	0	0
	3	6,668	34,256	22,289	0	0	0
	4	48,722	17,049	3,307	28,191	0	37,344
	5	0	0	45,393	20,689	35,166	30,919
Site preparation for artificial reforestation	1	3,233	30,510	4,273	54,889	0	0
	2	0	0	0	0	0	0
	3	953	4,894	3,184	0	0	0
	4	17,440	2,436	472	4,027	0	5,335
	5	37,526	0	24,840	15,920	4,799	45,127

Long term timber productivity of sites depends in part on how quickly trees are established after harvest. Adequate site preparation assists seedling survival by providing a good soil medium and reduced vegetative competition.

Site preparation does not imply an irreversible commitment of resources to harvest the regenerated trees at a later decade.

Tree Planting

Tree planting is done where natural regeneration has failed or is expected to fail after harvest, slash disposal, and site preparation are completed. The amount of acres needing planting varies by acres harvested (seed cut or clear cut) and vegetative type harvested.

Acres planted by decade would be the same as acres of site preparation for artificial reforestation, shown in Table 104 above.

Tree planting also is done in areas where regeneration failures have occurred and in burned-over areas. These acres cannot be accurately predicted.

The primary environmental effect of planting is the rapid regeneration of trees. Planting also has a long-term effect on the productivity of the next generation of trees. Other species or higher quality trees can be introduced on the site to lessen the loss to insects and disease and produce more wood fiber.

Although planting is expensive and energy is expended, it does not imply an irreversible commitment of resources to harvest the new generation of trees. The only irretrievable commitment associated with planting would be in cases where trees are not planted or when the planting fails. The fiber lost during the time the area is not stocked could not be recovered.

Even-aged Systems

Even-aged systems include intermediate cuts and regeneration cuts. Intermediate cuts are defined as all cuts in the life of a stand between establishment and regeneration cuts. The primary goal is to create desired stand characteristics to increase timber production, wildlife production, visual quality, or other management objectives. Establishing regeneration is not a goal of an intermediate cut. There are two basic methods of intermediate cutting; removal of high risk or dead trees called salvage, and harvest of live healthy trees called precommercial or commercial thinning.

Salvage cuts primarily affect snag recruitment by removing damaged or dying trees before they become snags. Through integrated stand management, salvage cuts will have no adverse affects or conflicts with other resources and little to no short-term or long-term effects. There would be no irreversible or irretrievable commitment of resources implied with salvage cuts. Salvage cuts were not modeled in FORPLAN and cannot be compared among the alternatives.

Precommercial and commercial thinning are common activities associated with timber stand improvement. Salvage cuts were a major practice under the old timber management plans. Less need for salvage cutting is anticipated for this plan and the primary objective of thinning is to reduce competition among crop trees, maximize the growth of each leave tree, control species composition, improve the average form of the residual stand, and reduce or eliminate trees susceptible to insects and diseases.

Prescriptions with precommercial thinning on existing stands are available in the model. Prescriptions accomplish precommercial thinning in regenerated stands at between 20 and 40 years old (regenerated stand age).

The acres of precommercial thinning vary by management intensity. Table 105 shows the average annual acres of precommercial thinning planned for the first five decades by alternative.

Table 105. Precommercial Thinning Acres for Decades 1-5 by Alternative

	Alternative					
Decades	PA	A	B	C	D	E
1	92,811	839	29,076	839	32,039	37,480
2	147,031	74,819	238,857	128,975	133,851	107,700
3	26,216	0	13,121	13,121	0	0
4	0	0	0	0	0	0
5	0	0	57,358	0	0	0

The acres of commercial thinning also vary by management intensity. Table 106 shows the acres of commercial thinning planned for the first five decades by alternative.

Table 106. Commercial Thinning Acres for Decades 1-5 by Alternative

	Alternative					
Decades	PA	A	B	C	D	E
1	59,535	0	24,082	0	40,270	39,849
2	223,015	94,552	319,730	202,627	153,851	216,906
3	192,192	35,226	109,173	143,864	181,301	146,913
4	184,496	83,965	409,855	213,199	198,308	324,444
5	256,969	58,921	156,034	201,126	153,851	134,948
TOTAL	916,207	272,664	1,018,874	760,816	727,581	863,059

Alternative A has a very low level of commercial thinning because timber management is very extensive in this alternative.

Alternative B includes very intensive timber management, and so includes the highest level of commercial thinnings. The remaining Alternatives vary by intensity of timber management.

There are no significant adverse environmental effects that cannot be mitigated through integrated stand management.

The major short-term effect of thinning is the increased fire hazard to the residual trees from the created slash; this adverse effect cannot be avoided, but can be mitigated through fuel treatment.

The long-term effect of thinning is the improved quality of the individual trees within the stand and the increased volume over the complete rotation of the stand. Quality of the residual trees is improved by the removal of poorly formed trees, slow growing trees, and insect and/or disease infected trees.

Increase in the general health and vigor of the residual stands can be both a short-term and a long-term effect.

Although thinnings are investments in a stand to improve yield over the entire rotation, thinnings are not an irreversible commitment to harvest timber in the future. Road building and road systems necessary for harvest also do not imply an irreversible commitment of resources.

Regeneration cuts are designed to establish a new stand of trees. The regeneration cuts modeled were shelterwood seed cuts and clear cuts.

Table 107. Even-aged Regeneration Cut Acres per Decade by Type of Cut.

	ALTERNATIVES											
DECADE	PA		A		B		C		D		E	
	CC	SC	CC	SC	CC	SC	CC	SC	CC	SC	CC	SC
1	4,173	32,329	29,969	5,407	0	42,730	54,889	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	9,526	0	48,937	0	31,841	0	0	0	0	0	0
4	10,480	69,603	0	24,356	0	4,724	0	40,273	0	0	0	53,348
5	37,526	0	8,352	0	23,604	58,604	26,051	22,996	5,022	43,679	49,651	37,611
Total	52,179	111,458	38,321	78,700	23,604	137,569	80,940	63,269	5,022	43,679	49,651	90,959
TOTAL CC & SC	163,637		117,021		161,173		144,209		48,701		140,610	

CC = CLEAR CUT SC = SEED CUT (SHELTERWOOD)

In order to insure a steady flow of timber products, it is necessary to have a reasonably steady rate of regeneration of stands.

Alternatives D and E provide the least stability in the level of regeneration cuts. Alternatives PA, A, and B provide the most stability.

No alternative can provide equal amounts of regeneration in each decade because of the lack of balance in age classes at the beginning of the period.

Clear cuts are optimum in preference to seed cuts in diseased stands because they more effectively control dwarf mistletoe. There is also a disadvantage, which is that they must be artificially regenerated in most habitat types other than aspen. Clearcuts are also optimum to regenerate aspen which starts from root suckers that are typically suppressed by partial cutting.

The economic advantage of either clear cutting or seed cutting are modeled for each alternative by FORPLAN. The effects of dwarf mistletoe control are accounted for in the yield tables used in the FORPLAN model. The better the dwarf mistletoe is controlled, the higher the timber production potential.

Alternative PA achieves a mix of clear cuts and seed cuts that will allow for dwarf mistletoe control while maintaining economic efficiency. It also provides a reasonably steady flow of regeneration for 50 years. About 13 percent of the even-aged regeneration cuts in the first decade are clearcuts.

Alternative A uses clear cuts heavily in the first period. This would allow quick control over a large area of the worst dwarf mistletoe. The flow is reasonably steady, but the rate at which regeneration occurs in the first 5 periods neccessitates much larger regeneration acreages in the later periods.

Alternative B provides a reasonably steady flow of regeneration but does not provide enough clear cuts to control dwarf mistletoe until the fifth period.

Alternative C does not provide a steady flow. It does allow the most intensive measures for dwarf mistletoe control early in the planning period, though. Alternatives D and E provide the least steady flow of regeneration and offer the least opportunity for early dwarf mistletoe control. Alternative D also requires massive regeneration acreages in later periods.

There are no irretrievable commitments implied with seed cuts. Once an area has been seed cut, an irreversible commitment to regenerate the area is made. There is no irreversible commitment implied with seed cuts to harvest either the residual stand or the regenerated stand at a later time.

The unavoidable short-term effect of a clear cut is the decrease in visual quality following the cut. This decrease is soon reversed as the new stand becomes established and can be minimized through proper design and layout of the areas to be cut. There is also a commitment to regenerate the area once it has been cleared. There are unavoidable changes in wildlife habitat which are adverse for some species and favorable for others. The changes are reversed over the life of the new stand.

Uneven-aged Systems

Selection harvest, an uneven-aged management system, was offered as an option in the FORPLAN model for all alternatives. In Alternatives D and E, no selection harvests were selected by the model. Alternatives PA, A, B, and C each selected 37 acres of selection harvest. This indicates that selection harvest is not economically efficient. However, selection harvest can be the best way to meet certain specific management objectives in specific stands such as perpetuating visual quality along a highway.

Selection harvest can be included in any alternatives when it is the best way to meet specific management objectives. See Standards and Guidelines in the Forest Plan.

Using selection harvest does not irreversibly commit that are to timber harvest or to continued uneven-aged management in the future. The money that could have been saved or earned by applying a more economically efficient system is irretrievably lost.

Cable Logging

Cable logging is a harvest method of extracting timber from steep slopes minimizing damage to soils or watersheds. Logs are removed from the slopes by suspending them under cables rather than by skidding them on-the-ground with tractors.

Alternatives A and E allocate no acres to cable harvest. Alternatives B, C, and D allocate all tentatively suitable areas or 53,418 acres to cable harvest. Alternative PA allocates 48,074 acres to cable harvest. This excludes canyonlands on the Sitgreaves National Forest.

Cable logging is less damaging to soil and water resources than tractor logging. Under either system, sales must be carefully designed to prevent unacceptable damage to other resources, and all management objectives for all resources must be integrated into the sale design.

Old Growth

Forest land suitable for timber management and forested wilderness or primitive areas have the potential to produce old growth stands unless catastrophic fires, insects or diseases kill the trees.

The minimum management requirement for old growth is that at least 6% of the forested land be in old growth conditions at any given time. This area should be well distributed across the Forest.

Since this is a minimum management requirement, all alternatives must at least meet this standard.

To ensure that old growth areas are well distributed, it was required that each 10,000 acre diversity unit meet the requirement on its own. If timbered wilderness or unsuitable areas fall within a diversity unit, those lands will count toward meeting the old growth requirement.

Since only about 1/3 of an extended rotation will meet the definition of old growth conditions, for each acre of old growth required, two additional acres must be managed under old growth prescriptions.

Table 108 shows the percentage of each diversity unit to be managed under old growth prescriptions. One third of the figure shown in each alternative should meet old growth definitions at any given point in time.

Table 108. Percent of Each Diversity Unit Allocated to Old Growth Prescriptions by Alternative.

ALTERNATIVE	% ALLOCATED
PA	18
A	20
B	9
C	20
D	13
E	9

Since diversity units tend to be almost entirely within either suitable or unsuitable areas, it is assumed that the above percentages can be directly applied to suitable acres in old growth prescriptions. This will slightly overestimate the effects of old growth.

It is estimated that 10% of the timber produced, and shown in the yield tables, will never be harvested in old growth areas. Therefore, losses in timber production would be as shown in Table 109.

Table 109. Estimated Timber Production Losses Due to Old Growth, by Alternative.

Alternative	Suitable Timbered Acres	Old Growth %	Old Growth Acres	LTSYC MCF/Year	LTSYC/ Acre MCF/Year	Growth Loss 1/ Adj. Far.	Growth Loss MCF/Year
PA	773,823	18	139,288	36,813	.047	.1	855
A	740,035	20	147,007	34,503	.047	.1	696
B	810,529	9	72,947	38,959	.048	.1	350
C	788,976	20	157,795	37,385	.047	.1	724
D	787,976	13	102,437	36,543	.046	.1	471
E	763,376	9	68,704	36,707	.048	.1	330

1/ Adj. Far. =Volume lost correction factor on old growth acres.

To obtain the growth loss:

Multiply the total suitable acres by old growth percentage (as a decimal) to obtain old growth acres.

Divide LTSYC by total suitable acres to obtain LTSYC/acre.

Multiply old growth acres by LTSYC/acre times adjustment factor (10% loss of potential growth) to obtain total annual growth loss.

Because of old growth deficits on the Sitgreaves National Forest, Alternative PA requires that no remaining old growth stands on the Sitgreaves National Forest will be harvested in at least the first planning period, and at least 18% of each diversity unit will be managed for old growth conditions.

This amounts to about 8,044 acres broken down as follows:

Canyon lands	-	5,344 acres
Double Cabin	-	400 acres
Forest Lakes Estates	-	300 acres

This requirement precludes any cable harvests on the Sitgreaves National Forest for at least the first planning period.

The total timber production loss ranges from 330 to 724 MCF per year due to allocations to old growth. These growth losses are irretrievable but allocation of an area to old growth prescriptions is not irreversible.

Health and Vigor of Stands

Health and vigor of timber stands are affected by the age class distribution, intensity of management, mix of tree species, susceptibility to insect and disease attack, and rate of growth. The alternatives vary in their impact on overall health and vigor of the timber stands. All prescriptions are silviculturally integrated with the needs to control dwarf mistletoe on suitable acres.

Alternatives A and E would have the lowest rating for health and vigor overall because they have the lowest growth rates and allocate the fewest acres to management prescriptions that would provide for insect and disease control.

Alternatives PA, C, and D are intermediate in maintaining health and vigor of the forests because they allocate more acres to management prescriptions that would provide for insect and disease control.

Alternative B would provide the highest level of health and vigor because it allocates the highest number of acres to management prescriptions that would provide for insect and disease control.

Any timber production lost because of poor health and vigor of stands on portions of the forested area would be irretrievable. Commitments of lands to low intensity old growth or no insect and disease control are not irreversible.

Fuelwood

The supply of fuelwood consists of green pinyon and juniper, dead standing pinyon and juniper, green aspen and dead and down wood of all species, including slash from timber harvests. Standing dead conifers over 12 inches DBH, excluding pinyon and juniper, are retained for wildlife snags except in fuelbreaks, areas where public safety requires removal of snags, or areas where the number of snags exceeds the needs of wildlife.

Fuelwood made available through timber harvest is considered a secondary benefit of harvesting timber. The timber objectives of each alternative affect the availability of fuelwood. The higher the level of timber harvest, the greater the amount of fuelwood that is made available.

Pinyon and juniper is managed under the even-aged systems of clearcutting and shelterwood. Intermediate cuts to reduce stand density and improve forage, are used under both methods.

Range forage improvement practices in the pinyon-juniper affect the amount of fuelwood that is available. When an area of pinyon or juniper is modified to a seral grassland through clearcutting, the short-term supply of fuelwood is increased, but the long term supply is reduced.

Alternatives PA, C, and D all indicate an annual production of 4,570 MBF of pinyon and juniper fuelwood in periods 1 through 5. However, this drops to 3,300 MBF for periods 6 through 20. This is because non-structural range improvements contribute to fuelwood supply in the early periods, but reduce acreage available for fuelwood production for the later periods.

Alternative E would provide for harvesting 3,625 MBF of pinyon and juniper fuelwood annually for periods 1 through 20. This is the sustainable level of harvest without range improvements.

Alternatives A and B assume that there will be no harvests of pinyon or juniper fuelwood.

Projected demand for fuelwood is 25,000 MBF for the first period, and 110,000 MBF in period 5. No alternative can meet these projected levels of demand. However, outputs of PJ fuelwood have been doubled from original estimates as a consequence of watershed improvement projects.

Alternative PA meet 80% of the demand in period 1, and 14% of the demand in period 5. Alternative A meets 34% of the demand in period 1, and 7% of the demand in period 5. Alternative B meets 70% of the demand in period 1, and 14% of the demand in period 5. Alternative C meets 71% of the demand in period 1, and 13% of the demand in period 5. Alternative D meets 84% of the demand in period 1, and 17% of the demand in period 5. Alternative E meet 55% of the demand in period 1, and 16% of the demand in period 5.

A consequence of not being able to meet demand is that fuelwood prices can be expected to rise to a point where other energy sources are more competitive.

Any fuelwood production lost following non-structural range improvements would be irretrievably lost. No irreversible commitments would result from fuelwood management.

DIVERSITY AND WILDLIFE HABITAT IMPROVEMENT

Diversity in habitats and animals is almost exclusively dependent on the level of wildlife planning, habitat improvement, and coordination with other resource activities.

Table 110. Diversity Index Values and Percent Change in Diversity Index - First & Fifth Decade by Alternative.

DIVERSITY INDEX VALUES

Decade	Balance Age Class	Alternatives PA	A	B	C	D	E
1	1.0	.65	.61	.61	.61	.61	.62
5	1.0	.62	.57	.61	.61	.62	.58

PERCENT CHANGE IN DIVERSITY INDEX (from current)

Decade	Alternatives PA	A	B	C	D	E
1	5%	-2%	-2%	-2%	-2%	0
5	0%	-8%	-2%	-2%	0	-6%

Alternative PA will have the highest level of diversity or interspersion of habitats. Alternatives B and C show a moderate decrease in absolute diversity of habitats, whereas A and E reflect a decline in interspersion of habitats. Alternative D shows a slight improvement in interspersion of habitats.

A change in vegetation composition or a change in vegetative volume or structure will affect the quantity of diverse habitats and animal taxa which utilize those habitats. A managed forest which offers a high degree of diversity in communities and seral stages not only insures ecological stability, but provides habitat for diverse wildlife.

Activities specific to the improvement of wildlife habitat on the Forest include; vegetative manipulation through the use of timber harvesting, direct treatment using fire or mechanical means, seeding and planting of desirable browse and herbaceous species, and access or road management. Minor programs in non-game and waterfowl habitat improvement are also carried out on the Forest, including constructing waterfowl nest structures, bird boxes, planting waterfowl foods, protection and creation of snags, and seeding and planning wildlife foods. Prescribed fire, timber harvesting, and livestock grazing are the main activities affecting wildlife. Prescribed burning will occur on lands suitable and unsuitable for timber production.

Wildlife appropriations provide for wildlife coordination with other resource uses and generate a large amount of direct habitat improvements. Wildlife coordination with other resource uses affects quality of habitats and has a direct bearing on future habitat capability. Additional improvements identified through coordination result from Knutsen-Vandenburg (K-V) Act collections from the sale of timber and firewood.

SOIL AND WATER

The environmental consequences resulting from each alternative vary by management prescription. The major effects on the soil and water resource would be the change in soil productivity and hydrologic functions. Changes in soil productivity can produce long-term changes in Forest resources such as timber production, forage production, wildlife habitat, and recreational opportunities. Changes in hydrologic function may also affect streamflow characteristics. Each of the alternatives would affect the soil and water resource in different ways.

An indicator of change in soil productivity is soil loss or movement. An indicator of hydrologic function is watershed condition. Watershed condition is a description of the health of a watershed in terms of the factors which affect hydrologic function. A watershed is considered to be in unsatisfactory condition if a significant portion of the watershed is experiencing soil movement in excess of tolerance or if the hydrologic function is unstable. Hydrologic function is the ability of a watershed to sustain favorable condition of water flow (minimum flood runoff and maximum base flows). If the soil movement and hydrologic function of a watershed exceed tolerance levels, soil productivity is lost. Soil movement and hydrologic function are greatly influenced by vegetative ground cover. Any management activity such as logging, grazing, fuelwooding, and road construction that affects the ground cover conditions will influence losses or gains in soil productivity.

Soil Movement

The Universal Soil Loss Equation (USLE) and professional judgment were used to develop and calculate soil loss rates (sheet and rill erosion) for each capability area type. These soil loss rates were compared with tolerance soil loss rates found in the R-3 Terrestrial Ecosystem Survey Handbook. Tolerance soil loss is defined as the maximum rate of soil loss that can occur while sustaining inherent soil productivity. Capability Areas (C.A.) with soil loss rate lower than tolerance are assumed to be maintaining soil productivity, whereby C.A. types with soil loss rates greater than tolerance are assumed to be losing soil productivity.

Soil loss is the amount of soil displaced or moved from a given site and does not represent sediment produced. Only a small amount, estimated at 10% or less, reaches reservoirs or perennial streams as sediment.

The figures for soil loss in Table 111 reflect total soil movement rather than net soil loss. For example, on a hillside soil displaced downhill may be replaced by an amount equal, greater, or less than has been displaced immediately upslope. Therefore, soil loss values have meaning primarily for comparing relative conditions.

Table 111. Average Annual Soil Loss Expressed as a Percent of Current Annual Soil Loss.

	Alternative					
Period	PA	A	B	C	D	E
1	78	79	81	64	79	95
2	76	76	78	62	76	77
3	73	75	77	60	72	75
4	73	72	74	59	72	72
5	72	70	73	58	72	73

Soil losses decline through time in all Alternatives, due primarily to increased vegetation cover from balancing livestock use and capacity, from increased fuelwooding in the PJ forest, from direct watershed treatment, from treatment of low and moderately low condition range, from reconstruction and surfacing of roads, and from closure of unneeded travelways.

Alternative E produces the greatest amount of soil loss. Even though permitted numbers are in line with capacity by period 3, direct treatment of watersheds with low and moderate range land and closure of roads is still inadequate.

Alternative C by far produces the least amount of soil loss. The reduced soil loss is a reflection of reduced emphasis on commodity outputs and increases emphasis is on amenity values and activities with minimal soil loss.

Alternative B produces the second highest soil loss because this alternative maximizes timber and other commodities which have activities that can increase soil loss.

Alternatives PA, A, and D, result in essentially the same soil losses even though permitted numbers and capacity come into line in different periods (PA in 1, A in 4, and D in 1). Differences in the rate of soil loss reduction for these alternatives occur because of the effects of range management mitigation measures and the effects of timber management activities.

Soil movement from ORV uses would be constant under all alternatives except C and is considered insignificant as compared to the movement from timber harvests, roads, and range allotments. This is also true of soil movement from wildlife, fire, and mineral entries. All can have a significant localized effect on soil movement, but the delivery efficiencies and volume of soil movement are insignificant in comparison to the movement from timber and range activities and roads.

Effects of management activities on large watersheds would be very limited. The implementation of 10,000 acre diversity units as management policy and standard silvicultural practices would limit the number of times an area may be entered. Watershed condition, water quality and quantity, and soil loss would remain at a relatively constant level under all alternatives.

Watershed Condition

An estimated 34% of the Forest is in treatable, unsatisfactory watershed condition. Treatable lands are those with a slope less than 40%. Unsatisfactory condition lands with slopes greater than 40% are classified untreatable because they cannot be mechanically treated and they will respond very little if at all.

The commercial forest land is in satisfactory watershed condition and would remain so. Watershed condition in the non-forested areas will continue to improve as cattle numbers are balanced with available capacity. There is a lag time estimated at one to two decades before watershed improves to a satisfactory condition after cattle numbers are balanced. There would still be large areas that are heavily canapied, rilled and gullied that are not expected to improve without help from improvement projects. Most of these areas are in the pinyon-juniper zone where rain is unpredictable, vegetative understory cover inadequate, and soils easily erode. The following table shows unsatisfactory watershed condition acres by alternative, taking into account lag time.

Table 112. Unsatisfactory Watershed Condition (M Acres)

Period	PA	A	B	C	D	E
1	410	543	536	469	458	514
2	205	402	389	253	210	345
3	4	261	242	38	4	157
4	0	126	100	0	0	6
5	0	5	0	0	0	0

The Proposed Action (PA) and alternative D bring permitted livestock numbers in line with capacity in the first decade, and allowing for lag time, unsatisfactory acres are in satisfactory or better condition by the end of period 3. Alternatives A is in satisfactory condition in period 6, Alternative C in period 4, and Alternative B and E in period 5.

Water Yield

Currently, the Apache-Sitgreaves yields an estimated 379,000 acre feet of water each year. The majority of the water comes from the ponderosa pine, mixed conifer, and spruce fir vegetative types.

All alternatives increase water yield over current, but all increases are 2% or less. Water yield by period is summarized in Table 113. No alternative significantly affects the Forest contribution to water recharge.

Table 113. Average Annual Water Yield (M/Acre Feet)

	Alternative					
Period	PA	A	B	C	D	E
1	379	379	379	379	379	379
2	384	376	381	380	379	377
3	387	378	383	385	383	377
4	382	376	379	377	378	372
5	381	375	376	375	366	373
50 Year Average	383	377	380	379	377	376

The preferred alternative produces 383,000 acre feet per year (50 year average). This 2% increase in yield over current is attributed to increased timber harvest (approximately 10%), which reduces basal area and includes a few clear cut options, and harvest of slopes over 40%.

Alternative B produces the highest water yield. This alternative emphasizes commodities such as timber, range, and wildlife and causes a corresponding high water production.

Water yield is increased in all alternatives, except current, by allocation of part of the suitable timber lands to prescriptions providing for wildlife habitat improvement, forage production, or reduced basal area for enhanced timber production.

Water Quality

Compliance with the Clear Water Act of 1977 would be met in all alternatives.

Water quality degradation due to timber activities would be temporary and limited in extent. Improved road locations and obliterating poorly located roads would also decrease sediment production and transport.

Water quality which is already described as good to excellent will increase slightly, as poorly located roads that contribute sediment to streams are closed or relocated. This will be accomplished under the timber sale program.

There are specific problem areas such as the Show Low/Lakeside/Pinetop area where new sewage facilities should allow an improvement in water quality. This is likely to be offset by continued development which will create disturbance in ground cover. The Division of Environmental Health Services of the State Health Department has described water quality degradation occurring in the Greer area as a result of septic tank problems. This problem will become worse until such time as the community corrects it.

Livestock impacts on water quality would be reduced as riparian areas are brought under more intensive management. With numbers in balance with capacity, watershed condition is expected to improve, although slowly in the more arid areas below the Rim.

Water Rights

The Preferred Alternative and all other alternatives provide for acquiring water rights as needed to implement those Forest Management prescriptions not currently covered. The preferred alternative emphasizes developed recreational lakes and increased wildlife habitat improvement, which will require development of a few wells and a large number of surface water developments. This will necessitate additional water rights; some may be acquired by application from the State, while others may have to be purchased from other water users. A State water right for each new surface development and each new spring development will be needed for future campgrounds, range waters, and wildlife habitat projects. Recreation and wildlife budgets allow for acquisition through appropriation or purchase of water rights as needed.

Those alternatives that have increased emphasis on developed recreation and/or range management would require proportional increases in demand for appropriated water. Alternatives with increased timber harvest and road building would require more use of reserved water rights.

Flood Risk

Flood risk, both local and downstream, would not vary significantly by alternative. Flood events would continue to occur, but are a result of extreme rainfall or snowmelt events, not as a result of management activities. Water yield enhancement projects such as timber overstory removal can produce increased sediment yields due to the surface disturbance and reduced evapotranspiration that will result in increased flows. Overstory removal can increase water yields. If done in large enough contiguous areas, it could increase the risk of localized downstream flooding.

Due to the limited number of treated contiguous acres and the off-setting decrease in water yield due to timber growth, increases in downstream flooding and sediment yields should be insignificant. Management practices that maintain adequate ground cover, protect streamcourses from human-caused debris accumulations, and limited road construction would reduce flood hazards under all alternatives.

There are no known plans for water transmission facilities. There are however, Bureau of Reclamation plans for the Quail Springs Flood Control Reservoir on the San Francisco River just inside the Forest Boundary near Clifton. As planned, the capacity ranges from 150,000 to 300,000 acre feet. Also planned as a flood control reservoir is Schoens Dam just off the Forest on Show Low Creek near Show Low, eighty-three acres of private land and 243 acres of Forest land would be inundated. Minimum storage pool will be approximately 200 acre feet, with a maximum (flood stage) capacity of 6,000 acre feet.

Irretrievable/ Irreversible Commitments

There are no irretrievable soil or water commitments, however, some irretrievable resource production will occur due to soil losses.

Some irreversible soil loss will occur in all alternatives where losses exceed tolerance levels and drainages adjust to new hydrologic gradients. These losses are minimized in Alternative C. Alternative E results in the greatest losses. The Preferred Alternative ranks third relative in soil losses.

MINERALS

Direct impacts to mineral prospecting, exploration, and development are difficult to predict accurately since the timing and location of work is controlled by the response to demand, supply, and market prices. In each alternative, the area of the Forest not withdrawn from mineral leasing and entry would be open for exploration and prospecting. Minerals development occurs only after specific project evaluations and analysis.

Table 114. Forest-Wide Summary of Acres Open and Withdrawn for Mineral Entry/Lease.

	Alternative (Approximate Acreage)			
	PA	A, B	Alt, C	D, E
Acres Open for Locatable Minerals	1,887,905	1,891,805	1,761,145	1,911,989
Acres Withdrawn from Locatable Mineral Entry	115,647	111,747	242,407	91,563

Table 114. Forest-Wide Summary of Acres Open and Withdrawn for Mineral Entry/Lease (Continued).

	Alternative (Approximate Acreage)			
	PA	A, B	Alt, C	D, E
Acres Open for Leasable Minerals	1,887,905	1,891,805	1,761,145	1,911,989
Acres Withdrawn from Mineral Leasing	115,647	111,747	242,407	91,563

Table 115. Mineral Withdrawals

	Alternative (Approximate Acreage)			
Type	PA	Alt, A,B	C	D, E
Administration Sites	4,086	4,086	4,086	4,086
Recreation Sites	25,024	25,024	25,024	25,024
Proposed Rec. Sites	23,573	23,573	8,702	3,389
Roadside Zones	5,143	5,143	5,143	5,143
River & Water Projects	26,061	26,061	26,061	26,061
RNA's	432	432	432	432
Proposed RNA's	1,329	1,329	1,329	1,329
Research/Watersheds	2,740	2,740	2,740	2,740
Wild & Scenic Des.	2,100	0	28,200	0
Spec. Areas (not listed)	1,800	0	119,331	0
Wilderness Areas	23,359	23,359	23,359	23,359
TOTALS	115,647	111,747	242,407	91,563

Areas with private mineral rights (outstanding and reservation mineral rights) are scattered throughout the Forest. The management emphasis of each alternative will influence the operating conditions the Forest would seek with private mineral owners if any operations proposed.

All of the Alternatives contain a base level budget to process mineral related proposals in a timely manner and assist the BLM in the administration of on-the-ground activities.

The principal mineral related workload on the Forest is the administration of common variety minerals. All alternatives respond the same to the anticipated demand and ensure provisions are made to rehabilitate the site.

Alternatives PA, B, C, D, and E also have a minimal program to identify and assess rehabilitation needs of old pits; or existing pits with inadequate rehabilitation provisions. Therefore, if special funding becomes available to implement the rehabilitation recommendations, the effects would be enhancement of visual quality, soil stabilization, increased forage production, and possibly a return of acres to timber production.

LANDS AND USES

Landownership

Lands related activities support other resource management activities and provide administration for approximately 503 special use permits covering 18,051 acres. Administration requirements of these permits is the same in all alternatives. A part of what is involved in landownership activities are those basic functions necessary to maintain ownership of the land such as land line maintenance and administration of land status records. In addition to the forest lands being used for various resource management programs, they also are needed to support activities occurring on private land within and outside of the forest boundary, and are needed for access to cross from one location outside the forest to another. Examples of these associated needs are utility lines, roads, water developments, and electronic sites. Because of the location of the National Forest in relationship to communities as well as individually owned private land, economic development or general utilization of areas in and around the forest can only occur in many cases if National Forest System lands are available to accommodate the required support activities or services.

Policy on approval of special use applications for private uses (rights-of-way) is expressed in FSM 2703 (amend 83 dated 5/85). In brief, that policy is that 1) application should be denied if location or development on non-National forest land is reasonably possible, 2) applications should not be granted, primarily to afford the applicant lower cost or less restrictive location as compared to other reasonable alternative locations, and 3) authorization should not be granted merely to accommodate the wishes of an individual applicant.

There is a need to manage special uses to mitigate environmental impacts and to prevent interference with other resource programs. The surveying and posting of landlines as well as maintaining existing posted lines is necessary to minimize potential trespass cases which are expensive to resolve once they occur. The acquisition of legal rights-of-way are also necessary to provide the access required to conduct resource management programs.

The reason many special uses occur, why many boundary lines are critical to survey and keep posted, why certain rights-of-way are required is that intermixed private land within the forest are for the first time occupied or used year-round, therefore, putting a greater burden on the management and protection of the adjacent National Forest System lands. In many cases, National Forest administration can be improved when landownership adjustments are made; that is giving up a parcel of National Forest affected by development of adjacent land in return for private land where administration would be easier (i.e., a parcel surrounded by National Forest).

Special authorities also exist in the Townsite Act and Small Tracts Act to make needed adjustments. The 12,060 acres classified as base for exchange or the 27,576 acres classified as desirable for acquisition do not change by alternative. Maps are available at the Forest Supervisor's Office and District Ranger's Offices for review.

In many instances, because of the legal requirement that such exchanges of land must be on a "value-for-value" basis, the National Forest System gains more land than it loses. The reason being the lands the Forest Service usually has to offer in order to improve administration are high valued properties adjacent to expanding communities.

A possible consequence of such landownership adjustments is one county can lose land from its net tax base, however, depending on the land acquired, this can be offset to some degree by in lieu of tax payments.

Alternatives A, B, C, D, and E all continue the current level of management. This results in minimal resolution of trespass cases which can have adverse effects on various resources as well as programs. In these alternatives, only those special uses with the greatest potential to affect public health and safety and forest resources are administered. Other special uses are not administered which can create adverse impacts on forest management activities, and also does not allow for collection of a fee reflecting fair market value or other sound business management practices. Landline work will take place only to resolve high priority cases and facilitate other resource management programs. Many landlines will not be maintained, therefore eventually will have to be resurveyed.

Trespasses would increase due to the poorly maintained landlines. Because of the high priority to be responsive to the land adjustment needs for community expansion around the Lakeside/Show Low/Pinetop area, a land adjustment program is maintained in Alternatives A, B, C, D, and E. However, the program will handle only a minimal caseload, therefore possibly slowing the development program desired by the three communities. Rights-of-way acquisitions may not occur which could prevent some resource management activities from taking place.

The PA alternative intensifies the landownership program by a factor of 2 in the first period allowing the Forest to be in a better position to respond to land adjustment proposals and issues in the Lakeside/Pinetop/Show Low communities. This timeliness allows the community development program to continue at the requested pace. In Alternative PA landlines are located in areas where potential for trespass exists and/or to resolve trespass cases. Existing land lines are better maintained therefore reducing opportunities for trespass. All special uses are administered, therefore conflicts with other resource management are reduced and a higher level of justifiable fees are collected. Needed right-of-ways are acquired in order to enhance the management of other resources.

Utility Corridors

In evaluating possible corridors, avoidance areas and exclusion areas have been established. Avoidance areas are lands having one or more physical, institutional, environmental, or statutory impediment that would be difficult to mitigate. Corridors are discouraged but not prohibited. These include developed recreation sites, archeologic or historic National Register sites, unstable soils, riparian areas, base for exchange lands, and areas with sensitive visual resources. Because of their high multiple use values, the ponderosa pine and mixed conifer timber types are also considered avoidance areas. Exclusion areas are primarily lands classified as wilderness, primitive, or research natural areas.

Existing utility rights-of-way are established as corridors in all alternatives. Corridors for the Proposed Action are displayed on the Transportation and Corridor Map. A window designates a land area within which a corridor such as a major power distribution line, major pipeline, or major transportation route may be located. Windows are normally located between exclusion and/or avoidance areas. Management requirements in Chapter 4 of the Forest Plan direct that new transmission corridors be sited in designated corridors and windows whenever environmentally and technically feasible. Windows on the Apache-Sitgreaves National Forests are areas parallel to three major transmission corridors. No new transportation corridors are proposed outside of these windows.

Emphasis is placed on using existing corridors to their capacity with compatible utilities before evaluating new routes.

Most of the utility corridor work will be upgrading existing 69KV corridors to respond to increased demand by growing communities within the Forest boundaries. Some new corridors are anticipated. See the transportation/corridors map for probable locations.

Depending on their location, new corridors could produce short-term irretrievable effects upon soil loss and long-term effects upon land taken out of production and the visual resource. Depending on their location and size, these effects will range from minimal to major. There will be no irreversible effects.

PROTECTION

Air Quality

Prescribed fire and dust from roads have direct effects on air quality. The effects are short-term and primarily consist of visibility impairment in a localized area from particulates.

Prescribed fire is the use of natural and planned ignitions of natural or activity generated fuels under controlled conditions of fuel and soil moisture and weather. The purpose is to confine the fire to a predetermined area, intensity and rate of spread to reduce fuel hazards and/or improve wildlife habitat, visual quality and forage resources.

Prescribed fire is principally utilized to clean up fuels generated by timber harvests and to stimulate sprouting in browse types for wildlife habitat improvement. Timber slash consumed is mostly "fines" such as needles, leaves, and small limbs.

Air quality due to forest burning would be at current levels under alternatives C and E, and slightly improved in Alternative D. Alternative A has the least impact on quality. Alternative B would have the most impact on air quality.

The preferred alternative impacts air quality slightly more than alternative E.

Applications for burning are submitted annually to the Arizona Department of Health Services describing the location, fuel, size, type of burn, and approximate dates. The State provides final approval on a day to day basis depending upon weather conditions and smoke dispersal predictions at the time of burning.

Some alternatives including the PA alternative tend to reduce air quality. However, total emission levels will remain fairly constant during the next 50 years, because of more stringent controls placed on air quality by the State and local communities, and increased utilization of Forest products.

Forest management will not permanently reduce visibility into or out of the Mt. Baldy Wilderness.

Fire

Fire management is affected by the amount of fire risk and fire hazard created under each alternative.

Fire risk is a function of human activity. Fire risk is expected to increase in all alternatives. Fire risk will rise significantly near the faster growing communities within the Forest, such as Show Low, Lakeside, Pinetop, Forest Lakes, Heber, Alpine, etc. Alternatives providing more recreation and wildlife opportunities and more access would generate a higher level of fire risk. The PA alternative produces the highest recreation and wildlife opportunities and therefore the highest fire risk.

Fire hazard is primarily the amount of fuel in the Forest created by nature or by management activities like logging. Natural fuels increase as trees grow older and die from insects and disease, and other causes. Timber sales and other timber related activities are the major activities that create fuels, thereby increasing the fire hazard. Fuel build up from management activities is partially mitigated by fuel treatments, that are planned and budgeted as part of the activity. For example, timber sales must treat fuels to the extent that the fire hazard is not greater following the completion of the sale activities than prior to it.

In addition, natural fuels and untreated activity fuels are partly mitigated by fire financed fuel treatments shown in Table 116. However, not all the fuel can be treated. Alternatives with higher levels of timber harvest would also have the highest levels of fuel hazards, particularly during the (2 to 5 years) decade before sale related treatments are completed. Fire hazard increases in all alternatives except A which has about a 50% reduction in fire hazard. Alternative B has the highest sustained fire hazard (30% greater than current). The PA alternative increases fire hazard about 13% in period 1 and would be 30% greater than current by period 5.

Table 116. Average Annual Acres of Fuel Treatment with Fire Management Funds.

PA	A	B	C	D	E
6,248	3,811	3,811	3,811	11,153	6,248

A combination of fire risk and hazard contributes to the probability of a damaging fire burning in the Forest. Fire occurrence probability is partially mitigated by the level of fire protection provided. The level of fire protection can be measured by the presuppression and fuel treatment funds included in each alternative (line one and two of Table 117).

When fire risk, hazard, and protection levels are considered together, a fire probability can be estimated for each alternative. This fire probability is expressed in estimated average annual acres burned. The average annual acres burned result in costs from fighting the fire and from both losses and gains in resources. Timber is lost but improvements in wildlife habitat may result. The total of all gains and losses to the resource is expressed as a cost called the Net Value Change.

Table 117. Comparison of Average Annual Fire Costs (M $'s) and Acres Burned for the First Decade

	PA	A	B	C	D	E
Presuppression	1,762	2,025	2,025	2,025	2,025	2,481
Fuel Treatment	200	122	122	122	367	200
Suppression	1,357	1,357	1,357	1,357	1357	927
Net Value Change	880	732	732	732	543	396
Total Cost	4,199	4,235	4,236	4,236	4,282	4,004
Avg. Annual Burned Acreage	2,775	2,450	2,450	2,450	1,990	1,814

Alternative E, which has the highest protection costs, would have the lowest suppression costs and the lowest net value change, resulting in the lowest total costs. Alternatives D, A, B, and C would have the highest total costs. Alternative PA would have slightly lower total costs than D, A, B, and C, but somewhat higher costs than alternative E.

The total cost difference between Alternative E and the Preferred Alternative is a reflection of a shift in management emphasis and decreasing budget.

Adverse environmental effects that could not be avoided are:

Temporary reductions in air quality due to prescribed fire.

Temporary to long-term reductions in visual quality, wildlife habitat, and recreation opportunities due to wildfires in proportion to the size and intensity of each fire.

Temporary increased soil movement and decreased watershed condition in proportion to the size and intensity of each fire.

Law Enforcement

The only quantifiable unit of measure of law enforcement relates to cooperative agreements with the counties and other agencies law enforcement officers. Most of the evaluation relates to non-quantifiable factors that tie back to how a resource will be managed.

Table 118. Annual Law Cooperative Law Enforcement Costs Averaged Over Periods 1-5 (M-Dollars).

PA	A	B	C	D	E
31.6	31.6	31.6	31.6	31.6	38.7

Table 118 summarizes cooperative law enforcement costs over the planning period. Cooperative law enforcement consists of reimbursing local agencies for the enforcement of State and local laws on Federal lands. Alternative E is the current level of enforcement, while the remaining alternatives are funded at a lower level. All Alternatives include other enforcement dollars that are not reflected here.

Enforcement of laws and regulations concerning timber harvesting or fuelwood gathering are the responsibility of the Forest timber organization and is funded through timber.

As such, this cost of enforcement is part of the cost of harvesting timber and does not show up directly as a law enforcement cost in the budget. Recreation, wildlife, and range are other resources that enforce laws and regulations concerning these respective resource areas.

Poaching wildlife would continue at about current levels in all Alternatives. Poaching is a violation of State game laws, and prevention and enforcement of violations is a State responsibility. No cooperative law enforcement dollars are paid to the Arizona Game and Fish Department.

In general, the more intensively a resource is managed, whether range, wildlife, recreation, timber or fuelwood, the better the level of compliance with rules and regulations concerning that resource. The increased level of compliance is due to the increased presence of Forest officers and the associated deterrent effect. The preferred alternative more intensively manages recreation, wildlife, and timber, and as a result the level of compliance with laws and regulations is expected to be better than any other alternatives.

Integrated Pest Management

Preventing insect and disease infestations, usually through cultural or mechanical means, is the long-range pest management objective. Population buildups will be monitored and, if potential epidemics are identified, ground surveys will be made. If determined to be serious, suppression measures will be taken to control populations until reduced to an endemic level.

Cultural or mechanical means of prevention are usually accomplished through vegetation manipulation activities associated with the long-term management of timber, range, and wildlife. Practices include: thinning, harvesting, and slash disposal associated with timber management. Revegetation, mechanical chopping and raking, and prescribed fire are used in range and wildlife management programs.

Approved pesticides may also be used on high value areas, such as campgrounds, or when all other methods have failed and resource values can be protected. Environmental effects associated with chemical control vary by the type and amount of chemical used and the method of application. In most cases, the major impact would be on non-target insects that would have a secondary effect on the food resource of birds and animals in the area. Streams, though avoided to the extent possible, could be affected by pesticide drift and destruction of insects could affect the food supply for fish.

At this time there is no specific use of herbicides or pesticides planned, but each potential situation for their use will be reviewed to see if it is the most economical, biologically sound, and environmentally acceptable means of accomplishing the desired management goals. Where non-chemical or mechanical means or prescribed fire are available at about the same price as chemical treatments, the non-chemical methods will be used. This applies to the timber resource as well as the range and wildlife resource.

Dwarf mistletoe in the ponderosa pine and mixed conifer types is a problem. This parasitic plant lowers tree vigor, causing significant reduction in growth, increased mortality, and increased susceptibility to bark beetles and root rots. Control is accomplished in all alternatives by removal of infected trees during intermediate and regeneration stages of a shelterwood cut to prevent dispersal of seed to the understory of regenerated stands or by clearcutting and establishing new stands. All alternatives provide the opportunity to reduce losses to dwarf mistletoe on suitable timber lands as stands are brought under management. Infected stands will receive priority for scheduled timber treatments during the first decade. The alternatives that treat the most acres silviculturally are most effective in controlling insects and disease. Alternatives that treat the most acres intensively are listed in descending order of acres treated: B, C, D, PA, E, and A.

Forest-wide management requirements provide for monitoring insect infestations and disease outbreaks through aerial surveys and ground checking. Integrated pest management prevention and suppression are applied under all alternatives. Monitoring needs are most intense under alternatives having the least vegetation manipulation such as Alternatives E and A.

The application of appropriate silvicultural methods to control insects and disease increases the long-term productivity of the Forest.

Irretrievable and Irreversible Commitment

The major control measures proposed are the timing and type of silvicultural treatments. Silvicultural treatments imply that the new generation of trees will also be harvested. Though this is not irreversible, it is a long term commitment. Trees killed by insects represent an irretrievable loss of timber. Reduced wood fiber production from suitable timber lands because of dwarf mistletoe and insect loss is an irretrievable loss.

FACILITIES AND TRANSPORTATION

Roads

The goal of road system development and management is to provide safe, cost effective transportation facilities for Forest users consistent with land management objectives. There are currently 368 miles of arterial roads with Forest Service primary responsibility, and 520 miles of collector roads. In addition, the Forest has 7,253 miles of local roads including travelways and jeep trails.

The alternatives affect the road system by changing the mileage of roads reconstructed/constructed, closed or obliterated, and the level of overall maintenance.

Road Reconstruction/ Construction

Timber harvest generates most road development activity. Timber purchasers receive credits on the stumpage price for reconstructing or constructing roads needed to get to the sale areas. Timber road reconstruction/construction mileage increases to an optimum balance of roads and skidding distance as timber harvest volume increases, and conversely decreases as harvest volume decreases, road mileage decreases and skidding distances increase.

Much of the local road reconstruction is associated with timber sales. Generally, new construction would be limited to minor local roads directly associated with timber harvest on cable timber sales. New construction by alternative would be limited to less than 10% of the total mileage shown in Table 119 for purchaser credit in decade 1, and would go to near zero by the end of decade 2 when first entry into the sale areas would be completed. Any new construction would result in increased irretrievable commitments in loss of land to production. Due to the limited amount of construction, however, these commitments are minimal. There would be no irreversible commitments.

Although local roads are designed for closure between 20 year timber harvest entry periods, approximately 25% remain open as hunters, ORV enthusiasts, firewood gatherers, and other users maneuver around barricades. Increased utilization of areas previously inaccessible to motor vehicles causes increased disturbance of wildlife, especially herbivores such as deer and elk. Elk in particular tend to avoid areas where open road density exceeds one mile per square mile. Local roads which are closed after harvesting, temporarily decreases total density by 1-1.5 miles per square mile. The Proposed Action decreases road density over the present. Alternatives A, B, C, and E have higher road densities than the Proposed Action while Alternative D is lower.

Other road projects are funded by a limited amount of capital investment dollars. Nearly all of this funding would go to reconstruction of arterial and collector roads. No alternative would require constructing new arterials or collectors. Increased funding in this area in the Preferred Alternative would result in upgrading a portion of the existing system and a shorter cycle of rotational reconstruction to the existing standard on the remainder of the system.

Lower funding levels in Alternatives A, D, and E would result in a continued loss of a portion of the system. Higher funding levels in Alternatives PA, B, and C would decrease irretrievable commitments in soil loss due to improved surfaces and drainage characteristics. Lower funding levels would slightly increase these commitments. There would be no irreversible commitments.

Table 119 summarizes miles reconstructed or constructed in each alternative by the type of funding.

Table 119. Average Road Reconstruction/Construction (Miles/Decade) Arterial/Collector/Local.

FUNDING	Decade	PA	A	B	C	D	E
Purchaser	1	1,045	307	1,154	573	885	598
Credit	2	1,166	515	1,612	1,061	838	1,101
	3	832	479	810	775	916	792
	4	846	372	972	698	500	1,084
	5	1,249	589	1,089	796	1,027	648
Capital	1	30	11	10	10	25	27
Investment	2	35	12	11	11	27	28
	3	35	12	11	11	27	28
	4	35	12	11	11	27	28
	5	35	12	11	11	27	28

Road Maintenance

Maintaining existing and proposed roads is essential to protecting the investments and the environment as well as providing safe and enjoyable use while reducing vehicle operating costs. Current maintenance levels on numerous system roads are inadequate and would remain so in Alternatives A, C, and D. It is not cost effective to maintain many existing roads at high levels until grades, drainage, and surface conditions are brought up to a suitable standard. Many gravel roads also need resurfacing to protect the investment and reduce vehicle operating costs. The proposed action along with its Capital Investment and Purchaser Credit Programs should adequately resolve the transportation problems. Road maintenance is summarized in Table 120 by funding.

Table 120. Average Annual Road Maintenance Funding (M$/YEAR) 1/

			Alternative			
Decade	PA	A	B	C	D	E
1	732	525	764	658	732	747
2	770	525	764	658	732	747
3	770	525	764	658	732	747
4	770	525	764	658	732	747
5	770	525	764	658	732	747

1/ Includes all funding sources.

Costs not shown are those associated with maintenance performed by timber purchasers commensurate with their use which is included in the appraised value of the timber sale. Also not shown, are those roads maintained by State, County, and commercial users.

Roads classified as local roads not needed, and planned for obliteration will be closed by mechanical or other means, as soon as possible. They will not be maintained unless serious resource damage or a public safety hazard is occurring between the time of closure and obliteration. Off-road vehicle restrictions will also be used to control public access to many of these roads.

Although there are increases above current in Alternative B, a substantial portion of the system will remain at a lower standard or as roads receiving no annual maintenance because of lower road closure/obliteration efforts. These roads will continue to deteriorate causing irreversible and irretrievable commitments in increased soil loss in both the short and long term. Alternatives A and E would accelerate these losses.

Road maintenance funding in Alternative PA decreases by 2% over Alternative E in the first decade, however, funding increases by 3% after Decade 1. This will provide for some increases in road maintenance and management on the Forest road system over Alternative E. Alternative A would provide the least improvement over Alternative E. Alternative B provides more maintenance funds than Alternative E. Alternative A is substantially below Alternative E due to budget constraints. Alternatives PA, B, D, and E would include maintenance to perpetuation on approximately 200 miles of arterial and collector roads upgraded during decades 1 and 2.

Road Obliteration or Closure

Obliterating or closing unneeded roads poses a special transportation problem. Approximately 50% of the 5,700 miles of local roads listed under maintenance level 1 are not needed for management purposes. Erosion is occurring in many cases due to poor location and drainage. Table 121 displays planned obliteration of unneeded travelways.

Table 121. Travelway Obliteration or Closure (Miles/Decade)

	Alternative					
Decade	PA	A	B	C	D	E
1	1000	0	43	65	615	30
2	1000	0	43	65	615	30
3	1000	0	20	20	20	30
4	20	0	20	20	20	30
5	0	0	20	20	20	30

All Alternatives except A would close a part of the unneeded roads by the end of the second decade. Alternative D would accomplish 1,230 miles by the second decade. Alternatives PA, C, and D would result in decreased irreversible and irretrievable effects on soil loss and land kept out of production. Alternative A would result in continued deterioration of these roads and would subsequently increase losses in these areas.

Alternatives A, B, C, D, and E show total mileage obliterated through decade 5 which are lower than the identified 3,000 mile backlog.

Table 122 shows total miles on the Forest system by decade by alternative after any new construction, reconstruction, or obliteration occurs.

Table 122. Total Miles by Decade by Alternative After New Construction, Reconstruction, Obliteration, or Closure.

	Alternative					
Decade	PA	A	B	C	D	E
1	8075	8055	8055	8005	7470	8040
2	6850	8065	8079	8030	7465	8065
3	5600	8065	8060	8010	7445	8035
4	5040	8065	8040	7990	7425	8005
5	5040	8065	8020	7970	7405	7975

The preferred alternative produces the most significant reduction in number of roads existing by the fifth decade with alternative D as next best. Alternative A would increase the total miles over current conditions. All other alternatives show a modest reduction. Alternative PA would accomplish a 60% reduction by the end of the second decade as road obliteration projects are completed.

Facilities

Administrative facilities such as offices, houses, crew quarters, and lookouts are used in the administration and management of the Forest. Many administrative facilities are too old for cost effective maintenance and require reconstruction or replacement.

All alternatives except PA would result in some obsolete facilities by the end of the fifth decade. Some facilities would deteriorate to the point of non-useability.

SECTION B
ECONOMIC AND SOCIAL CONSIDERATIONS

Social Effects

Each alternative has a unique potential effect on employment, income and population patterns in the Forest's influence zone. Differences are a function of the different outputs modeled by FORPLAN for each alternative. A computer input/output model, IMPLAN, is used to transform these outputs into data for effects assessment. The input (i.e., FORPLAN output) categories are Timber (sawtimber, timber products, fuelwood), Recreation (picnicking, camping, skiing, water-based, dispersed—both motorized and nonmotorized—uses, snowmobiling, other uses), Wildlife (big game, small game, gamefowl, fishing, nonconsumptive uses), Grazing (sheep, cattle), and Government Expenditures (employee compensation, operation and maintenance/investment). IMPLAN outputs are produced in terms of employment and income for each of 98 industry sectors for each alternative. Population outputs for each alternative vary directly with employment.

The IMPLAN model is Forest-specific, the multi-county area modeled including Apache, Greenlee and Navajo counties. While there are economic flows to other counties, such as Coconino and Gila, these are considered to be relatively insignificant. The model utilizes a 1977 base-year. Even so, it is assumed that employment predictions are accurate given the lack of substantial technological change in most industry sectors since then. Income figures have been adjusted to 1982 dollar values to ensure comparability to other such figures in this document.

The assessment of potential social/economic effects is conducted in terms of differences from the existing, current situation for the first decade of the Forest Plan's implementation. The first table that follows shows the 1977 base-year data and the base-level data for Alternative E (No-Action). The second and third tables illustrate changes in alternative outputs, relative to Alternative E, on a net and percentage basis, respectively. In these tables, certain industry categories have been defined in order to provide for particular monitoring of Forest-dependent sectors. The selected categories are Trade, Lodging and Dining (L&D), and Logging and Mills (L&M); other merely lumps the remaining sectors modeled in the multi-county economy.

Table 123. Base-year and Current (Alternative E) Forest-dependent Base-level Figures, with Categorical Percentages of the Total.

	1977 Base		Alternative E	
EMPLOYMENT (Jobs)				
Trade	4,180.0	15.6%	1,094.4	32.3%
L & D	3,107.8	11.6	670.5	19.8
L & M	1,368.8	5.1	528.4	15.6
Other	18,198.3	67.8	1,092.5	32.3
All Sectors	26,855.0		3,385.7	
INCOME (MM$)				
Trade	45.0	7.6	12.4	23.6
L & D	23.2	3.9	5.0	9.6
L & M	30.6	5.2	11.7	22.4
Other	496.4	83.4	23.2	44.4
All Sectors	595.2		52.4	
POPULATION	119,084		15,013	

Table 124. Net Change in Output Levels, Relative to Alternative E, for the Various Alternatives.

		A	B	C	D	PA
EMPLOYMENT (Jobs)						
	Trade	33.6	155.3	72.2	16.3	363.6
	L & D	37.5	78.4	25.2	8.5	184.4
	L & M	-93.5	431.4	264.7	50.9	56.0
	Other	16.5	205.1	99.5	25.3	318.0
	All Sectors	-5.9	870.1	461.6	101.0	921.9
INCOME (MMS)						
	Trade	.4	1.7	.8	.2	4.1
	L & D	.3	.6	.2	.1	1.4
	L & M	-2.3	9.1	5.5	.9	1.3
	Other	.2	4.7	2.2	.6	6.5
	All Sectors	-1.4	16.0	8.7	1.7	13.3
POPULATION		-26	3,859	2,047	448	4,088

Table 125. Percentage Change in Output Levels, Relative to Alternative E, for the Various Alternatives.

		A	B	C	D	PA
EMPLOYMENT						
	Trade	3.1%	14.2%	6.6%	1.5%	33.2%
	L & D	5.6	11.7	3.8	1.3	27.5
	L & M	-17.7	81.6	50.1	9.6	10.6
	Other	1.5	18.8	9.1	2.3	29.1
	All Sectors	-.2	25.7	13.6	3.0	27.2
INCOME						
	Trade	3.3	13.7	6.5	1.4	33.3
	L & D	5.6	11.7	3.7	1.3	27.5
	L & M	-19.7	77.4	46.4	7.3	11.0
	Other	.9	20.0	9.5	2.4	28.1
	All Sectors	-2.7	30.6	16.6	3.2	25.4
POPULATION		-.2	25.7	13.6	3.0	27.2

From Table 123, it can be seen, first, that the distribution of employment and income in the multi-county economy as a whole is much different in its patterning compared to that portion which can be traced to Forest activities. About two-thirds of multi-county jobs fall within the Other category compared to some one-third of Alternative E jobs. Similar proportions hold for income: 83.4% versus 44.4%. The Forest-dependent sectors are concentrated in the three defined categories. Secondly, it can be seen that the role of Forest activities is somewhat limited, but not unimportant. These activities, directly and indirectly, account for 12.6% of employment and 8.8% of income within the multi-county area.

The remaining two tables provide the basis for assessing potential social and economic effects. The adoption of Alternative A, with its budget limitations, would appear to have virtually no net effect on the multi-county economy. However, this is a result of a change in the pattern, or mix, of employment. While some industry sectors would gain jobs, this would come at the expense of others, notably the Logging & Mills category. There would be a slight net decrease in overall income and employment levels.

The adoption of Alternative B, which emphasizes commodity values, would lead to notable growth in all categories. The bulk of this—49.6% of the additional jobs and 56.9% of income—is to be found in Logging & Mills. Detailed inspection of the IMPLAN results does not isolate any other industry sector which would be substantially affected, so it may be presumed that the increase in the Other category is only an indirect result of the increase in timber production.

Alternative C, with its emphasis on amenity values, would lead to general growth as well, with patterns rather similar to Alternative B but at lower levels.

The adoption of Alternative D, with its emphasis of meeting RPA objectives, would result in a low level of overall growth. Logging & Mills would realize the greatest increase.

The Proposed Action Alternative, if adopted, would lead to the highest levels of growth of any of the alternatives. Comparatively, these benefits are distributed more evenly throughout all sectors of the economy. In addition to the main categories shown in the tables, appreciable increases would accrue to sectors involved in transportation, food production and processing, and business, automotive and recreation services.

In summary, Alternative A would result in a slight decline in the overall multi-county economy, affecting the Logging & Mills category the most. Alternative E would result in no change. Alternatives B, C and D all would theoretically result in growth in the multi-county economy; in each instance one-half or more of the change would occur in Logging & Mills. The levels of growth which would result from Alternative PA are derived from a modest increase in timber supply but also from increased emphases on hunting, fishing, and general recreational uses of the Forest. As mentioned, the Proposed Action would result in the greatest change. Relative to the multi-county economy, jobs are predicted to increase by 3.4% and income by 2.2%.

For the area as a whole, changes associated with the alternatives considered will result in essentially no effect on community stability. Communities that currently exhibit a rural or small-town atmosphere will not change as result of Forest management direction proposed by any of the alternatives. Political and social organization will not be affected, and land-use patterns would not be expected to be significantly altered.

None of the alternatives are expected to result in any notable change in the present use of Forest lands or products by minorities. Opportunities will continue to be equally available to all who seek them. With respect to employment, minorities and women are hired directly by the agency, or obtain contracts from the agency or work for those who do. Hiring and contracting are directly related to the Forest budget. As funding increases, more people are hired and more contracts are issued. The alternatives ranked in order of decreasing budgets for the first decade are B, C, PA, D, E and A.

SECTION C
OTHER CONSIDERATIONS

Energy Efficiency

Estimates of energy consumption by alternative include energy used to provide goods and services. Estimates are based on timber and firewood harvest, recreation use, grazing, road construction/ reconstruction and maintenance, as well as fire management.

Energy consumption by alternative is mainly a function of the activity level of a given alternative to produce goods and services. Alternatives A and E with the lowest average annual budgets, have the lowest estimated energy consumption over the planning horizon. These alternatives also have the lowest PNV over the planning horizon. Excluding other alternatives, the Proposed Action is the most energy efficient alternative.

The other Alternatives have higher estimated energy consumption needs because of higher activity levels with different combinations of net public benefits and higher costs to implement than the Proposed Action.

Mitigation measures such as the use of energy efficient vehicles, trip consolidation and other conservation practices will be considered in project level implementation of management activities, including timing and location for efficiency opportunities. Most of these practices covered apply to the implementation of any given alternative. Table 126 summarizes energy consumption by alternative. Figures for period 5 represent total energy consumed for decades 1-5.

Table 126. Energy Consumed by Decade 5 - Trillion BTU's.

	Alternative					
Period	PA	A	B	C	D	E
1	5.0	3.0	9.0	7.0	3.5	4.0
5	25.0	15.0	50.0	35.0	18.0	25.0

SECTION D
SUMMARY OF EFFECTS

Irretrievable resource commitments result from allocation decision that reduce production or use of renewable resources. Irretrievable commitments represent opportunities foregone for the period the plan is in effect and reflect trade-offs made to integrate multiple-use considerations or meet budget limitations. Significant irretrievable effects are summarized in the following table.

Table 127. Average Annual Irretrievable Resource Commitments in the First Decade by Alt.

	PA	A	B	C	D	E
RECREATION (MRVD)						
DEVELOPED						
High Output	1035	1035	1035	1035	1035	1035
Alt. Output	1035	1035	1035	820	760	773
Irr. Comm.	0	0	0	215	275	262
DISPERSED						
High Output	891	891	891	891	891	891
Alt. Output	714	840	736	753	891	863
Irr. Comm.	177	51	155	138	0	28
WILDERNESS						
High Output	35	35	35	35	35	35
Alt. Output	19	35	35	35	35	35
Irr. Comm.	16	0	0	0	0	0

Table 127. Average Annual Irretrievable Resource Commitments in the First Decade by Alt. (Continued)

	PA	A	B	C	D	E
WILDLIFE (MWFUD)						
High Output	1048	1048	1048	1048	1048	1048
Alt. Output	1048	951	971	995	943	953
Irr. Comm.	0	97	77	53	105	95
PERMITTED RANGE (MAUM)						
High Output	221	221	221	221	221	221
Alt. Output	204	119	220	168	211	221
Irr. Comm.	17	2	1	53	10	0
TIMBER (MMCF)						
MERCH. VOL.						
High Output	33	33	33	33	33	33
Alt. Output	23	15	33	27	21	20
Irr. Comm.	10	18	0	6	12	13
FUELWOOD (MMBF)						
High Output	18	18	18	18	18	18
Alt. Output	16	9	17	18	18	14
Irr. Comm.	2	9	1	0	2	4
WATER YIELD (M AC FT)						
High Output	379	379	379	379	379	379
Alt. Output	379	379	379	379	379	379
Irr. Comm.	0	0	0	0	0	0

ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

Recreation

Adverse effects on dispersed recreation which cannot be avoided include 1) temporary disruption of some dispersed use in timber sale areas during harvest; 2) disruption of wildlife because of increase in dispersed recreation activities; 3) increased user conflicts because of increased use coupled with reduced service levels in Alternative D, E, and (to a lesser degree) A; 4) deterioration of desirable settings (streams, lakes, rim vistas) due to increased use coupled with reduced management intensity in alternatives D and E; 5) and reduction in variety of recreation opportunities in Alternatives B, D, and E, and quality of experience in Alternatives D and E.

	Adverse effects on developed recreation which cannot be avoided, include: 1) increasing user conflicts and deterioration of sites and nearby heavily used dispersed areas when use exceeds capacity in alternatives D and E; 2) minor reductions in available outputs such as timber and wildlife habitat from construction of sites; 3) and reduction in the variety of recreation opportunities due to the loss of 600 acres in the semi-primitive motorized ROS class due to the development of one or both ski areas.
Wilderness	In all alternatives except PA, wilderness values would be reduced in the Mt. Baldy Wilderness where use exceeds capacity and management is at the less than standard service level.
Visual Quality	Unavoidable adverse effects are generally temporary and occur during project implementation. The effects of large fires will be visible until burned areas are revegetated. Following such fires, stands often will exceed optimum sizes and visual variety will be reduced. Alternative PA has the highest probability for large burned areas, and Alternatives D and E have the least. Alternatives A, B, and C are between PA and D.
Timber and Firewood	Reduced growth and increased mortality will occur in timber stands not allocated and scheduled for timber harvest. Alternative A has the most acres not scheduled for timber harvest followed by alternatives E, PA, D, C, and B, in that order.
Air Quality	Temporary reduction of air quality will occur during planned burning of activity generated slash, natural slash accumulations, treatment of wildlife habitat and during wild fires. Alternative D has the highest level of planned burning followed by alternatives E, PA, A, B, and C. Alternative PA has the highest probability for large acreages burned by wildfire followed by alternatives A, B, C, and D.
Soil & Watershed	All alternatives would have some soil movement. Alternative E has the most soil movement followed by alternatives B, PA, A, D, and C in descending order.

5. List of Preparers

CLAY BAXTER

District Ranger, B.S. Timber Management, Oregon State University, 1962.

Twenty-two years of experience with Forest Service in Region 3, on the Lincoln, Apache-Sitgreaves, Prescott, and Kaibab National Forests, and one year in Northern California, in timber, recreation and lands, range, wildlife, soils, and watershed.

Responsible for providing basic resource data for the Clifton Ranger District to the I.D. Team. Management Team member.

DEAN BERKEY

District Ranger, B.S. Forest Management, Pennsylvania State University, 1960.

Twenty-four years experience with Forest Service in Arizona and New Mexico, in recreation, lands, timber management, minerals, range, and wildlife. 12 years as District Ranger on the Glenwood, Sandia, and Alpine Districts.

Responsible for providing basic resource data for the Alpine Ranger District to the I.D. Team. Management Team member.

DICK BRINGHURST

Forest Engineer, B.S. Forest Engineering, Oregon State University 1962.

Twenty-six years experience in Arizona, Oregon, California, Washington, and Washington D.C. in engineering, transportation planning, and timber management. Two years experience as an auditor with the Office of Inspector General.

Supervised engineering inventories and coefficient development until transferred to the Washington Office in 1982. Management Team Member.

WALT BROOKS

Forest Engineer, November 1982-present. B.S. in Civil Engineering Gonzaga University, Spokane, Washington, 1962.

Twenty-five years experience with Forest Service. Supervised engineering input. Management Team Member.

RICK CABLES

District Ranger, B.S. Forest Management, Northern Arizona University, 1976.

Ten years experience with Forest Service in Arizona and New Mexico, in recreation, lands, minerals, wilderness, and timber management.

Member of Forest Management Team.

VERN CIMMERY

I.D. Team Leader, B.S. Geography/Psychology 1972, Portland State University; Graduate Certificate, International Institute Aerial Survey & Earth Sciences, 1973; M.S. Geography, Portland State University, 1976.

Four years experience in Remote Sensing, Environmental Analysis, and Geographic Information Systems with the Bonneville Power Administration, Department of Energy. Eight years experience with the Forest Service in Oregon and Arizona, in planning and geography.

Responsible for providing direction to I.D. Team as leader. Cooordinated CA delineation, prescription development, standards and guidelines, and building and editing FORPLAN model. Member I.D. Team, and member of Core Team.

TOM CLIFFORD

Forest Silviculturist, B.S. Forest Management 1972, Michigan State University.

Twelve years experience in Forest Service in Arizona, in timber management, fire management, and planning.

Responsible for timber coefficients and all timber related inventories. Member of I.D. Team.

JOHN COIL

Administrative Officer, B.A. Business Management-Accounting 1968, College of Idaho.

Three years experience with Department of Army as auditor and accountant. Sixteen years experience in Forest Service in Oregon, Minnesota, California, and Arizona.

Responsible for development of administrative cost. Management Team member.

GARY DAVIS

Forest Wildlife Biologist, B.S. Wildlife and Fisheries, 1971; M.S. Ecology, University of California, Davis, California, 1973.

Thirteen years experience with Forest Service in California and Arizona in timber and wildlife.

Responsible for wildlife and range standards and guidelines, and resource data. Provided coefficients for FORPLAN model. I.D. Team member, transferred to Alpine Ranger District in 1984.

JERRY DEITER	District Ranger, B.S. Range Management, 1961 Utah State University. Twenty-three years experience in Forest Service. Nineteen years as Ranger in New Mexico and Arizona. Supervised data input for Clifton Ranger District. Member of Management Team, until transfer to Coronado N.F. in 1984.
CHARLES DENTON	District Ranger, B.S. Forest Management, 1966 Northern Arizona University. Two years experience with State of Arizona Department of Forestry, and eighteen years in Forest Service in range, timber, fire, minerals, recreation, and lands. Six years as District Ranger. Supervised data input for Springerville Ranger District. Member of Management Team.
LOYD DILLE	Operations and Maintenance Engineer, B.S. Civil Engineering 1968, Brigham Young University. Sixteen years experience in Forest Service. Supervised engineering data gathering.
BRUCE DONALDSON	Forest Archeologist, B.A. Economics 1964, University of California, Berkeley; M.A. Anthropology 1975, State University of New York, Binghamton. Eight years experience with the Forest Service. Responsible for archeological and historical data, and social effects assessment.
TOM DWYER	Recreation Assistant, Springerville Ranger District; B.S. University of Arizona, 1976. Eight years experience with Forest Service in recreation, timber, lands, and human resource programs on three National Forests. Responsible for Wild and Scenic River studies, and preparing roadless area technical reports.

LEON FAGER

Wildlife Biologist, B.S. Range Management 1965, University of Arizona; M.S. Policy Analysis 1982, Michigan State University.

Ten years experience with the Soil Conservation Service in Arizona, eleven years experience with the Forest Service in Arizona and South Dakota, Wyoming, Nebraska, and Colorado in wildlife and range management.

Responsible for the range and wildlife coefficients and resource inventories. Transferred to Apache-Sitgreaves N.F. in 1984. Member of I.D. Team.

PAT HANRAHAN

Range and Wildlife Staff Officer (in 1984 assumed fire responsibilities), B.S. Forest-Range Management, Colorado State University, 1958.

Twenty-seven years experience in Forest Service in range and timber management. Eight years as District Ranger on Coronodo and Gila N.F.'s, fifteen years as Range and Wildlife Staff Officer.

Supervised data gathering of Range and Wildlife resource. Member of Management Team.

JOHN HART

Timber and Fire Staff Officer (in 1986 assumed fire responsibilities), B.S. in Forest Management, Colorado State University, 1958.

Twenty-nine years experience in Forest Service in Region 3. Eighteen years as District Ranger on three Ranger Districts in Arizona and New Mexico, seven years as Timber Staff Officer.

Supervised data gathering, prescription and coefficient development for the timber resource. Member of Forest Management Team.

VEARL HAYNES

Recreation and Lands Staff Officer, B.S. Forest Management 1962, West Virginia University.

Twenty-five years experience with Forest Service in West Virginia, Minnesota, and Arizona in timber management, recreation, and planning. District Ranger for twelve years, and Planning Staff Officer for nine years.

Responsible for Lands, Recreation, Wilderness, Minerals, Cultural Resources, Visual Management, and Special Uses. I.D. Team Member, Core Team Leader, and Management Team member.

WESLEY LATHROP

Fire and Watershed Staff Officer, B.S. Forest Management 1955, University of Minnesota.

Twenty-nine years experience with Forest Service in Arizona, New Mexico, and Washington in timber, fire, planning, and soils and watershed. Two years experience in infra-red imagery for Navy. Six years as District Ranger on Tonto and Apache N.F.'s. Retired from USFS in 1984.

Supervised the data gathering for fire and soils and watershed. Member of Forest Management Team.

LARRY LUCAS

Assistant Recreation and Lands Staff, B.S. Forest Management (forest recreation emphasis) 1973, Stephen F. Austin State University, Texas.

Four years experience with private industry in Texas, one year with BLM in Wyoming in Timber Management and Lands, and eight years experience in Forest Service in California, Arizona, and New Mexico in recreation, lands, minerals, and cultural resources.

Responsible for recreation, lands, minerals, and cultural resource inventories and coefficients. Transferred to Apache-Sitgreaves N.F. in 1984. Member I.D. Team.

NICK MCDONOUGH

Forest Supervisor, B.S. Civil Engineering 1961, Gonzaga University, Spokane, Washington.

Twenty-six years experience in the Forest Service in Oregon, Arizona, and Minnesota. Forest Supervisor six years on Apache-Sitgreaves.

Responsible official for development of the Land and Resource Management Plan. Management Team Leader.

ART MATTHIAS

Assistant Recreation and Lands Staff, B.S. Forest Management 1965, Iowa State University.

Eighteen years experience in Forest in timber, recreation, lands and minerals. Transferred to Coconino N.F. as District Ranger in 1984.

Responsible for data and coefficient development in minerals, lands, special uses and visual. I.D. Team member. Helped develop CA criteria and map delineations.

MARY COULOMBE

District Ranger, B.S. Political Science, POrtland State University, 1972; B.S. Forest Management, Northern Arizona University, 1984.

Fifteen years experience with the Forest Service in Land Management Planning in Oregon, Alaska, and New Mexico.

Responsible for providing basic resource data for the Lakeside Ranger District to the I.D. Team. Management Team Member.

JIM MORRIS

Recreation, Lands, and Minerals Staff Officer (assumed responsibility for soils and watershed in 1984), B.S. in Forest Recreation 1959, Colorado State University.

Twenty-five years experience in Forest Service on six National Forests in three regions, in timber management, range, recreation, and lands.

Supervised data gathering for recreation, lands, visual, minerals, archeology, and special uses. Member of Management Team. (Retired 1986).

BOB OSTHREIM

Forest Landscape Architect, B.S. City Planning 1957, University of Illinois.

Four years as Assistant Planning director in Evanston, Illinois; Chief of Advance Planning, five years in Alexandria, Virginia; Landscape Architect for U.S. Navy for five years. Twelve years with Forest Service on Apache-Sitgreaves.

Responsible for inventory and coefficients for visual management and ROS, other mapping and graphics.

KEN PALMROSE

Public Information Officer, A.S. Forestry Technology 1966, Clatsop College, Astoria, Oregon.

Twenty-one experience in Forest Service in Oregon and Arizona in engineering, timber, public involvement, data base management, and fourteen years in land management planning, and six years public affairs. Two years imagery interpretation in Army.

Responsible for public involvement, S2K Data Base, and writing and/or editing forest planning documents. I.D. Team and Core Team member.

MEL SCHWEIGERT — Hydrologist, B.S. Watershed Management 1970, University of Arizona.

Ten years experience with the Forest Service in timber and watershed working in research, and at the forest level as a barometer hydrologist and watershed specialist, and in planning.

Responsible for watershed mapping, inventory, and coefficient development. Worked on CA delineation and mapping, FORPLAN editing. Assumed responsibility for fire data in 1984, member of I.D. Team.

JOHN SHAFER — Forest Silviculturist, B.S. Forestry 1968, University of Missouri; M.S. Forest Ecology and Silviculture 1971, University of Missouri.

Fifteen years experience with the Forest Service in Arizona, California, and New Mexico in forest surveys, timber management, silviculture, timber sale administration, and planning. Imagery interpreter in Army. Certified Silviculturist from 1975 to present, with latest certification in 1986.

Responsible for timber inventory, coefficients, and prescription development concerning the timber resource.

DOUG SMITH — Deputy Forest Supervisor, B.S. Forest Management 1962, Arizona State College.

Twenty-three years experience with Forest Service in Arizona and New Mexico on forests and grasslands, in timber, range, recreation, fire, and lands. Recreational specialist in R-3 Regional Office. Five years experience as Deputy Forest Supervisor.

Maintained link between Forest Management Team and I.D. Team. Reviewed planning accomplishments. Member Management Team. (Transferred to Modoc N.F. in 1986).

BOB WAGENFEHR — District Ranger, B.S. Forestry 1966, Northern Arizona University.

Nineteen years experience in Forest Service in Arizona and New Mexico, in fire management, sale administration, recreation, and lands. Incident Commander on Class I fire team.

Supervised data gathering on Lakeside Ranger District until transfer to Tonto N.F. in 1984. Member of Forest Management Team.

CHARLES WILDES

District Ranger, B.S. Forestry 1969, University of Montana.

Sixteen years experience in Forest Service in Arizona, Montana, and Alaska, in timber management, and smoke jumper. Seven years as District Ranger.

Supervised data gathering on Heber Ranger District. Member of Forest Management Team. Transferred to Tonto N.F. in February, 1985.

MIKE WILSON

Supervisory Civil Engineer, B.S. Civil Engineering 1966, Arizona State University.

Four years experience with the Arizona and Montana State Highway Departments. Fifteen years experience in Forest Service in Arizona and New Mexico.

Responsible for engineering cost and coefficient development as well as transportation inventories and use data. Became member I.D. Team in 1984.

DON WOOD

District Ranger, B.S. Game Management 1967, University of Idaho.

Twenty years experience in Forest Service in Idaho, Wyoming, Colorado, and Arizona. District Ranger in Colorado and Arizona for twelve years.

Supervised data gathering on the Chevelon Ranger District. Member of Forest Management Team.

PETE ZETTEL

Transportation Planner, B.S. Civil Engineering 1963, New Mexico State University.

Twenty years experience in Forest Service in engineering and transportation planning. Two and a half years experience with the Corps of Engineers.

Responsible for engineering coefficients and inventories until 1984.

6. Consultation With Others

MAILING LIST

Copies of the Proposed Land and Resource Management Plan and Draft Environmental Impact Statement were distributed to the following agencies, organizations, businesses, and individuals specifically requesting these documents. Those individuals requesting information on the Proposed Forest Plan were mailed a summary. The distribution list for the Summary is not included in this document because of its length.

Federal

Arizona Soil & Water Conservation
Arizona State Soil Conservation
Bureau of Indian Affairs
San Carlos, AZ
Bureau of Indian Affairs
Zuni, NM
Bureau of Land Management
Bureau of Reclamation
Carson National Forest
Cibola National Forest
Coconino National Forest
Congressman Bob Stump
Coronado National Forest
DeConcini, Dennis
Gila National Forest
Intermountain FS
Kaibab National Forest
Lincoln National Forest
Modoc National Forest
National Park Service
Prescott National Forest
Rocky Mountain Forest & Range Experiment Station
Santa Fe National Forest
Senator Barry Goldwater
Southwestern Res. Station
Tonto National Forest
Udall, Morris K. Congressman
U.S. Army Corp of Engineers
U.S. Department of Interior
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
Phoenix, AZ
U.S. Geological Survey
Tucson, AZ

State

Arizona Agriculture & Horticulture Department
Arizona Comm. Agriculture & Horticulture
Arizona Department of Transportation
Arizona Department of Water Resources
Arizona Game & Fish Department
Arizona Geological Survey
Arizona Parks Board
Arizona State Clearing House
Arizona State Land Department
Arizona State Parks
Arizona State University
Arizona Water Resource Committee
Northern Arizona Council of Governments
Northern Arizona University
Office of Econ. Planning
Office of Governor
University of Arizona

Local

Apache County Board of Supervisors
Apache County Planning & Zoning
Apache Natural Resource Conservation District
City of Pinetop/Lakeside
City of Show Low
Eagar, Town of
Gila County Board of Supervisors
Greenlee County Board of Supervisors
Navajo County Board of Supervisors
Navajo County Natural Resources
Navajo County Parks and Recreation Department
Navajo County Planning
Springerville, Town of

Organizations

Advisory Council Historic Preservation
American Camping Association
American Motor Association
American Smelt Refin.
Animal Protection Institute
Arizona Auto Dealer Association
Arizona Cattle Growers
Arizona Desert Race Association
Arizona Disabled American Veterans
Arizona Farm Bureau Federation
Arizona for Wild & Scenic
Arizona Historical Society

Arizona Native Plan Society
Arizona Nature Conservancy
Arizona State Horseman Association
Arizona WC
Arizona Wildlife Federation
Arizona Water Resource Committee
Ashley Realty
Audubon Society, Phoenix
Audubon Society, Sedona
BO-K Explorations
Bengson Stu. 4-WD Association
Bennett-Phelps Dodge, Ken C.
Bob's Realty
Campfire Girls
Cardon Oil Company
Clayton & Association, Michael
Coconino Sports
Cottonwood Public Library
Defenders of Wildlife
Denver Public Library, Acqu. Dept.
Disabled American Veterans
Duke City Lumber Company, Inc.
Earth First
Environmental Impact Service
Flores Association, Inc.
Flying Box Ranch
Forest Planning
Frontier State Bank
Girl Scouts of America
Government Task Force on Recreation
Government Council on Arizona Environ.
Grace Comm. Church
Grand Canyon Chapter Sierra Club
Greenlee Cattle Growers
Greer Association
Greer Civic Club
Kaibab Industries
KNAZ - TV
KVWM Radio
Lazy YJ RANCH
Lewis Realty
Linda Hall Library
MCCD Acquisitions
Moeller & Fagan
Mountain Man Wagon
Northern Arizona Cattle Growers Assoc.
Nature Conservancy
Navopache Electric Cooperative
NFPA
Northern Arizona Audubon Society
Pearce Construction Co.
Phelps-Dodge Corp., Morenci

Phelps-Dodge Corp., Tucson
Pinetop Country Club
Pinetop Lake Realty
Pinetop Realty
Pinetop/Lakeside Chamber of Commerce
Pinetop/Lakeside San.
Prescott Public Library
Rancho Alegre Cattlegrowers
Reidhead Lumber Co.
Rimza, Tony-Realty
Saguaro Amateur Base
Salt River Project
San Carlos Irrigation
Scottsdale Progress
Sierra Club
Sierra Club, Grand Canyon Chapter
Snowflake Chamber of Commerce
Southwest Forest Industries, Eagar
Southwest Forest Industries, Phoenix
Southwest Forest Industries, Snowflake
Springerville Chamber of Commerce
State University of NY Plattsburgh
T-Link Ranches, Inc.
The Eloy Enterprise
Trail To Yesterday
University, Texas A & M
Western Woods Products
White Mountain Apache Tribe
White Mountain Chamber of Commerce
White Mountain Country Club
White Mountain Realty
Whiting Homesteading
Wilderness Society
Wildlife Management Inst.
Wildlife Society Arizona Chapter
Wirth Environmental Service

Individuals

Aannestad, Per A.
Adams, Chester
Allison, James
Allison, Rebecca P.
Allison, Shelley
Anderson, Ms. Roberta
Angenent, Thomas
Anthony, Anthony B.
Anway, Steve
Aragon, Pamela J.
Arnold, Lavon
Augustine, Kurt

Bailey, Jeff
Bailey, John B. Jr.
Baltic, Tony
Barlow, Roxanne
Barney, Eldon J.
Batsez, A.
Beaver, William
Begay, David
Begaye, Norman et al
Bell, Gary
Bell, Marvin & Carrie
Bereit, A.E.
Berger, Bruce
Berger, Sherwin N.
Best, Sal
Bickel, Bettina
Bigelow, Thirl
Bills, Bev
Blurton, Jacqueline J.
Bodell, Hugh & Valerie
Bodell, Time
Bovinet, Betty
Bowman, Dr. Eldon G.
Boyd, Rich
Braun, Jim
Briggs, Phil
Briney, Dr. William
Briseno Mendoza, Martin Alfonso
Brookshire, David S.
Brown, Fred C.
Bryce, M.R.
Bryce, Palmer Mr. & Mrs. A.J.
Buck, R.L.
Burk, Aldrice
Burney, Michael S.
Butler, Hal
Butterwick, Mary
Carlisle, J.C.
Carlisle, Jack
Carpovich, A.A.
Casoose, Lester
Castillo, Edda
Castillo, Eligice F.
Charfer, S.
Chavez, Manual M.
Cloud, Candace
Cocke, Bob
Cogut, Ted
Colderwood, George S.
Coleman, Charles & Rose
Cook, Kathy
Corbell, C.P. & Dorothy

Cordes, Leonard & Carolyn
Cordier, Frank
Covington, Mr. W.W.
Cowgill, Pete
Craig, Terry
Crider, Robert W.
Crosby, George E.
Cunningham, Lisa
Dahms, Guy E.
Damon, Jeffrey P.
Davis, Bill
Davis, J.R.
Davis, Jim
Delvin, Vic
Deyo, Robert & Jane
Dickinson, Kent
Dillman, Jean H.
Drake, Daryl D.
Earl, John E.
Edgar, Barrett D.
Elliot, Richard & Maxine
Ellis, Mrs. Cleo E.
Ellis, Randy R.
Ellsworth, Robert C.
Emerald, Rod
Emerson, Fred
Escuela De Ciencias Ambientales
Evans, Bob
Evans, Michael O.
Evans, Kitchel et al
Fagan, Robert H.
Fehlner, Cheryl
Fischer, Dan
Gallagher, Dennis J.
Garcia, Joe
Gay, Lawrence & Mary
George, Brian
George, D.M. & Judy
Goats, Leroy
Goetze, Phillip R.
Goldsmith, Kenneth M.
Goldstein, David L.
Goldstein, M.
Goldwater, Barry
Gonzales, Joe
Gonzalez-Boepple, Rita
Gottgetreu, James H.
Grayson, Michael
Green, Heather
Gregory, Mike
Grier, Tom

Gust, Devens
Haas, Beth M.
Haley, Stan
Hall, Chellis
Hamilton, Max
Hansen, Deanna
Harris, Gary
Havens, Fred W.
Haynes, L.E.
Henderson, Lester
Hershey, J.W.
Hickman, Willie
Hill, Mervyn
Hill, Thomas
Hintzen, Paul
Hirt, Paul
Hobbs, John S. & D.E.
Hoffman Sr. Charles D.
Hoffman-Realty, Lon
Holaday, Bobbie
Holland, Edward Allen
Holmes, Mary Eleanor
Horning, Philip H.
Huntley, Travis S.
Ingels, Robert & Linet
Jernigan, Marcus
John, Richard
John, Ruth
John, Wallace
Johns, Joey
Johnson, Alexander K.
Johnson, Andy
Johnson, C.H.
Johnson, Floyd M.
Johnson, Fran R.
Johnson, Bob
Jojola, Mr. Joe
Joner, Nelson
Joy, John E., Jr.
Kalt, Prof. Joseph
Kellett, Michael J.
Kendall, Bill
Kennedy, C.E.
Kessler, John S.
Kiehne, Emil O.
Killen, Rose M.
Kilmer, Kathy
Kindel, Fred
King, Cassandara A.
King, Dennis
Kintigh, Keith
Kitchen, Jim

Klein, Hanny F.
Kovach, L.J. & L.S.
Kraemer, Carl L.
Krausman, Paul R.
Krueger, Larry
Kulosa, Erv
Kurtz, Clyde W.
Larson, J. Wade
Lavine, Dr. Jay B.
Law, William H.
Lee, Katherine W.
Lesueur, Virgil
Levy, Henry M.
Leyba, Thomas E.
Lines, Ruskin & Jeana
Lively, Harold W.
Logan, Manual O.
Lopez, Trumbo
Love, Walter G. & Kaye
Lowell, Mr. & Mrs. David J.
Lytle, Dan
Macy, Jerry
Macy, Virginia
Makela, Paul D.
Mancini, Frank J.
Mariscal, Patricia
Marks Jr. Mr. & Mrs. William
Martinez, Abelardo
Maxwell, Mr. & Mrs. Marlin
McCarty, Glen
McCloskey, Steve
McDowell, William
McKeen, John A.
McWenie, Matt
Meadows, Warren P.
Meister, C.W.
Melts, Harry
Menasco, Keith
Mings, Robert C.
Minnamon, Paul S.
Mittendors, George
Monson, Gale
Moore, Mrs. Faye Stacy
Moore, Robert
Morgan, Penny
Mueller, Robert F.
Murphy, F.H.
Nassidy, Sue F.
Nelson, Glen J.
Nelson, S.D.
Noble, Mrs. Mary M.
Norman, Christopher

Notestine, Jim
Nozie, Patrick
Ohmart, Dr. Bob
Orona, Eva
Pacheco, Chris R.
Palmer, A.J.
Pamperin, John F.
Parsons, Russ
Patton, Barbara
Pavies, Bill
Pearce, Mark
Pelech, Walter & Dorothy
Pellissier, D.H.
Pewe, Prof. Troy L.
Pinnes, Jim
Pitcher, James
Platt, Earl
Platts, Geoffry
Pollack, Robert
Porter, Walter & Kathy
Powell, Donald
Price, Melvin B.
Pucci, Lisa
Racicot, E.
Radlinski, Alaysius
Ramsey, Jerry & Sharon
Ranney, Wayne D.
Rashak, John J.
Reidhead, George
Reinhold, Ryan
Rice, Richard Mary F.
Richardson, Elmer
Riley, Cynthia
Ring, Ray
Roberts, John
Robertson, Mrs. L.B.
Robertson, Virginia
Roe, Raymond & Mary
Roth, Vincent
Rowe, Linda
Russell, Gary
Russell, John W.
Ruth, John
Sanders, Kristi
Saroni, Maurice
Scheidig, Paul A.
Schmidt, Dale
Schneider, John P.
Schoonover, Grace
Schramm, Arthur & Marian
Schrieber, Hank
Sebald, Prof. Hans

Sells, Alan Wayne
Shaffer, Mark
Shakely, Jerry & Sharon
Shewalter, Dale
Shreeve, Franklin Keith
Smith, Mrs. Louise
Smith, Reid
Smith, Ted
Souder, John
Spencer, Diana T.
Staff, Leonard
Strauss, Deena
Sucero, Ray
Summers, Steve P.
Sundberg, Sally J.
Swanson, John K.
Swanson, Ken
Sypoilt, Dr. Chuck
Tannler, Florence M.
Terry, Craig
Thomas, Danny
Thompson, H. Virginia
Thompson, Newton
Tilford, Ernest H.
Tindell-Gibson, Rosemary F.
Tisdell, Blaine
Tisdell, Teddy C.
Tomick, Novkov et al
Trevizo, Alex
Troutman, R.L.
Tudor, Mr. Stumpy
Tuell, Claude C.
Ulibarri, Ruben
Unreadable, Leon
Vaaler, Lynn & Jim
Vallejos, Nick
Vasela, Jose M.
Viehland, Dennis W.
Virden, Randy
Vlassis, Mrs G.P.
Watson, Mike
Wedemeyer, Robert
Wenstrand, Tom
Wheeler, Terry
Whipple, John L.
White, Dana G.
Whitmer, Arthur
Wilbur, Tilden
Wilkenson, Forrest G.
Williams, Cindy
Williams, Harvey E.
Williamson, Patty & Jeff

Willis, Melbourne R.
Wiltbank, Bob
Wiltbank, Jeff
Windsor, Fred
Winkle, R.F.
Wittmer, Connie B.
Wood, Arthur A.
Woodall, Bob & Linda
Worden, Marshall A.
Wylie, K.C.
Yazzie, Charles B.
Yazzie, Clifford
Yazzie, Gilbert K.
Yazzie, Jerry
Youtz, Jim

Glossary

Access - See Public access.

Acquisition of land - Obtaining full ownership rights by donation, purchase, exchange, or condemnation.

Acre-foot - A measurement of water volume. The volume of water that would cover one acre to a depth of one foot, equal to 43,560 cubic feet or 325,851 gallons.

Activity - Actions, measures, or treatments that are undertaken which directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental objectives.

Administrative Site - A site which primarily exists for general administrative purposes. It normally will include office, warehouse, outside storage, and parking areas. It may include housing and pasture for livestock. A work center may be part of an administrative headquarters site.

Aesthetics - Pertaining to the quality of human perception of natural beauty (including sight, sound, smell, touch, taste, and movement).

Affected environment - The natural and physical environment, and the relationship of people to that environment, that will or may be changed by actions proposed.

Afforestation - The establishment of tree cover on an area where trees have not grown previously.

Age Class - Interval of years, commonly 20, into which trees are grouped for management. Example: 1-20 years, 21-40 years.

Airshed - The air encompassing a specific geographic region.

Allocation - The assignment of a land area to a particular use or uses, to achieve management goals and objectives.

Allocation model - See Resource allocation model.

Allotment - See Range Allotment.

Allowable sale quantity - The quantity of timber that may be sold from the area of suitable land covered by the Forest plan for a time period specified by the plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity."

Alternative - The Forest planning, a mix of management prescriptions applied in specific locations to achieve a desired management emphasis as expressed in goals and objectives.

Amenity - The pleasurable, educational, or aesthetic features of the land or resources.

Analysis area - The basic land unit of analysis which is used to allocate and schedule management prescriptions. Each analysis area is considered to be homogeneous in terms of input requirements and output response to management practices. Composed of capability areas or portions of capability areas with similar physical attributes, management costs, and resource yields.

Analysis of the management situation - A determination of the ability of the planning area to supply goods and services. A phase of the planning process.

Animal unit month - The quantity of forage required by one mature cow (1,000 pounds), or the equivalent for one month.

Arterial roads - Roads which service large areas and usually connect with public highways or other Forest arterial roads, to form an integrated network of primary travel routes. The location and standard are determined by a demand for maximum mobility and travel efficiency rather than by a specific resource management service. Usually they are developed and operated for long-term land and resource management purposes, and constant service.

Artifact - An object that has been modified, used, or constructed by man. Stone tools, pottery, buildings, roads, and mines are examples of artifacts.

AUM - See Animal unit month.

Available and suitable - See Available lands and Suitable lands.

Available lands - Those portions of the Forest not administratively excluded from use for timber harvest or livestock grazing.

Backlog - Resource jobs needing completion as directed by the deadlines in the Resource Planning Act (RPA). Includes reforestation, thinning, and land line location.

Backlog reforestation - Areas needing re-establishment of tree cover due to failure of natural regeneration as a result of site conditions or lack of seed trees.

Backlog thinning - Those areas that had not previously been thinned and were in need of a precommercial thinning as of 1965.

Bankhead-Jones Farm Tenant Act - Authorizes the Secretary of Agriculture to develop a program of land conservation and utilization in order to correct maladjustments in land use, and to assist in controlling soil erosion; promoting reforestation; preserving natural resources; protecting fish and wildlife; developing and protecting recreation facilities; mitigating floods; preventing impairment of dams and reservoirs; conserving surface and sub-surface moisture; protecting the watershed of navigable streams, and protecting the public's health, safety, and welfare.

Basal area - A measurement of how much of a site is occupied by trees. It is determined by measuring the square feet of the diameter of all the trees in an area at breast height (4.5 feet).

Base sale schedule - A timber sale schedule formulated on the basis that the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity.

Benefit-cost analysis - An analytical approach to solving problems of choice. Benefit-cost analysis identifies for each objective, that alternative which yields the greatest benefit for a given cost, or that alternative which produces the required level of benefits for the lowest cost.

Benefit-cost ratio - An economic indicator of efficiency, computed by dividing benefits by cost.

Best management practice - Application of the best available demonstrated control technology, process, measures, and operating methods that are socially, economically and technically feasible for controlling soil loss or improving water quality.

Big game - Those species of mammals normally managed as a sport hunting resource, e.g., deer, turkey, elk, bear, etc. Big game is classified by the Arizona Game and Fish Commission.

Big game winter range - The area available to, and used by big game through the winter season.

Biological Condition Index - An evaluation technique using macroinvertebrates as biological indicators, to monitor effects of management activities, for detecting positive or negative trends in habitat quality, and to measure the success of action plan implementation.

Biological growth-potential - The average net growth attainable in a fully stocked natural forest.

BLM - Bureau of Land Management, U.S. Department of the Interior.

Board foot - The amount of wood in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide.

Browse - That part of the current leaf and twig growth of shrubs, woody vines, and trees available for animal consumption.

Calving areas (elk) - The areas, usually on spring range, where elk cows give birth to calves and tend them during their first few days or weeks.

Candidate Species - See Threatened and endangered species.

Canopy - The more or less continuous cover of branches and foliage formed by the crowns of trees and other woody growth.

Capability - The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends upon site conditions such as climate, slope, landform, soils, and geology, as well as the application of management practices, such as silviculture or protection from fire, insects, and disease.

Capability area - A contiguous unit of land having similar geological, climatic and resource characteristics. Responses to treatment are expected to be relatively the same throughout the unit, as well as having similar treatment costs.

Carrying capacity (range or wildlife) - The maximum stocking rate possible without inducing damage to vegetation or related resources. It may vary from year to year due to changes in climatic conditions on the same area causing fluctuating forage production.

Cavity nesters - Wildlife species that utilize tree cavities. Primary cavity nesters excavate their own hole. Secondary cavity nesters use natural cavities or cavities created by primary cavity nesters.

CEQ - See Council on Environmental Quality.

CFR - Code of Federal Regulations.

Clearcut - Removal of all standing trees over a given area of land in a single cut. Clearcut areas may occur in large or small blocks, patches, or strips.

Clearcut harvest - Silvicultural system used to harvest mature trees at rotation age in one cut, for the purpose of regenerating a new even-aged stand.

Climax - The culminating stage in plant succession for a given site, where the vegetation has reached a highly stable condition.

Closure - An administrative order restricting either the location, timing, or type of use in a specific area.

CMAI - See Culmination of mean annual increment.

Cold-water fishery - Stream and lake waters which support predominately cold-water species of game or food fishes [e.g., trout, salmon], which have maximum sustained water temperature tolerances of about 70 degrees Fahrenheit in the summer.

Collector roads - Roads which serve smaller land areas and are usually connected to a Forest arterial road or public highway. They collect traffic from Forest local roads or terminal facilities. The location and standard are influenced by both long-term multi-resource service needs and travel efficiency. Forest collector roads are operated for constant service.

Commercial Forest - Forest land capable of producing merchantable timber, currently or prospectively accessible, and not withdrawn from such use. Excludes pinyon-juniper woodlands.

Commercial thinning - Thinning in tree stands with diameters greater than 5 inches, for which there is a market value for pulpwood and/or small saw logs.

Commodity - Tangible or physical output, such as timber, livestock, minerals, water, etc., synonymous with RPA's "Market."

Common variety minerals - See Minerals, common variety.

Concern - See Management concern.

Consumptive use - A use of resources that reduces the supply--such as logging and mining. [See also Nonconsumptive use].

Contiguous analysis area - An analysis area confined within a single geographic area that is associated with a single issue, problem, or management concern.

Controlled burn - A deliberate application of fire to an area where control is exercised. See prescribed fire.

Cord - A unit of volume measurement containing 128 cubic feet of solid wood. Generally, a stack of round or split wood measuring 4 foot wide, by 4 feet high, by 8 feet long.

Corridor - A linear strip of land identified for the present or future location of transportation or utility right-of-way.

Cost efficiency - The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs, including environmental, economic, or social impacts, are not assigned monetary values but are achieved at specified levels in the least cost manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates-of-return may be appropriate.

Council on Environmental Quality - An advisory council to the President, established by the National Environmental Policy Act of 1969. It reviews federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

Cover/Forage Ratio - The ratio of area of cover usually confers to foraging areas, natural openings, and clearcuts.

Cover, hiding - Vegetation capable of hiding 90 percent of a standing adult deer or elk from the view of a hunter, at a distance equal to or less than 200 feet.

Cover, thermal - Cover used by animals to ameliorate effects of weather. Elk - A stand of coniferous trees, 30-60 acres, 40 feet or more tall with an average crown closure of 70 percent or more. Deer - Cover may include saplings, shrubs, or trees at least five feet tall, with 75 percent crown closure, in stands 2-5 acres in size.

Criteria - Predetermined factors for comparing alternatives to facilitate and expedite the decision making process. "Critical" is a formal designation.

Critical habitat - That portion of a wild animal's habitat that is critical for the continued survival of the species.

Cubic foot - In timber management, a volume measured as a 1 foot cube of solid wood.

Culmination of mean annual increment (CMAI) - Point in time in the age of a forest stand in which the mean annual growth increment no longer increases.

Cultural resources - The physical remains (artifacts, ruins, burial mounds, petroglyphs, etc.), which represent former human cultures.

Culture - The complex whole which includes knowledge, beliefs, art, morals, customs, and any other capabilities and habitats peculiar to a society.

Cunit - Equivalent to 100 cubic feet of solid wood.

Current direction - The program level curently being used to implement the 1980 RPA program.

Cutting cycle - The planned, recurring period of time between successive cuttings or harvests in a stand of trees.

DBH - Diameter at breast height. Diameter of a tree approximately 4-1/2 feet above the ground.

Decision unit - The smallest component of an alternative for which relevant inputs (costs) and outputs (benefits) are analyzed. A general term that applies to analyses at any level. Decision units may be grouped for decision making into aggregates called decision variables.

Decision variable - A component of an alternative in which input costs, outputs, and benefits are identified and used for analysis and decision making.

Demand - The quantity of a good or service called for by society at a given price.

Demonstrated Favorable - A geologic environment that has yielded in the past, or is currently yielding, mineral production in a regional context.

Departure - Timber harvest schedule which deviates from the principle of non-declining even flow by exhibiting a planned decrease in the timber sale and harvest schedule in the future. A departure is characterized as a temporary increase over the base sale schedule without impairing the Forest's long-term sustained-yield.

Developed recreation - Use of a developed recreation site.

Developed recreation (private) - Use of a developed recreation site on National Forest System lands where facilities were built, and are maintained by the private sector.

Developed recreation site - A distinctly defined area where facilities are provided by the Forest Service for concentrated public use, e.g., campgrounds, picnic areas, swimming areas.

Direction - See Management direction.

Discount rate - The interest rate used in plan formulation and evaluation for discounting future benefits and costs, or otherwise converting benefits and costs to a common time basis.

Dispersed recreation - Recreation used which occurs outside developed sites.

District - See Ranger district.

Diversity - "The distribution and abundance of different plant and animal communities and species within the areas covered by a land and resource management plan." (36 CFR 219.3)

Diversity Unit - An area of approximately 10,000 acres delineated on maps in which diversity standards will be implemented.

DRC - Diameter at Root Collar.

Ecosystem - The system formed by the interaction of a group of organisms and their environment.

Edge - The place where plant communities meet or where successional stages or vegetative conditions within plant communities come together. It often contains organisms from both comunities as well as those restricted to the interface area. The number of species present is sometimes greater than the surrounding communities.

Effects - Results expected to be achieved from implementation of the alternatives relative to physical, biological, and social (cultural and economic) factors. Examples of effects are tons of sediment, pounds of forage, person-years of employment, income, etc. There are direct effects, indirect effects, and cumulative effects.

Endangered species - A species which is in danger of extinction throughout all or a significant portion of its range--other than members of the class Insecta--and which have been designated under the provisions of the Endangered Species Act of 1973.

Endemic organism - A taxonomic category, (e.g., genus, species, variety) whose natural occurrence is confined to a certain region, and whose distribution is relatively limited.

Environment - All the conditions, circumstances, and influences surrounding and affecting the development of an organism or group of organisms.

Environmental assessment - A document which displays a comparison of the effects of a proposed project and alternatives to it on the environment.

Environmental setting - See Management situation.

Erosion - (1) The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep. (2) Detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

Erosion, natural - Wearing away of the earth's surface by natural agents under natural environmental conditions of climate, vegetation, etc., undisturbed by man. Also called geologic erosion.

Even-aged management - The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages [and therefore, tree size] throughout the forest area. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harvested. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

Even-flow - Maintaining a relatively constant supply of timber from decade to decade.

Experience levels - The range of opportunities for satisfying basic recreation needs of people. A scale of five experience levels ranging from "primitive" to "modern" is defined in the National Forest System.

Extensive grazing - Season-long use of rangelands, with distribution of livestock occurring through riding, salting, etc. This is similar to Level C.

Fawning areas - The areas, usually on spring ranges, where deer give birth to fawns, and tend them for a few days or weeks.

Feasibility - The relative advantage of managing or improving a land unit, considering its capability and suitability for specific use under the existing or projected socio-economic climate.

Fisheries habitat - Streams, lakes, and reservoirs that support fish.

Floodplain - That portion of a stream valley, adjacent to the channel which is covered with water when the stream overflows its banks at flood stages.

Forage - All browse and non-woody plants that are available to livestock or game animals for grazing or harvesting for feeding. The weight may be expressed as either green, air dry, or oven dry. The term may also be modified as to time of production such as annual, current year, or seasonal forage production.

Forest land - Land at least 10 percent occupied by forest trees of any size, or formerly having had such tree cover and not currently developed for non-forest use. Lands developed for non-Forest use include areas for crops, improved pastures, residential or administrative areas, improved roads of any width and adjoining clearings, and powerline clearings of any width.

Forest standard - A performance criterion indicating acceptable norms or specifications that actions must meet to maintain the minimum conditions for a particular resource. This type of standard applies to all areas of the Forest regardless of the other management area direction applied.

Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) - An Act requiring the preparation of a program for the management of the National Forests' renewable resources and of land and resource management plans for units of the National Forest System. It also requires a continuing inventory of all forest and rangelands, and renewable resources nation-wide.

Forest development roads - Roads that are part of the Forest transportation system, which includes all existing and planned roads, as well as other special and terminal facilities designated as Forest development transportation facilities.

Forest Plan - See National Forest land and resource management plan.

Forest Supervisor - The official responsible for administering the National Forest System lands in a Forest Service administrative unit. He/she reports to the Regional Forester.

FREM - Acres of Final Removal.

Fuelbreak - Any natural or constructed barrier used to segregate, stop, and control the spread of fire or to provide a control line from which to work.

Fuels - Anything within the Forest that will burn. Usually live and dead woody vegetation, e.g., grass, shrubs, trees.

Fuel treatment - The rearrangement or disposal of fuels to reduce the fire hazard. Fuels are defined as both living and dead vegetative materials consumable by fire.

Full capacity range - Rangelands that are accessible to livestock, produce forage, or have inherent forage producing capabilities, are stable because of effective ground cover, and can be grazed on a sustained yield basis under reasonable management goals.

Game species - Any species of wildlife or fish normally harvested by hunters, trappers, and fishermen under State or Federal laws.

Goal - A concise statement that describes a desired condition to be achieved sometime in the future. It is normally expressed in broad, general terms, and is timeless in that it has no specific date by which it is to be completed. Goal statements form the principal basis from which objectives are developed.

Goods and services - The various outputs, including on-site uses, produced from forest and rangeland resources.

Grass/forb - An early forest successional stage where grasses and forbs are the dominant vegetation.

Grazing - Consumption of range or pasture forage by animals.

Grazing allotment - See Range allotment.

Grazing capacity - The maximum stocking rate possible without inducing damage to vegetation or related resources.

Grazing permittee - An individual who has been granted written permission to graze, for a specific period on a range allotment.

Grazing season - 1. A period of grazing to obtain optimum use of the forage resource. 2. On public lands, an established period for which grazing permits are issued.

Ground water - Water in a saturated zone of a geologic system.

Growing Stock Level (GSL) - Growing Stock Level and Basal Area are equal and the same, when the average D.B.H. of a stand of trees is 10 inches or greater. In stands of trees smaller than 10 inches D.B.H., G.S.L. is the term used to determine the number of trees needed to achieve the stated basal area of the stand, when the average stand D.B.H. has grown to 10 inches. The number of trees stated for a given G.S.L. is based on the assumption that periodic thinnings will be made during the time that it takes for the stand to grow to an average D.B.H. of 10 inches.

Guideline - An indication or outline of policy or conduct.

Habitat - The natural environment of a plant or animal. The locality where the organism may generally be found, and where all essentials for its development and existence are present. Habitats are described by their geographical boundaries, or with such terms as "shady woodlands", "banks of streams", "dry hillsides", etc.

Habitat Capability Index - An index with a range from zero to one, with one being the optimum. The index displays the percent of acres in an area meeting selected wildlife species habitat requirements for feeding and cover.

Habitat Capability Model - A computer model used to evaluate the capability of an area to support selected wildlife species. The model evaluates the mix and proportion of strucutral stages in different vegetation types, and determines a habitat capability index.

Habitat diversity - See Wildlife habitat diversity.

Habitat Effectiveness - The freedom from human disturbance of wildlife.

Harvest cut - The removal of a stand of trees as a final cut in even-aged management, or the removal of mature trees in uneven-aged management. Regeneration encouragement is emphasized.

Herbage - Herbs taken collectively, usually used in the same sense as forage, except that it may include material not palatable to grazing or browsing animals.

Hiding Cover - Vegetation capable of hiding a deer or elk from human view at a distance of 200 feet or less.

High power electronic site - Usually an FM radio or TV broadcasting facility. Acutally any electronic use producing an output of 1000 watts (effective radiating power).

Horizontal structure - Consists of single age and size classes by stands.

Hydrologic Function - The ability of a watershed to sustain favorable conditions of streamflow. Favorable conditions of streamflow are measured in terms of water quality, quantity, and timing.

Improvement - Manmade developments such as roads, trails, fences, stock tanks, pipelines, power and telephone lines, survey monuments, and ditches.

Indicator species - A wildife species whose presence in a certain location or situation at a given population level, indicates a particular environmental condition. Population changes are believed to indicate effects of management activities on a number of other wildlife species.

Input/output analysis - A systematic technique for qualitatively analyzing the interdependence of producing and consuming units in an economy. It studies the interrelationship between products offered in the marketplace. It is a useful tool for separating the component parts of an economy to determine the influence of each on the other for short run forecasting and policy guidance.

Intermediate development level - A level of modification for developed recreation sites. Modification is moderate, equally protecting both site and users. Generally, facilities are made of native materials, and vehicle traffic controls are inconspicuous. Roads may be hard surfaced and trails formalized. Development density is about three family units per acre. Forest environment is essentially natural.

Instream flows - Flows needed to meet seasonal streamflow requirements for maintaining aquatic ecosystems, visual quality, and recreational opportunities at an acceptable level.

Intensive Grazing - Grazing management that controls distribution of cattle and duration of use on the range, usually by fences, so parts of the range are rested during the growing season.

Intermittent stream - A stream which flows only 50 percent to 90 percent of the year, when it receives water from some surface source such as melting snow.

Interpretive services - Information services designed to present inspirational, educational, and recreational values to Forest visitors, to provide the utmost in understanding, appreciation and enjoymnent from their Forest experience.

Irretrievable resource commitment - Allocation decision causing loss of production or use of a renewable resource.

Irreversible resource commitment - Allocation decision affecting nonrenewable resources, soils, minerals, and cultural resources--causing permanent loss of these resources.

Issue - See Public issue.

Key Area - Areas of land or water that the responsible official and resource specialist determine to be important to wildlife or fish productivity. Other uses in key areas could result in negative effects to the wildlife or fish. For example, timber sale activity in an elk calving area could disturb the elk and cause calving failures.

Land exchange - The conveyance of non-Federal land or interest in the land to the United States, in exchange for National Forest System land or interest in the land.

Land line location - Location of Forest property boundaries.

Less than standard (LSTD) - In reference to recreation management. Management level is below established standards and practices.

Lifestyle - A characteristic way of living which may be an individual variant within the cultural mainstream, or may be an individual expression of a subculture. "Lifestyles" are generally expressed through the means of economic sustenance, dwelling site and type, group associations, and social practices such as family form, religious practices, sexual mores, style of dress, and type of diet.

Linear programming - A mathematical method used to determine the most effective allocation of limited resources between competing demands, when both the objective (e.g., profit or cost) and the restrictions of its attainment are expressible as a system of linear equalities or inequalities (e.g., $y = a + bx$).

Livestock grazing management levels

Level A (no grazing) - Management excludes livestock to protect other values or eliminate conflict with other uses.

Level B (low investment) - Management objective is control livestock numbers within present grazing capacity. Improvements and/or management systems are inadequate to fully utilize the range resource. Use is generally continuous.

Level C (extensive) - Management seeks full utilization of forage allocated to livestock. Cost effective management systems and techniques, including fencing and water developments, are designed to obtain relatively uniform livestock distribution and use of forage, and to maintain plant vigor.

Level D (intensive) - Management seeks to optimize production and utilization of forage allocated to livestock within the constraints of multiple use. Cost effective methods for achieving improved forage supplies, and uniform livestock distribution and forage use. Cultural practices may be combined with fencing and water developments to implement complex grazing systems.

Level E (maximum livestock production) - Management seeks to maximize livestock production while maintaining basic soil and water values. Cost effective management systems and techniques are used to achieve this goal, may involve conversion of forest. It includes administrative pastures or other specifically seeded areas under intensive management.

Local roads - Local roads are usually one-lane roads constructed to serve a dominant use or resource. Local roads do not access large land areas since they are more site specific than arterial and collector roads.

Locatable minerals - See Minerals, locatable.

Long-term effects - Those effects which will be significant beyond the RPA planning horizon of 50 years.

Long-term sustained yield capacity (LTSYC) - The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity consistent with multiple-use objectives.

M - Thousand.

MM - Million.

Management area standard and guidelines - Management practices selected and scheduled for application in a specific area to attain multiple use and other goals and objectives.

Management concern - An issue, problem, or a condition which constrains the range of management practices identified by the Forest Service in the planning process.

Management direction - A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them.

Management emphasis - A reflection of allocation choices for an analysis area. Management emphasis, as used in FORPLAN, is a 6-letter identifier used to describe (name) a prescription in FORPLAN.

Management indicator species - See Indicator species.

Management intensity - A management practice or combination of management practices and associated costs designed to obtain different levels of goods and service.

Management opportunity - A statement of general actions, measures, or treatments that address a public issue or management concern in a favorable way.

Management practice - A specific activity, measure, course of action, or treatment.

Management prescription - Management practices and intensity selected and scheduled for application on a specific area, to attain multiple use and other goals and objectives.

Management situation - A comprehensive statement of the planning area resources, its history, past and present uses, and a review of the public's concerns with the area.

Mature sawtimber - Trees that have attained full development, and the growth rate has leveled off.

Maximum potential - The maximum potential output level that can be attained.

Mean annual increment of growth - The total increase in girth, diameter, basal area, height, or volume of individual trees or a stand up to a given age, divided by that age.

Mineral activity - Production: The activity of obtaining and transporting a commercial yield from a mine, plant, quarry, or well. Activities include transportation over established roads, maintenance of structures, and extraction of mineral at a well-defined location.

Development: The work performed to open up a proven deposit to prepare it for commercial exploitation. It may include surface and underground excavation around ore blocks, permanent access road construction, construction of on-site support facilities, and land acquisition.

Exploration: The work performed to determine the size, shape, character, and value of a deposit. This work may include geochemical and geophysical surveys, drilling, surface and underground excavations, bulk sampling, and multiple temporary access road construction.

Prospecting: The search for untested, undiscovered mineral deposits. The search usually involves casual use methods including surface mapping and sampling and reconnaissance surveys over existing roads and trails, but may include some pitting and trenching of mineral showings.

None: No form of mineral activity is anticipated.

Can't Predict: The mineral situation it too unknown or too changeable for forecasting of future activities.

Mineral entry - Filing a mining claim on public land to obtain the right to any minerals it may contain.

Mineral favorability - Demonstrated favorable: A geologic environment that has yielded in the past, or is currently yielding mineral production in a regional context.

Theoretically favorable: Geologic conditions are similar to those of a producing area or may be inferred similar through indirect evidence.

None-applicable: The geologic conditions for estimating favorability are uncertain, but mineral occurrence cannot be precluded.

Unfavorable: The geologic environment has been proven by direct evidence to be unfavorable for mineral occurrence.

Insufficient geologic information: Knowledge of the geologic environment is absent or severely lacking.

Mineral withdrawal - Public lands withdrawn from mineral entry under the General Mining Laws and the mineral leasing laws. Lands withdrawn usually have unique features which are highly valued by the public or are needed for administrative purposes.

Minerals, common variety - Deposits which--although they may have value for use in trade, manufacture, the sciences, or in the mechanical or ornamental arts--do not possess a distinct, special economic value. May include sand, stone, gravel, pumicite, cinders, pumice (except that occurring in pieces of two inches on a side), clay, and petrified wood.

Minerals, leasable - Coal, oil, gas, phosphate, sodium, potassium, oil shale, and geothermal steam.

Minerals, locatable - Those hard rock minerals which are mined and processed for the recovery of metals. May include certain nonmetallic minerals and uncommon varieties of mineral materials, such as valuable and distinctive deposits of limestone or silica. May include any solid, natural inorganic substance occurring in the crust of the earth, except for the common varieties of mineral materials and leasable materials.

Mining claim - That portion of the public estate held for mining purposes in which the right of exclusive possession of locatable mineral deposits is vested in the locator of a deposit.

Mining claim, patented - A mining claim to which a patent has been secured from the Government by compliance with the laws relating to such claims.

Mining patent - The patent is a legal document which conveys the title to the ground (i.e., ownership) to the claim's owner.

Multiple use - The management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources and related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some lands will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

National Environmental Policy Act (NEPA) - An Act declaring a National policy to encourage productive and enjoyable harmony between man and his environment, to promote efforts which will prevent or eliminate damage to the environment and the biosphere, and stimulate the health and welfare of man, to enrich the understanding of the ecological systems and natural resources important to the Nation, and to establish a Council on Environmental Quality.

National Forest Land and Resource Management Plan - A plan developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended, that guides all resource management activities, and establishes management standards and guidelines for the National Forest System lands of a given National Forest.

National Forest Management Act (NFMA) - A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act, and requires preparation of Forest plans.

National Recreation Trails - Trails specifically designated by the Secretary of the Interior or the Secretary of Agriculture, as part of the national system of trails authorized by the National Trails System Act. National Recreation Trails provide a variety of outdoor recreation uses in or reasonably accessible to urban areas. Not all recreation trails are so recognized.

National Register of Historic Places - A list (maintained by the National Park Service) of areas which have been designated as being of historical significance. The Register includes places of local and state significance, as well as those of value to the Nation.

National Wild and Scenic River System - Rivers with outstanding scenic, recreational, geological, fish and wildlife, historic, cultural, or other similar values designated by Congress under the Wild and Scenic Rivers Act for preservation of their free-flowing condition.

National Wilderness Preservation System - Pristine federal lands designated by the Wilderness Act of 1964 and subsequent wilderness legislation. Generally, these lands are untouched by "works of man".

Natural prescribed fire - See Prescribed fire.

Net public benefits - An expression used to signify the overall long-term value to the Nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.

No action alternative - The most likely condition expected to exist in the future if current management direction would continue unchanged.

Nonconsumptive use - Use of a resource that does not reduce the supply, such as many types of recreation. (See also Consumptive use).

Noncontinguous analysis area - An analysis area consisting of many parcels of biologically homogeneous land scattered throughout the Forest.

Nondeclining even flow or yield - Refers to a harvest schedule in which the harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade of planning period.

Nongame wildlife - Species of animals which are not managed as sport hunting or fishing resource.

Nonpoint source pollution - The Environmental Protection Agency defines nonpoint source pollution in terms of activities rather than specific conveyances. Nonpoint sources of pollution are the result of activities which are initiated or caused by natural processes, including precipitation, drainage, seepage, percolation, and runoff; or is not traceable to a discrete or identifiable facility. The term silvicultural nonpoint sources includes activities inherent to forest management, which accelerate the effects of natural processes. Such activities include nursery operations, site preparation, reforestation and subsequent culture, thinning, prescribed burning, pest and fire control, harvesting operations, and the construction and maintenance of roads and other transportation systems associated with these activities.

Nonstructural range improvement - Practices and treatments undertaken to improve range not involving construction of improvements.

Objective - A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken, and the resources to be used in achieving identified goals.

Occupancy trespass - The illegal occupation or possession of National Forest land or property.

Old growth - The final successional stage of a stand of trees, characterized by a high degree of decadence, because of declining health and vigor.

Ponderosa Pine--Stand size of between 100 to 300 acres and 5 chains or greater in width or grouping of stands in close proximity to provide contiguous habitat for interior dwelling species. Give priority to managing for old growth stands adjacent to lakes and streams in potential osprey nesting and bald eagle wintering sites.

-At least 14 trees/acre of 20 inches D.B.H. or greater on sites >54 (Minor). At least 14 trees/acre of 14" D.B.H. or greater on sites <54 (Minor).

-At least two-storied stands with approximately 60 BA in the understory.

-At least an intermediate class with a GSI or BA of 80 and trees greater than 10 inches D.B.H.

-At least 180 snags/100 acres >14 inches D.B.H. and 15 feet tall.

-At least two trees/acre of down woody materials 12 inches or greater in diameter and 16 feet long. Fuel treatment is not to be applied until 12 tons/acre is exceeded.

Mixed Conifer (Douglas fir and white fir)--Stand size of between 100 and 300 acres and 5 chains or greater in width or grouping of stands in close proximity to provide contiguous habitat for interior dwelling species.

Manage stands to achieve:

-At least 16 trees/acre of 16 inches D.B.H. or greater.

-At least two-storied stands with 100 BA in understory.

-At least an intermediate class with a GSI or BA of 120 and trees greater than 8" D.B.H.

-At least 300 snags/100 acres of 20 inches D.B.H. and 15 feet tall.

-At least four trees/acre of down woody materials 12 inches or greater in diameter and 16 feet long. Fuel treatment is not to be applied until 20 tons/acre is exceeded.

Pinyon-Juniper--Stand size of between 100-300 acres and 5 chains greater in width or grouping of stands in close proximity to provide contiguous habitat for interior dwelling species.

Manage stands to achieve:

-At least 3000 trees/100 acres of 9 inches diameter root collar.

-At least 100 snags/100 acres $\geq$ 9 inches diameter root collar and 10 feet or greater in height.

-At least two trees/acre of down woody material 9 inches in diameter or greater and 10 feet long.

On site soil loss - The movement of soil from the point at which it was formed to another location.

Opportunity - See Management opportunity.

ORV - Off-road vehicle. This includes all mechanical means of transportation; passenger cars, 4-wheel drive pickups, trail bikes, snowmobiles or other ground transportation vehicles that are capable of traveling overland where no roads exist.

ORV closure - An administrative order closing a land area to specified types of off-road vehicle travel yearlong.

ORV restriction - An administrative order closing a land area to specified types of off-road vehicle travel during specific seasons or conditions.

Outputs - The goods, services, and products which are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. Also goods, end products, or services that are purchased, consumed, or utilized directly by people. A broad term for describing any result, product, or service that a process or activity actually produces.

Overstory - That portion of the trees in a forest of more than one story, forming the uppermost canopy layer.

Overstory modification - Removal of 80 percent or more of the overstory to increase production of grass and browse for utilization by livestock and wildlife.

Particulates - Small particles which are suspended in the air, and generally are considered pollutants.

Patented land - Public lands conveyed to private ownership most commonly by homestead, mining, or land exchange laws.

People at one time (PAOT) - The number of people that can use a recreation opportunity at any one time without substantially diminishing the quality of the experience sought after.

Permitted grazing - Use of a National Forest range allotment under the terms of a grazing permit.

Personal use - Normally used to describe the type of permit issued for removal of wood products (firewood, posts, poles, and Christmas trees) from National Forest land when the product is for home use and not to be resold for profit.

Pesticide - Any organic or inorganic preparation used to control populations of injurious organisms, plant or animal.

Planning area - The area covered by a Forest Plan.

Planning Criteria - Standards, tests, rules, and guidelines by which the planning process is conducted, and upon which judgments and decisions are based.

Planning horizon - The overall time period considered in the planning process that spans all activities covered in the analysis or plan, and all future conditions and effects of proposed actions which would influence the planning decisions.

Planning period - Generally one decade. The time interval within the planning horizon that is used to show incremental changes in yields, costs, effects, and benefits.

Planning records - A system that records decisions and activities that result from the process of developing a forest plan, revision, or significant amendment.

Point source pollution - Silvicultural point source pollution is defined to be those forestry related activities in which any discernible, confined, and discrete conveyance related to rock crushing, gravel washing, log sorting, or log storage facilities from which pollutants are discharged into the waters of the United States.

Potential natural vegetation - Vegetation that would exist today if man were removed from the scene, and if resulting plant succession were telescoped into a single moment.

Practice - See Management practice.

Precommercial thinning - Thinning trees with diameters under 5 inches where material thinned does not have market value. Cutting of trees with an objective of removing the least desirable trees, and improving the spacing of remaining trees to accelerate growth.

Preferred alternative - The alternative recommended for implementation as the Forest Plan, based on the evaluation completed in the planning process. (See Proposed Action).

Preparatory cut - Removal of mature trees near the rotation age in a shelterwood harvest for the purpose of opening the canopy, to encourage development of cone bearing crowns for seed production on the remaining trees.

Prescribed fire - The natural or intentional application of fire to wildland fuels under such conditions as to allow the fire to be confined to a predetermined area, intensity of heat, and rate of spread. Required to obtain planned resource objectives.

Present net value (PNV) - The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned, and the total discounted costs of managing the planning area.

Present value of benefits (PVB) - The value of future benefits discounted to the present.

Present value of costs (PVC) - The value of future costs discounted to the present.

Primitive area - An area formally designated as such until it is added to the National Wilderness Preservation System by Congressional action, or similarly removed from primitive status. Managed in accordance with policies and procedures established for areas within the National Wilderness Preservation System.

Primitive roads - Roads constructed with no regard for grade control or designed drainage, sometimes by merely repeated driving over an area. Those roads are single lane, usually with native surfacing, and sometimes passable with 4-wheel drive vehicles only, especially in wet weather.

Productivity - See Site productivity.

Proper Use - A degree of use of current year growth which, if continued, will achieve management objectives and maintain or improve the long-term productivity of the site. Proper use varies with time and system of grazing.

Proposed action - Specified in the National Environmental Policy Act as the project, activity, or decision that a Federal agency intends to implement or undertake, which is the subject of an environmental impact statement.

Public access - Usually refers to a road or trail route over which a public agency claims a right-of-way available for public use.

Public issue - A subject or question of widespread public interest relating to the management of National Forest System.

Range allotment - A designated area available for livestock grazing upon which a specified number, kind of livestock, and season of use may be grazed under a term grazing permit. The basic land unit used to facilitate management of the range resource on the National Forest System and associated lands administered by the Forest Service.

Range allotment plan - The document which contains the program needed to manage the range resource for livestock grazing while considering the soil, wildlife, watershed, recreation, timber, and other resources on lands within a range allotment.

Range Capacity Levels - Levels are described as follows:

No Allowable Capacity - Lands that are incapable of being grazed by domestic livestock under reasonable management goals. Examples include areas under natural conditions that are not capable of producing vegetation; soils that are not capable of producing more vegetation than is needed to prevent excessive erosion rates, and slopes over 45 percent.

Potential Capacity - Lands not undergoing accelerated erosion but requiring access, water developments, or other improvements to bring them up to full capacity.

Full Capacity - Lands that are presently stable because effective ground cover is holding soil loss to an acceptable level, and are, therefore, suited for grazing and can support a livestock operation.

Range condition - The state or health of the range vegetation and soil to produce a stable biotic community based on the composition, density, and vigor of the vegetation, and the physical characteristics of the soil. Condition is expressed as satisfactory or unsatisfactory.

Range improvement - Any structural or nonstructural improvement to facilitate management of rangelands or livestock.

Range inventory - The systematic acquisition and analysis of resoruce information needed for planning and managing rangeland. The information acquired through range inventory.

Rangeland - Land where the vegetation is predominately grasses, grass-like plants, forbs, or shrubs suitable for livestock grazing and browsing.

Range management intensity level - See Livestock management.

Range management - The art and science of planning and directing range use to obtain sustained maximum animal production, consistent with perpetuation of the natural resource.

Ranger District - Administrative subdivisions of the Forest supervised by a District Ranger, who reports to the Forest Supervisor.

RARE II - See Roadless Area Review and Evaluation II.

Real dollar value - A monetary value which compensates for the effects of inflation.

Reconstruction - Road or trail construction activities which take place on an existing road or trail, and raise the standard of the road or trail. This can include relocation of the facility in a completely new location.

Receipt shares - The portion of receipts derived from Forest Service resource management that is distributed to State and county governments, such as the Forest Service 25 percent fund payments.

Record of Decision - A document, separate from but associated with, an environmental impact statement, that publicly and officially discloses the responsible official's decision on which alternative assessed in the EIS will be implemented.

Recreation Opportunity Spectrum (ROS) - A method of delineating types of recreation settings. There are six ROS settings. These settings are: Primitive - Essentially unmodified natural environments; Semi-Primitive Nonmoterized - Few or subtle modifications by people, high probability of isolation, no motorized activity; Semi-Primitive Motorized - Predominately natural or natural appearing environments where motorized use occurs; Roaded Natural - Predomi- nately natural appearing environments with moderate evidence of the sights and sounds of man; Rural - Modified natural environment with facilities for special activities; Urban - substantially urbanized environment.

Recreation Visitor Day (RVD) - A unit for measuring recreation activities which aggregate 12 visitor hours. May consist of one person for 12 hours, 12 persons for one hour, or any equivalent combination of continuous or intermittent recreation use by individuals or groups.

Reforestation - The natural or artificial restocking of an area usually to produce timber and other wood products, but also to protect watersheds, prevent soil erosion, and improve wildlife, recreation, and other natural resources. Natural reforestation includes site preparation to reduce competing vegetation and provide a mineral seedbed for seed provided by seed trees. Artificial reforestation is the planting of seedlings, cuttings, or seeds by hand or mechanical means, and may include site preparation.

Reforestation backlog - See Backlog reforestation.

Regeneration - The term is used two ways: 1) The actual seedings or saplings existing in a young tree stand; or 2) The act of reforesting an area.

Regeneration cutting - The removal of trees intended for the purpose of assisting regeneration already present, or to make regeneration of the stand possible.

Region - For planning purposes, the standard administrative unit of the Forest Service administered by a Regional Forester.

Region 3 - The Southwestern Region. A Forest Service organizational unit consisting of all National Forests in New Mexico and Arizona, plus four (4) National Grasslands in Texas, Oklahoma, and New Mexico.

Regional Forester - The official responsible for administering a single Region, and preparing a Regional Guide.

Regional Guide - The plan developed to meet the requirements of the Forest and Rangeland Renewable Resource Planning Act of 1974, as amended, that guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands of a given region. It also disaggregates the RPA objectives assigned to the Region and the Forests within that region.

Removal cut - Removal of remaining mature trees near rotation age in a shelterwood harvest to provide full sunlight to the regenerated crop.

Research Natural Area - An area set aside by the Forest Service to preserve a representative sample of an ecological community primarily for scientific and educational purposes. Commercial exploitation is not allowed, and general public use is discouraged.

Resource allocation model - A mathematical model using linear programming which will allocate land to prescriptions, and schedule implementation of those prescriptions simultaneously. The end purpose of the model is to find a schedule and allocation that meets the goals of the Forest and optimizes some objective function.

Resource - An aspect of human environment which renders possible or facilitates the satisfaction of human wants, and the attainment of social objectives.

Resource element - A major Forest Service mission-oriented endeavor which fulfills statutory or executive requirements, and indicates a collection of activities from the various operating programs required to accomplish the mission. The eight resource elements are recreation, wilderness, wildlife and fish, range, timber, water, minerals, and human and community development.

Responsible line officer - The Forest Service employee who has the authority to select and/or carry out a specific planning action.

Revegetation - The re-establishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora, or artificially through the direct action of man (reforestation or range reseeding).

Right-of-way - The right to pass through another person's land as obtained by condemnation or purchase.

Riparian ecosystem - A transition between the aquatic ecosystem and the adjacent terrestrial ecosystem, identified by soil characteristics and distinctive vegetation communities that require free or unbound water.

Roadless Area Review and Evaluation (RARE II) - The assessment of unroaded areas within the National Forests as potential wilderness areas. This refers to the second review which was begun in 1977 and documented in a final environmental impact statement, January 1979.

Road density - The number of miles of road per square mile in a land area.

Road maintenance - Level 1 maintenance involves annual inspection to identify drainage problems in order to protect the investment and resources. The road is always closed to public use. Level 2 maintenance includes brushing, logging-out, restoring the road prism, and signing necessary to provide passage for high clearance vehicles only. Passenger car traffic is not a consideration. Level 3 maintenance provides for minimal conditions for passenger cars. Traffic volumes are minor to moderate. User comfort and convenience are not priorities. Level 4 maintenance covers roads suitable for all types of vehicles. More emphasis is given to user comfort. Roads are frequently surfaced with aggregate material. Dust may be controlled. Level 5 maintenance provides for a smooth and dust free surface to ensure safe and comfortable driving conditions.

Rotation age - The period of years between initial establishment of a stand of timber and the time when it is regenerated.

RPA - See Forest and Rangeland Renewable Resource Planning Act.

RPA Program - The recommended direction for long range management of renewable resources of National Forest System lands. This direction serves as the basis for the Regional targets assigned to the Forest. The development of this direction is required by the Forest and Rangeland Renewable Resource Planning Act.

RVD - See Recreation Visitor Day.

Sale schedule - The quantity of timber planned for sale by time period from an area of suitable land covered by a forest plan. The first period, usually a decade, of the selected sale schedule provides the allowable sale quantity. Future periods are shown to establish that long-term sustained yield will be achieved and maintained.

Salvage harvest - Removal of dead or dying trees resulting from insect and disease epidemics, wildfire, or windthrow.

Sanitation harvest - Removal of dead or dying trees to prevent spread of insects or disease.

Satisfactory range allotments - Allotments with management intensities B - D. Stocking is at capacity. Range and watershed conditions are stable or improving.

Sawtimber - Trees suitable in size and quality for producing logs that can be processed into lumber. For planning purposes on the Forest, trees with a nine-inch diameter were classified as sawtimber.

Scoping - Determination of the significant issues to be addressed in an EIS.

SCORP - See State Comprehensive Outdoor Recreation Plan.

Secondary modern development level - A level of modification for developed recreation sites. Modification is heavy, with facilities provided strictly for comfort and convenience of users. Construction may use synthetic materials, and vehicular traffic controls are usually obvious. Artifical surfacing of roads and trails is extensive. Development density is three to five family units per acre. Forest environment is pleasing and attractive, but not necessarily natural.

Sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice, and has come to rest on the earth's surface either above or below sea level.

Seed cut - Removal of mature trees near rotation age in a shelterwood harvest to permanently open the stand, and prepare the site for regeneration from the seed trees left for that purpose.

Seedling/sapling - A forest successional stage in which trees less than five inches in diameter are the predominant vegetation.

Selection cutting - The annual or periodic removal of trees, individually or in small groups from an uneven-aged forest in order to realize the yield, and establish a new crop of irregular constitution.

Seral - A plant and animal community which is transitional in stage of succession, being either short- or long-term. If left alone, the seral stage will pass, and another plant or animal community will replace it. Aspen represents a seral stage that would eventually be replaced by conifers such as spruce.

Shelterwood harvest - Silvicultural system used to harvest mature trees at rotation age in a series of preparatory, seed, and removal cuts designed to regenerate a new even-aged crop under the shelter of the old crop.

Short-term effects - Those effects which will not be significant beyond the RPA planning horizon of 50 years.

Silvicultural system - A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method, and carrying out of the fellings that remove the mature crop and provide for regeneration, and according to the type of forest thereby produced.

Silviculture - The science and art of growing and tending crops of forest trees.

Site preparation - Removing unwanted vegetation and debris from a site, and preparing the soil before reforestation.

Site productivity - Production capability of specific areas of land.

Size class - For the purposes of Forest planning, size class refers to the intervals of tree stem diameter used for classification of timber in the Forest Plan data base: less than five-inch diameter = seedling/sapling; five to nine-inch diameter = pole timber; and greater than nine-inch diameter = sawtimber.

Slash - Debris left after logging, pruning, thinning, or brush cutting, and large accumulations of debris resulting from windstorms. It includes logs, bark, branches, and stumps.

Small game - Birds and small mammals normally hunted or trapped.

Snag - A standing dead tree from which the leaves and most of the branches have fallen. A ponderosa pine/mixed conifer snag is a tree greater than 12 inches D.B.H. and 15 feet tall. Only ponderosa pine/mixed conifer species can contribute to the minimum snag requirement. An aspen snag is a tree greater than 12 inches D.B.H. and 15 feet tall. An oak snag is a tree greater than 10 inches D.B.H. and 10 feet tall.

Social analysis - An analysis of the social (as distinct from the economic and environmental effects of a given plan or proposal for action. Social analysis includes identification and evaluation of all pertinent desirable and undesirable consequences to all segments of society, stated in some comparable quantitative terms. It also includes a subjective analysis of social factors not expressible in quantitative terms.

Softwood - A conventional term for both the timber and the trees belonging to the evergreen group, as the pine, spruce, fir, etc.

Soil erosion - The detachment and movement of soil from the land surface by wind, water, or gravity.

Soil productivity - The capacity of a soil in its normal environment, to produce a specific plant or sequence of plants under a specific system of management.

Soil survey - See Terrestrial Ecosystem Inventory.

Southwestern Region - See Region 3.

Special cutting - Logging activities in special areas, such as recreation areas and administrative sites, where other uses or values override timber production values.

Special use permits - Permits and granting of easements (excluding road permits and highway easements) authorizing the occupancy and use of land.

Special interest administrative areas - Areas having significant or unique features requiring special consideration. For example, candidate areas for research natural areas may qualify.

Stand - A group of trees on a minimum of 1 acre of forest land, that is at least 10 percent stocked by forest trees of any size.

Standard - Performance criteria indicating acceptable norms of specifications that actions must meet. A principle requiring a specific level of attainment, a rule to measure against.

Standard (STD) - In reference to recreation management. Management level that provides services at or above established standards and practices.

State Comprehensive Outdoor Recreation Plan (SCORP) - Plan prepared by the State which identifies recreation supply and demand, and recommends future development actions.

Stocking rate - Range management usage. The actual number of animals, expressed in either animal units or animal unit months, on a specific area at a specific time.

Successional stage - A phase in the gradual supplanting of one community of plants by another.

Structural range improvement - Improvement requiring construction or installation to improve the range, facilitate management, or control distribution and movement of livestock.

Suitability - The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences, and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.

Suitable lands - Lands which are appropriate for the application of certain resource management practices as determined by an anlaysis of the economic and environmental consequences, and the alternative uses foregone.

Supply potential - The output production possible from available resources.

Suppression (Fire Suppression) - Any act taken to slow, stop, or extinguish a fire. Examples of suppression activities include line construction, backfiring, and application of water or chemical fire retardants.

Sustained yield of products and services - The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest system without impairment of the productivity of the land.

Targets - Objectives assigned to the Forest by the Regional Guide.

Temporary roads - Temporary roads are low-level roads constructed for a single purpose and short-term use. Once use of the road has been completed it is obliterated, and the land it occupied is returned to production.

Terrestrial Ecosystem Survey - Systematic inventory based on the concept that within the landscape there are naturally occurring ecosystems with unique sets of properties. These terrestrial ecosystems form a continuum, and can be recognized at different levels in classification systems. The soils component of the ecosystem is inventoried through the use of "Soil Taxonomy", USDA Soil Conservation Service Handbook #436, and the "Terrestrial Ecosystem Survey Handbook". The vegetation component of the ecosystem is inventoried through the use of the International Classification and Mapping of Vegetation, UNESCO, and the above mentioned Forest Service handbook. The terrestrial ecosystem inventory is sometimes referred to as a "soil survey" in the planning documents.

Theoretically Favorable - Geologic conditions are similar to those of a producing area, or may be inferred similar through indirect evidence.

Thermal cover - Cover used by animals to reduce effects of weather; for an elk, a stand of coniferous trees 40 feet or more tall with an average crown closure of 70 percent or more.

Thinning - Cutting made in an immature stand to accelerate diameter growth and improve form of remaining trees.

Threatened and endangered species - Species identified by the Secretary of Interior in accordance with the 1973 Endangered Species Act, as amended.

Threatened Species -- Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Endangered Species -- Any species that is in danger of extinction throughout all or a significant portion of its range.

Candidate Species -- (1) A species listed in a Notice of Review or a proposal for listing published in the Federal Register. A Notice of Review is triggered by a petition to list a species. The public at large is asked for data on a species. After the data has been collected, a species is proposed for listing as threatened or endangered in the Federal Register. In either case, the species is a candidate species and is not subject to protection under the Endangered Species Act; (2) A species listed in the Fish and Wildlife Service's program advice is a candidate species; (3) A species proposed for listing, but for which the decision to list is forestalled is a candidate species.

Threatened species - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, and which has been designated in the Federal Register by the Secretary of the Interior as a threatened species.

Timber production - The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. The term "timber production" does not include production of fuelwood.

Timber stand improvement (TSI) - Cuttings made in an immature stand to accelerate diameter growth, and improve the form of the trees that remain.

Topography - The configuration of a land surface including its relief, elevation, and the position of its natural and man-made features.

Transitory range - Land that is suitable for grazing use of a non-enduring nature over a period of time.

Trailhead - The parking, signing, and other facilities available at the terminus of a trail.

Trail Maintenance Level

Trail Maintenance Level I - Trails maintained for primitive experience level. Custodial care only. No tread maintenance. Drainage functional and not likely to fail. Trailsides not brushed but tread is kept passable. Small slides may remain except for erosion potential. Structures maintained as needed. Signing may be deferred.

Trail Maintenance Level II - Trails maintained for near-primitive experience level. Tread

maintained for public safety. Logs or similar rustic structures may be provided at stream crossings. Drainage same as Level I. Signing at a minimum level commensurate with level of trail use.

Trail Maintenance Level III - Trails maintained for intermediate experience level. Tread maintained for public safety and user convenience. Drainage same as Level I. Trailsides brushed out at Handbook standards. Structures maintained to original design standards. Signing same as Level II.

Trail Maintenance Level IV - Trails maintained at relatively high standards to provide for public safety and convenience. Tread relatively smooth, firm, and may require stabilization. Signing at high level, all other elements same as Level III. The trails are generally maintained for family or senior citizen use.

Trail Maintenance Level V - Trails maintained for high use and experience levels, including special purposes such as VIS trails, bicycle trails, trails to major vista points, trails for handicapped, etc. Basic care same as Level IV but patching of paved tread may be needed annually. Trailsides maintained to meet high visual quality standards by brushing and cleanup of debris beyond the trail limits. Vistas maintained.

Transportation system - All existing and planned roads and trails needed to access the Forest.

Travelway - An unconstructed two-track road resulting from repeated cross-country travel.

Trick tank - A water development constructed by laying an impervious surface on a collection area, and funneling water to a storage and use point. The key consideration for trick tanks is they are not placed in defined channels, and therefore are not making use of appropriable water. Commonly constructed of tin, concrete, butyl or treated soil, and sometimes use natural collection from rock outcrops.

TSI - See Timber Stand Improvement.

Uneven-aged management - The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

Unpalatable species - In range management usage, plant species that are not readily eaten by animals.

Universal soil loss equation (USLE) - Empirical erosion model that computes long-term average soil losses from sheet and rill erosion under specified conditions.

Unsatisfactory range allotments - Allotments with management intensity of X. Stocking is at least 20 percent overstocked. Range and watershed conditions are deteriorating at a rate which will require significant management changes and/or investments to correct.

Use season - That period of time developed recreation sites are open for public use, with routine maintenance, cleanup, and operation on a scheduled basis.

USF&WLS - U.S. Fish and Wildlife Service, Department of Interior.

Vertical structure - Consists of more than one age and size class of trees within a forested stand.

Viable population - A wildlife or fish population of sufficient size to maintain its existance over time in spite of normal fluctuations in population levels.

Viewshed - The visible landscape from an established point.

Virgin Timberland - Any area of timberland which has never been harvested for forest products.

Visual Quality Objectives (VQO) - Measurable standards for the management of visual resources of the landscape. Refers to the degree of acceptable alterations of the

characteristic landscape based on the importance of aesthetics. Objectives used in the Proposed Plan are:

Preservation - Provides for ecological change only.

Retention - Man's activities are generally not evident to the casual visitor.

Partial Retention - In general, man's activities may be evident but must be subordinate to the characteristic landscape.

Modification - Man's activity may dominate the characteristic landscape, but must at the same time, utilize naturally established form, line, color, and texture. Man's activities should appear as natural occurrences when viewed from foreground or middle ground.

Maximum modification - Man's activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

Visual resource - The composite of basic terrain, geological features, water features, vegetative patterns, and land use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

Visual sensitivity level - A classification system for establishing visual landscape categories according to the relative importance of user concern and viewing distance.

Visual variety class - A classification system for establishing visual landscape categories according to the relative importance of the visual features.

Warm-water fishery - Stream and lake water which support fishes with a maximum summer temperature tolerance of about 80 degrees Fahrenheit. Bluegills, catfish, and largemouth bass are examples.

Water rights - A right to the use of water, such as irrigation, wildlife, etc.

Watershed - The area that contributes water to a drainage or stream.

Watershed condition - A description of the health of a watershed, or portion thereof, in terms of the factors that affect hydrologic function and soil productivity.

Water yield - That portion of the annual precipitation which contributes to stream flow and recharge of the ground water table.

Weeks Act - Passed in 1911, it set up the National Forest Reservation Commission, and authorized the Secretary of Agriculture to purchase lands for addition to the National Forest System, provided that such purchases were approved by the Commission and by the states in which they were made.

Wetlands - Any area that is more or less regularly wet or flooded. Where the water table stands at or above the land surface for at least part of the year.

Wilderness - All National Forest lands included in the National Wilderness Preservation System; an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain.

Wilderness Act - Establishes a National Wilderness Preservation System to be composed of Federally-owned areas designated by Congress, administered for use and enjoyment as Wilderness, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as Wilderness.

Wilderness Opportunity Spectrum - A system of classifying wilderness areas into management units possessing homogeneous social characteristics. The classes are: Transition - Areas adjacent to non-wilderness high use areas, or adjacent areas with incompatible management activities, or wilderness areas that experience large numbers of day users traveling short distances into the wilderness. Semi-Primitve - Travel principally on system trails; low incidence of encounters with others; evidence of past human use not essential part of social setting; repeated use of popular camp sites. Primitive - Travel is cross-country or by a low density trails system; high degree of solitude. Pristine - No trails; high degree of solitude of both man and wildlife; no perceptible evidence of past human use.

Wildfire - Any fire on wild lands other than one intentionally set for management purposes, and confined to a predetermined area.

Wildlife - All nondomesticated mammals, birds, reptiles, and amphibians living in a natural environment, including both game species and non-game species. Animals or their progeny, which once were domesticated but escaped captivity and are running wild (i.e., feral animals), such as horses, burros, and hogs, are not considered wildlife.

Wildlife habitat diversity - The distribution and abundance of different plant and animal communities and species within a specific area.

Withdrawal - An order removing specific land areas from availability for certain uses.

Woodland - Pinyon and juniper forests annually growing on drier sites in the low elevations (less than 8,000 feet).

Appendix
A. Public Involvement

Overview

Public issues, management concerns, and resource use and development opportunities (ICO's) drive the planning process. If no significant ICO's have been identified, current management would have been confirmed with only minor changes. The fact that significant ICO's were identified meant that conflicts in resource uses and management activities would have to be addressed. The purpose of the Proposed Action is to change current management direction as necessary to address the identified ICO's within the limitations of budgets and legal requirements. The management program proposed by the Forest to address the ICO's is contained in the Forest Plan.

The process used to identify the significant ICO's is discussed in detail in a technical report titled Issues, Concerns, and Opportunities Identification Process, available for review at all Apache-Sitgeaves National Forest Offices during regular office hours and at the Regional Forester's Office in Albuquerque, New Mexico. The report is available by writing to: LMP, Apache- Sitgreaves National Forests, P. O. Box 640, Springerville, AZ 85938 or by calling (602) 333-4301.

The Technical Report for the ICO's identification process contains a detailed record of management's intentions and activities, the public's, other agencies, and the Native American response and involvement, and a list of persons known to be affected by or interested in the Plan.

The discussion that follows is a summary of the technical report on the ICO's and is meant to give the reader the broadest possible overview of a detailed and thorough process. Reviewers are invited to contact the Forest if they require more detail.

Introduction

Forest Plans developed from the planning process will direct management of the National Forest System. The public is encouraged to participate throughout the process for their own benefit and to help Forest managers make management decisions that reflect public attitudes and desires.

The intent of public involvement is to broaden the information base upon which decisions are made; to consider the public's advice and counsel; to ensure that the Forest Service recognizes the publics needs, concerns, and values; to inform the public about planning activities; and to inform the public about Forest Service programs and proposed actions. Land and resource management public involvement activities comply with the requirements of NFMA (36 CFR Part 219) and of NEPA (40 CFR Parts 1500-1508).

Public Involvement Plan

The Forest developed a Public Involvement Plan as part of its Work Plan to implement direction provided in NFMA, NEPA, and RPA. The Public Involvement Plan detailed activities, assigned responsibilities and due dates, and recorded accomplishments for involving the public at each step in the process.

ICO's Identification

A Notice of Intent to prepare an EIS appeared in the Federal Register in September 1980. Key people, groups, and organizations were contacted to discuss the process. The Tonto National Forest met with the Governor and Congressional delegations on behalf of the Arizona Forests. Forest employees were briefed. PUBLIC, a computer assisted value analysis, was used to assess the attitudes of different people and organizations during the course of public meetings and workshops. Notices, paid and free, were placed with the news media across the State, and a State-wide scoping effort was announced involving every Forest in Arizona except the Coronado, a forest far along in planning. The Arizona Forests developed a coordinated plan to solicit and analyze public opinion.

Posters with the same information as mentioned above were placed in stores, post offices, and gathering places, in communities on or near the Apache-Sitgreaves National Forests. Radio stations in Show Low, Holbrook, Winslow, and Clifton ran public service announcements (PSA's) concerning ICO meetings. News releases were published in all local papers during the comment period.

A response booklet was designed that contained an overview of planning. The booklet was divided by resource area by Forest, including general descriptions of each Forest and individual pages categorized by RPA resource elements. Over 14,000 booklets were mailed to people in Arizona and elsewhere. Another 8,000 booklets were distributed at public meetings, workshops, and by other means. In addition, 32,000 interest response cards were mailed to people who had applied for Christmas tree permits the previous year.

State-wide and local public meetings and workshops were held to explain the process and gather input. The Forest participated in 8 separate meetings, four of them State-wide, four locally, two of these four were held in concert with neighboring Forests.

An additional involvement plan was developed, approved, and implemented concerning outside agency coordination. Meetings were held in the afternoon of the same day of the general public meetings mentioned above. The purpose was the same, but the meetings afforded a more personal contact with County, State, and local Agency officials and planners.

The booklet generated about 20,000 detailed responses pertinent to the Arizona Forests. The public meetings comments were coded and added to the comment data base. All together, the public involvement effort generated over 7,000 comments specific to the Apache-Sitgreaves National Forests.

A detailed content analysis was done on all public input in January and February 1981 to determine the context and intensity of various issues raised by commentors. The Issues raised by the public were compared and added to concerns raised by managers at the beginning of the process. Forest managers compiled a list of preliminary ICO's based on previous experience, input already gathered for the Regional Guide, newspaper clippings, and internal input.

Final ICO's

All comments were treated as preliminary ICO's and compiled for review and decision by the I.D. Team. Each comment was subjected to a series of screens to determine whether or not it was broad enough in scope, within the Regional Forester's authority to resolve, and within the Forest's physical and fiscal capability to resolve. The comments were further screened as to their duration, quantifiability, intensity, and whether the ICO's dealt with existing or anticipated conflicts. A list of the final ICO's was sent to the Regional Forester for approval and to the public for comment and information in July 1981.

Roadless Areas

After the 9th Circuit Court's decision on the adequacy of the RARE II EIS, every jurisdiction was again contacted to help re-evaluate the roadless inventory. The land allocation portion of the roadless/ wilderness issue was resolved in the summer of 1984 with the passage and signing into law of the Arizona Wilderness Bill.

Issue Resolution/ Contacts

The major current issues were identified for the Apache-Sitgreaves National Forests, and an action plan was implemented to discuss these issues and the potential to resolve them, with key members of environmental groups, recreation groups, agency officials, industry, congressional representatives, and interested individuals. Four meetings were held covering the local and metropolitan areas. Potential outputs for each resource area were discussed, as well as a preliminary range of alternatives, excluding any preferred alternative. The purpose of these contacts was to display the ranges of outputs, and the effects caused by changes in budget level.

On January 17, 1986, the Environmental Protection Agency printed the notice of availability of the Apache-Sitgreaves National Forests Plan Draft Environmental Impact Statement in the Federal Register.

At this time, Forest personnel sent approximately 400 copies of the EIS and 1200 summaries to individuals and groups that requested copies or were on our updated mailing list as interested individuals or groups. A letter was also sent with the documents advising of the availability and arrangement for Forest Service speakers on Forest

planning. A schedule and location of open-houses to be held in March, 1986 was also included.

A news release was mailed indicating the availability of the documents and the length of the comment period. Releases were sent to 29 newspapers, radio, and TV stations. All media on or near the Forest were covered, as well as major media in the Tucson and Phoenix areas.

Additional news releases were sent out two weeks prior to the March, 1986 workshops. As a result of these releases, another 150 plans/EIS and 500 summaries were mailed to requesters.

The public involvement process met our objectives outlined in our public involvement plan. The seven public open-houses were attended by 75 people enabling Forest personnel the opportunity to clarify planning documents and help attendees better understand the planning process. Information meetings were held with the Wilderness Society, local timber purchasers, Forest permittees, Nature Conservancy, numerous local civic groups, Congressional delegates, and both local city councils. In addition to previous meetings, a special meeting was held at the Hannagan Meadow administration site to discuss polarized points-of-view, potential changes for the Final Plan, and areas needing clarification.

Attendees were from environmental groups, industry, government, the private sector, and the media. Approximately 40 people attended.

Consultation With Others

During the initial phase of public involvement, (identification of issues, concerns, and opportunities) the following agencies were contacted in person or by mail:

Federal

Army Corps of Engineers
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
Council on Environmental Quality
Department of Energy
Department of Housing and Urban Development
Environmental Protection Agency
Federal Highway Administration
Fish and Wildlife Service
National Park Service
Soil Conservation Service
U.S. Geological Survey

State

Arizona Attorney General
Arizona Commission of Agriculture and Horticulture
Arizona Department of Transportation
Arizona Game & Fish Department
Arizona Historical Preservation Officer
Arizona Office of Tourism
Arizona Outdoor Recreation Coordinating Commission
Arizona Resource Information System
Arizona Secretary of State
Arizona State Clearing House
Arizona State Department of Health Services
Arizona State Department of Mineral Resources
Arizona State Land Department
Arizona State Parks Board
Arizona State Treasurer
Arizona Water Commission
Governor Bruce Babbitt
Governor's Commission on Arizona Environment
Office of Economic Planning and Development

Local

Apache County Board of Supervisors
Apache County Planning and Zoning
Coconino County Board of Supervisors
Coconino County School District
Greenlee County Board of Supervisors
Navajo County Board of Supervisors
Navajo County Parks and Recreation Commission
Navajo County Planning Commission
Northern Arizona Council of Governments
Town of Alpine
Town of Clifton
Town of Eagar
Town of Holbrook
Town of Morenci
Town of Pinedale
Town of Show Low
Town of Springerville
Town of St. Johns
Town of Winslow

Agencies and Native American Tribes were consulted regularly throughout the process. Every jurisdiction that could reasonably be expected to be affected in any way by management activities on the Forest, was contacted to describe the planning process, solicit input, and gather advice on developing evaluation criteria. Over 24 formal contacts were made with different agencies, organizations, and Tribes about subjects as varied as how much prime farmland exists on the Forest and what the geothermal potential is across the Forest.

Native American input was exhaustively pursued and included contracting with Northern Arizona University to find out what the Navajo thought about Forest management on the three Mogollon Rim Forests (Apache-Sitgreaves, Coconino, Kaibab), as well as numerous contacts with the Apaches at Whiteriver and San Carlos.

As part of the process, the I.D. Team reviewed the plans of other agencies at all levels as well as the programs of affected Tribes to ensure reasonable coordination between multiple planning efforts.

SELECTED ISSUES CONCERNS AND OPPORTUNITIES

In the following text, each ICO is described and the complementary and conflicting relationships among resources within and between issues is discussed.

1. What timber harvest level should be maintained - reforestation is inadequate in some areas. In others, slash is not being adequately treated. The level of timber harvest affects the opportunities for management and use of other resources, and the economic stability of local communities. There are views that the current timber harvest level is too high, too low, and just right. Some feel that timber harvest on steep slopes should not be initiated while others felt it would be appropriate.

Other issues and concerns have to do with the fact that demand for many species of fuelwood may soon be or already is exceeding supply in some areas; that commercial and personal-use wood cutters compete for the available supply; that logging debris and residue be made available for firewood where timber has been cut; and requirements be placed on logging operations to "yard" unmerchantable material for other uses, thereby reducing waste. The information on these firewood sources should be made available to the public.

2. The range resources are perceived as being overgrazed in some areas - there are livestock conflicts with other resources on range lands. These conflicts occur between livestock grazing and timber, wildlife, riparian resources, soils, and watershed resources. Range management techniques such as juniper "pushes" (eradication of woodland species) are controversial.

Other factors include livestock overuse of riparian areas, woodland species are increasing on land suitable for grazing, some allotments may need reductions in numbers while others have the potential for increase, and conversion of woodland to grassland will reduce the longterm supply of firewood.

3. Water quality is adversely impacted in some areas by activities and management practices. Manipulation of vegetation and activities such as road building, off-road-vehicle use, and grazing are believed to be causes of soil movement. Downstream demand for water exceeds supply.

4. What adjustments in ownership should be made, considering community expansion in Show Low, Pinetop, and Lakeside - Intermingled ownerships resource and administrative needs, and property line identification are of concern to the public and land managers.

Consideration should be given to special needs of local communities for support services such as land fills, airports sewage treatment facilities, land exchanges, and fire protection. Management efficiency needs to be addressed.

5. The demand for developed recreation sites exceeds the availability of improvements, particularly around lakes and along streams - Miles of trails are insufficient in high demand areas such as along the Mogollon Rim, in the Pinetop/Lakeside area, and in the vicinity of Big Lake and Black River. This issue includes consideration of the level of maintenance of recreation improvements and trails, the impact of recreational use on lakes and streams, public safety, allowable length of visit and length of visitor use season, insufficient law enforcement and protection, and proximity to metropolitan areas of New Mexico and Arizona.

6. Damage from Off Road Vehicle use is occurring in certain areas - Conflicts are occurring in both the winter and summer. Other factors concern motorized vs non-motorized use on and off trails in the summer, demands for open/closed areas to ORV use, and resource damage from motorized vehicles.

There is concern over the conflict between snowmobiles and cross country skiers.

7. Managers and the public are concerned that grazing, timber harvesting, and associated activities will reduce fish and wildlife habitat or adversely affect animal diversity and populations - Many species are dependent upon riparian areas. Conflicts in these areas are occurring between recreation, road construction, and water use demands. Although riparian areas account for less than 0.1% of our total land area, they have the heaviest demands.

8. The transportation system, standards, and maintenence do not always accommodate the wide range of vehicles such as motor homes, camp trailers, logging trucks, and automobiles that travel the roads - Productive land is lost to transportation corridors. Demand is increasing for more signed trails and more access is wanted by various commodity users. Many forest visitors feel we have too many roads and there are conflicts between the number of roads, wildlife, and dispersed recreation.

9. Visitors to existing and recommended wildernesses are experiencing conflicts with the Apache Indians, range management, and fire management. Wilderness classification restricts access by the handicapped.

10. People's information needs and desires concerning National Forest management are not being met - The public stated that problems from user demands and resource conflicts may be eliminated by better public information programs or public notice. More information is needed about things such as: fuelwood location and access, personal use or commercial use of firewood, restrictions, laws, regulations, use restrictions concerning certain areas, and resource management practices such as prescribed burning.

11. Violations of specific laws and regulations were mentioned by many respondents - Violations were said to be committed by ORV users, pot hunters, poachers, timber thieves, length of stay violators, and drivers on Forest roads. There is insufficient law enforcement capability to handle every violation.

B. Forest Planning Model

INTRODUCTION

This Appendix describes the analysis process used in developing the range of alternatives discussed in Chapter 2 of this Environmental Impact Statement.

The Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974, as amended by the National Forest Management Act (NFMA) of 1976 mandates preparation of National Forest System and Resource Management Plans. These plans are to provide for multiple use and sustained yield of goods and services from the National Forest System in a way that is sensitive to economic efficiency and maximizes long-term net public benefits in an environmentally sound manner (36 CFR 219.1(a) and (b)). Regulations for implementing the procedural provisions of the National Environmental Policy Act (NEPA) of 1969 require that all reasonable alternatives, including the Proposed Actions, be vigorously explored and objectives evaluated (40 CFR 1502.14).

In order to meet these requirements, the Forest developed a quantitative analysis incorporating economics into the process.

The purpose of this analysis is three-fold: First, it assures that each alternative contained the most cost efficient combination of management activities which met the objectives of that alternative. Second, it provided a means to evaluate or compare alternatives for the purpose of choosing among them. Third, it allowed a quantitative starting point from which non-monetary values can be related and discussed.

Forest planning is a detailed analysis process. It is necessary to analyze the interrelationships between renewable and non-renewable resources, economic trends, and the social aspects of distributing resources and services to society. The goal is to select the most economically efficient combination of management prescriptions that would achieve a given set of priced and non-priced goals and objectives from the millions of possible combinations of management emphasis which could be applied throughout the Forest.

Computer modeling is an analytic technique designed to overcome the complexity of keeping track of the resulting resource outputs, environmental consequences, costs, benefits, and activity schedules applied to the land. This phase of the process is a tool for the manager to use in making a decision. However, based on professional judgment and experience, adjustments in resource distribution are appropriate in order to satisfy implicit social-political implications, or intangible resource considerations which are not inherent in a mathematical model. Judgmental decisions are described in Chapter 2 and the constraints section of this appendix.

Requirements to be fulfilled in the planning process are described in 36 CFR 219.12. A brief discussion of the steps used on the Apache-Sitgreaves National Forest to complete the planning actions is described below.

Identification of Purpose and Need

Public issues, management concerns, and resource use and development opportunities were identified through public participation activities and coordination with other Federal agencies, State and local governments, and Indian tribes. The development of issues, concerns, and opportunities is described in Appendix A and is available at the Forest Supervisor's Office in greater detail in a report titled Issues, Concerns, and Opportunities Identification Process."

Planning Criteria

Planning criteria guided the planning through: 1) Identification of the kind and detail of resource inventories needed; 2) the development of benchmark runs for determining minimum and maximum levels of resource production (decision space) responsive to issues, concerns, and opportunities; 3) the formulation and evaluation of alternatives responsive to resolving issues, concerns, and opportunities; 4) insuring net public benefits were maximized.

Inventory Data and Information Collection

Individual resource inventories were completed to identify site specific areas having common environmental characteristics. Data were collected and stored in the Forest resource data base consistent with the available information and the level of detail needed.

Analysis of the Management Situation

The Analysis of the Management Situation (AMS) is a determination of the availability of the Forest to supply goods and services in response to society's demands. The primary purpose for this analysis is to provide a basis for formulating a broad range of reasonable alternatives. During development of the AMS, benchmark runs with single resource emphasis were developed to define the Forest capability to supply various renewable resources on the Forest. Benchmarks were also developed to determine the most cost effective means of managing the Forest.

Formulation of Alternatives

Formulation of alternatives is described in Chapter 2 and in the Formulation of Alternatives portion of this appendix. The primary objectives are to provide an adequate basis for identifying the alternative that comes nearest to maximizing net public benefits, consistent with resource integration and management requirements of 36 CFR 219.13 and 219.27).

Estimated Effects and Evaluation of Alternatives

The physical, biological, economic, and social effects of implementing each alternative, considered in detail, provide the analytic basis for comparison of alternatives. This is presented in detail in Chapter 4. To provide a clear basis for decision making, Chapter 2 presents the major environmental impacts in comparative form in a manner which shows the major differences between the Proposed Action and the other alternatives.

The constraints section of this appendix shows the constraints used to formulate each alternative.

INVENTORY DATA

The following discussion presents concepts on how resource data were utilized to delineate capability areas, define areas tentatively suitable for management practices, and determine production coefficients. The inter-relationship between alternative development and implementation is also discussed.

The first step in gathering resource data, was to define areas that could be utilized as the basic inventory units. These were defined by combining slope, vegetation, and soils information and were called Capability Areas. All resource data were catalogued into these areas.

As described in the Analysis Area section of this appendix, some analysis areas were defined to address issues and concerns while others were defined as aggregations of capability areas. Capability areas and the inventory data gathered by capability areas were, however, used to determine the acreage within analysis areas that were suitable for specific management practices and to provide the basic data needed to develop production coefficients.

Acres suitable for various management practices within the analysis areas were determined by reviewing the biological capabilities of the capability areas within the analysis areas. These acreages provided the framework for developing integrated production coefficients that would meet a range of management objectives for each analysis area.

Production coefficients reflect the number of units per acre or per area of a given resource that can be produced over a specific period of time. These coefficients were estimated for the acreages within the analysis areas that would have a similar response to management. Resource specialists made these estimates using the latest research findings, simulation models, literature reviews, field observations, and professional experience. After the coefficients were generated for areas of similar response within the analysis areas, the ID Team modified these coefficients as needed to form integrated allocations and scheduling alternatives (prescriptions) for the total analysis area.

Because analysis areas are spatially locatable and resource data were used to develop coefficients for these individual analysis areas, the outputs and costs generated for the proposed action alternative can be used to monitor progress in implementing the alternative and to develop subsequent programs for implementation.

The following list summarizes resource data sources used:

Forest Timber Inventory Data
Forest Timber Compartment Examination Data (and Updates)
Forest Recreation Opportunity Spectrum Inventory
Wilderness Opportunity Spectrum Inventory
Forest Visual Resource Inventory
Wildlife Inventory
Sikes Act Mapping
Terrestrial Ecosystem Surveys (Soil)
Forest Transportation Inventory
Forest Slope Map
Forest Fire Occurrence Information
Forest Fuels Inventory
Range Allotment Analysis Information
Forest Vegetation Map
Forest Precipitation Map
Range Allotment Management Plans
Range Improvements Inventory
Watershed Condition Survey
Water Resource Inventory
USFS/USGS Streamflow Surveys
Floodplain Map
Cultural Resource Sensitivity Inventory
Forest Land Use Report Data Base

OVERVIEW AND ANALYSIS PROCESS

Planning consists of exploring the productive potential of the Forest and analyzing alternative strategies for management. This analysis is conducted with a model that is a computerized representation of the Forest. All Forests were directed to construct a planning model with a standardized computer software package called FORPLAN. The Forest used, a direct entry option of FORPLAN (FORPLAN Version 2, Release 10).

Analysis prior to the use of the FORPLAN model included that needed to develop analysis areas, define prescriptions, and develop coefficients for both costs and outputs. These processes are explained in detail in their respective sections of this appendix.

Cost and output coefficient development involved the use of various analytic models. In defining the inputs to the models that were used in addition to FORPLAN, the ID Team always tried to integrate resources in the most cost efficient way and simulate outputs using the most cost effective practices.

After analysis areas and prescriptions were defined and coefficients were developed, FORPLAN was used to generate benchmarks and alternatives. FORPLAN is a linear programming model that simultaneously distributes specific land areas to individual management prescriptions, and schedules use and development activities to achieve a specific set of objectives within certain constraints. Variables that are accounted for by the model include resource outputs, costs, and period of implementation. Given a set of data describing the Forest, an objective function and a set of constraints, the FORPLAN model determines an optimal or best possible solution to the problem. The objective function on all alternatives was to maximize present net value. Present net value is the total of discounted benefits minus discounted costs.

The primary use and purpose of the model is to look at the Forest's productive potential and describe what is and is not possible. Decisions about how to structure the model and the analysis are human choices. Decisions are not made by the model. The model is simply a device used to organize the elements of a decision problem and describe its results.

In some cases, the FORPLAN model indicated the Forest could not be managed to meet a specific combination of objectives. The limitations of land and resources, the impact on environmental quality, or the practical limits of budgets occasionally resulted in an infeasible solution. The ID Team then modified the objectives and made other "runs" of the computer model to find the particular combinations of lands, activities, and schedules which would best meet the goals of that alternative. FORPLAN solutions were validated by the ID Team to insure that solutions represented implementable options. Because FORPLAN is only an aid for analysis and does not model all components of net public benefits, adjustments in the final solution for the proposed action alternative were made by the ID Team based on professional expertise and prior experience.

After the FORPLAN model was used to generate alternatives, the IMPLAN model was utilized to analyze economic impacts associated with the various alternatives.

ANALYSIS AREAS

Analysis Areas (AA's) are the planning land units used in the allocation and scheduling analysis tool, FORPLAN. The combinations of AA's and management prescriptions are the decision variables analyzed in the program. The FORPLAN model includes 145 AA's. These AA's represent the land units used in planning for allocation and scheduling analysis. Management prescriptions were entered for each AA in FORPLAN.

AA's delineated by the Forests are combinations of capability areas CA's). The AA's reflect groupings of CA's based on common costs, yields, vegetative conditions, roaded or non-roaded, or administrative direction. An in depth discussion of the process and criteria used in (and the implications of) delineating analysis areas is contained in the Analysis Area Technical Report which is available in the planning records of the Forest Supervisor's Office. This report also contains a detailed description of each analysis area. A brief description is contained in the following tables.

Table 128. Analysis Areas in the Mt. Baldy Wilderness Area.

AA #	Acres	Description
011	60	Ponderosa pine vegetation, unsuitable for harvest.
012	621	Mountain grasses vegetation.
013	231	Mixed conifer species vegetation, unsuitable for timber harvest.
014	312	Aspen vegetation, unsuitable for harvest.
015	5845	Spruce/fir vegetation, unsuitable for harvest.

Table 129. Analysis Areas in the Lower San Francisco Roadless Area.

AA #	Acres	Description
021	3229	Ponderosa pine vegetation, unsuitable for timber harvest.
022	2634	Mountain grasses vegetation.
023	888	Prairie grasses vegetation.
024	50585	Pinyon-juniper vegetation.
025	813	Riparian type species vegetation.

Table 130. Analysis Areas in the Blue Range Primitive Area.

AA #	Acres	Description
031	6228	Blue addition, ponderosa pine, unsuitable for timber harvest.
032	2357	Blue addition, mixed conifer, unsuitable for timber harvest.
033	128	Blue addition, aspen, unsuitable for timber harvest.
034	9739	Blue addition, pinyon-juniper, unsuitable for timber harvest.
035	98	Blue addition, prairie grasses.
041	1424	Blue deletion, ponderosa pine, unsuitable for timber harvest.

Table 130. Analysis Areas in the Blue Range Primitive Area. (Continued)

AA #	Acres	Description
042	970	Blue deletion, mixed conifer, unsuitable for timber harvest.
043	24810	Blue deletion, pinyon-juniper.
044	1044	Blue deletion, prairie grass.
045	1381	Blue deletion, riparian.
051	45183	Blue existing, ponderosa pine, unsuitable for timber harvest.
052	11804	Blue existing, mixed conifer, unsuitable for timber harvest.
053	45	Blue existing, aspen, unsuitable for timber harvest.
054	761	Blue existing, prairie grass.
055	90200	Blue existing, pinyon-juniper.
056	1569	Blue existing, riparian.

Table 131. Analysis Areas in Terry Flat (Escudilla Mountain).

AA #	Acres	Description
061	94	Aspen, unsuitable for timber harvest.
062	2136	Spruce-fir, suitable for timber harvest.
063	37	Mixed conifer, suitable for timber harvest.
064	693	Mountain grass.
065	6	Prairie grass.
066	43	Mixed conifer, unsuitable for timber harvest.

Table 132. Analysis Areas in Scenic Backdrop (Escudilla Mountain).

AA #	Acres	Description
071	28	Mountain grass
072	2413	Mixed conifer, suitable for timber harvest
073	861	Spruce-fir, suitable for timber harvest
074	376	Ponderosa-pine, suitable for timber harvest
		Pinyon-juniper
076	35	Ponderosa-pine, suitable for timber harvest
077	1197	

Table 133. Analysis Areas in the Alpine Watershed (Escudilla Mountain).

AA #	Acres	Description
081	1713	Ponderosa pine, suitable for timber harvest.
082	872	Ponderosa pine, unsuitable for timber harvest.

Table 134. Analysis Areas in the Escudilla Wilderness Area.

AA #	Acres	Description
091	871	Ponderosa pine vegetation, unsuitable for timber harvest.
092	2208	Mixed conifer vegetation, unsuitable for timber harvest.
093	2325	Aspen vegetation, unsuitable for timber harvest.
094	406	Mountain grasses vegetation

Table 135. Analysis Areas in the Hell's Hole Roadless Area.

AA #	Acres	Description
101	822	Ponderosa pine, unsuitable for timber harvest.
102	4241	Mountain grass vegetation.
103	10324	Pinyon-juniper vegetation.

Table 136. Other Ponderosa Pine Analysis Areas.

AA #	Acres	Description
111	261743	Less than 40% slope, seedling-sapling, suitable for timber harvest.
112	737	Less than 40% slope, seedling-sapling, unsuitable for timber harvest.
121	235173	Less than 40% slope, pole size, suitable for timber harvest.
122	1103	Less than 40% slope, pole size, unsuitable for timber harvest.
131	134793	Less than 40% slope, sawtimber, suitable for timber harvest.
132	182	Less than 40% slope, sawtimber, unsuitable for timber harvest.
141	3893	More than 40% slope, seeding-sapling, suitable for timber harvest.
142	7260	More than 40% slope, seedling-sapling, unsuitable for timber harvest.
151	5011	More than 40% slope, pole size, suitable for timber harvest.
152	3651	More than 40% slope, pole size, unsuitable for timber harvest.
161	7446	More than 40% slope, sawtimber, suitable for timber harvest.
162	12542	More than 40% slope, sawtimber, unsuitable for timber harvest.

Table 137. Other Mixed Conifer Analysis Areas.

AA #	Acres	Description
171	14594	Less than 40% slope, seed-sapling, suitable for timber harvest.
172	562	Less than 40% slope, seedling-sapling, unsuitable for timber harvest.
181	40263	Less than 40% slope, pole size, suitable for timber harvest.
182	156	Less than 40% slope, pole size, unsuitable for timber harvest.
191	45916	Less than 40% slope, sawtimber, suitable for timber harvest.
192	1608	Less than 40% slope, sawtimber, unsuitable for timber harvest.
201	2776	More than 40% slope, seedling-sapling, suitable for timber harvest.
202	256	More than 40% slope, seedling-sapling, unsuitable for timber harvest.
211	3011	More than 40% slope, seedling-sapling, unsuitable to timber harvest.
212	559	More than 40% slope, pole size, unsuitable for timber harvest.
221	19121	More than 40% slope, sawtimber, suitable for timber harvest.
222	3154	More than 40% slope, sawtimber, unsuitable for timber harvest.

Table 138. Other Spruce-Fir and Aspen Analysis Areas Suitable for Timber Harvest

AA #	Acres	Description
230	6866	Spruce-fir less than 40% slope, all sizes.
240	1591	Spruce-fir, greater than 40% slope, all sizes.
250	5045	Aspen, less than 40% slope, all sizes.
260	1236	Aspen, greater than 40% slope, all sizes.

Table 139.		Other Miscellaneous Analysis Areas.
AA #	Acres	Description
270	350825	Pinyon-juniper, above the Mogollon Rim.
280	75693	Pinyon-juniper, below the Mogollon Rim.
291	40243	Prairie grass vegetation.
292	183863	Mountain grass vegetation.
300	4803	Areas characterized by riparian vegetation.
310	3962	Water areas [lakes, ponds, etc.].
320	969	Campgrounds [i.e. developed recreation sites].

Table 140.		Black River Canyon Roadless Area Analysis Area.
AA #	Acres	Description
361	4462	Ponderosa pine vegetation, suitable for timber harvest.
362	2926	Mixed conifer vegetation, suitable for timber harvest.
363	496	Aspen vegetation, unsuitable for timber harvest.
364	160	Mountain grasses.
365	2839	Mixed conifer vegetation, suitable for timber harvest.

Table 141.		Center Fire Roadless Area Analysis Area.
AA #	Acres	Description
371	7391	Ponderosa pine vegetation, unsuitable for timber harvest.
372	48	Mixed conifer vegetation, unsuitable for timber harvest.
373	5864	Pinyon-Juniper vegetation.
374	64	Riparian vegetation.

Table 142.		Bear Wallow Wilderness Area Analysis Area.
AA #	Acres	Description
381	5048	Ponderosa pine vegetation, unsuitable for timber harvest.
382	5333	Mixed conifer vegetation, unsuitable for timber harvest.
383	431	Aspen vegetation, unsuitable for timber harvest.
384	18	Mountain grasses vegetation.
385	200	Riparian vegetation.

Table 143.		Nolan Roadless Area Analysis Areas.
AA #	Acres	Description
391	1004	Ponderosa pine vegetation, unsuitable for timber harvest.
392	379	Mountain grass vegetation.
393	5267	Pinyon-juniper vegetation.

Table 144.		Campbell Blue Roadless Area Analysis Area.
AA #	Acres	Description
401	3963	Ponderosa pine vegetation, unsuitable for timber harvest.
402	101	Aspen vegetation, unsuitable for timber harvest.
403	2989	Pinyon-juniper vegetation.
404	231	Mountain grasses vegetation.
405	40	Riparian vegetation.

Table 145.		Mother Hubbard Roadless Area Analysis Area.
AA #	Acres	Description
411	474	Ponderosa pine vegetation, unsuitable for timber harvest.
412	1677	Pinyon-juniper vegetation.

Table 146.		Painted Bluffs Roadless Area Analysis Area.
AA #	Acres	Description
421	6895	Ponderosa pine vegetation, unsuitable for timber harvest.
422	1159	Mountain grasses vegetation.
423	32645	Pinyon-juniper vegetation.
424	220	Riparian vegetation.

Table 147.		Mitchell Peak Roadless Area Analysis Area.
AA #	Acres	Description
431	11557	Ponderosa pine vegetation, unsuitable for timber harvest.
432	952	Mountain grasses vegetation.
433	451	Riparian vegetation.
434	22237	Pinyon-juniper vegetation.

Table 148.		Pipestem Roadless Area Analysis Area
AA #	Acres	Description
441	2440	Ponderosa pine vegetation, unsuitable for timber harvest.
442	1963	Mountain grasses vegetation.
443	565	Prairie grasses vegetation.
444	31606	Pinyon-juniper vegetation.
445	170	Riparian vegetation.

Table 149. Salt House Roadless Area Analysis Area

AA #	Acres	Description
451	5602	Ponderosa pine, suitable for timber harvest.
452	1439	Mixed, conifer vegetation, suitable for timber harvest.
453	12960	Pinyon-juniper vegetation.
454	40	Mountain grasses vegetation.
455	90	Riparian vegetation.

Table 150. Hot Air Roadless Area Analysis Area.

AA #	Acres	Description
461	10559	Ponderosa pine vegetation, suitable for timber harvest.
462	1811	Mountain grass vegetation.
463	18130	Pinyon-juniper vegetation.
464	95	Riparian vegetation.

Table 151. Sunset Roadless Area Analysis Area.

AA #	Acres	Description
471	8932	Ponderosa pine vegetation, unsuitable for timber harvest.
472	3112	Mountain grasses vegetation.
473	1283	Prairie grasses vegetation.
474	16878	Pinyon-juniper vegetation.
475	113	Riparian vegetation.

Table 152. Leonard Canyon Roadless Analysis Area.

AA #	Acres	Description
491	1016	Ponderosa pine, unsuitable for timber harvest.
492	133	Mountain grasses vegetation.
493	1348	Pinyon-juniper vegetation.

Table 153. Chevelon Canyon Roadless Area Analysis Area

AA #	Acres	Description
481	1485	Ponderosa pine, unsuitable for timber harvest.
482	2507	Mixed conifer vegetation, suitable for timber harvest.
483	205	Pinyon-juniper vegetation.
484	205	Riparian vegetation
485	336	Ponderosa pine vegetation, suitable for timber harvest.

PRESCRIPTIONS

Prescriptions serve as the basis for choice of what can be done in a specific analysis area. A prescription is the set of assigned management treatments or practices and a schedule of application to achieve the desired quantity of goods, services, and environmental consequences. As a result, each prescription consists of resource production coefficients, costs, and a scheduling option.

The management requirements defined in 36CFR were integrated into prescriptions by modifying the production coefficients and costs by an amount needed to assure compliance with these requirements.

A wide range of prescriptions was developed to meet goals and objectives of benchmarks on the planning criteria, public issue, and management concerns and opportunities developed early in the planning process. Prescriptions ranged from minimum and low intensity to maximum production of the various goods and services.

Economic efficiency was considered by the ID Team as prescriptions were developed by utilizing the most recent technology, research findings, and cost effective methodologies to accomplish management practices and activities. Prescription development was coordinated by the ID Team members to integrate various practices and activities together in the most cost efficient combinations.

The FORPLAN model assigned the prescriptions to specific analysis areas while maximizing present net value based on the constraints used to meet the goals and objectives of the benchmark or alternative. Thus, the most cost efficient prescriptions to meet the objectives were chosen for each benchmark and alternative.

Prescriptions Development Process

The first step in the process of developing prescriptions was to identify and define management intensity levels for each resource. As an example, see Table 153 for range management. Each resource has at least a low, current, and maximum intensity level. Depending on the resource, other intensity levels were developed as required.

The next step was to identify combinations of management intensities, one per resource, that could be combined into an integrated prescription. Two examples, of integrated prescriptions are given in Table 154. An integrated prescription is one in which all management practices making up the prescription are compatible. A second criteria is that the particular combination of intensities (i.e., the prescription) is "reasonable".

These two criteria were achieved by reviewing all the possible combinations and developing a set of rules related to which intensity levels could occur with which other ones, and which ones could not occur, etc. A final list of prescriptions were generated. A complete documentation of the prescription development process and a detailed definition of the prescriptions is available in the Prescription Development Technical Report in the Forest planning records. This report is available upon request.

Table 154. Descriptions of Range Management Intensities.

Intensity Code	Descriptions
RA	**Minimum:** Management excludes livestock grazing to protect other values or eliminated conflicts with other uses. Measurement is in acres of suitable range affected by the level of management practiced.
RB	**Low Intensity:** Management controls livestock numbers so that livestock use is within present grazing capacity. Distribution is achieved through riding, herding and/or salting. Improvements are minimal and constructed only to the extent needed to cost effectively maintain stewardship of the range in presence of grazing. Measurement is in acres of suitable range affected by the level of management practiced.
RC	**Moderate:** Management seeks full utilization of forage allocated to livestock. Cost effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage and to maintain plant vigor. Measurement is in acres of suitable range affected by the level of management practiced.
RD	**Moderate High:** Management seeks to optimize production and utilization of forage allocated for livestock use consistent with maintaining the environment and providing for multiple use of the range and livestock management technology, practices may be selected and used to develop cost effective methods for achieving improved forage supplies and uniform livestock distribution and forage use. Cultural practices such as brush control, type conversion, fertilization, site preparation and seeding of improved quality and quantity of forage.

The cultural practices may be combined with fencing and water developments to implement complex grazing systems. Measurement is in acres of suitable range affected by the level of management practiced.

RE **Maximum:** Management seems to maximize livestock production, while maintaining basic soil and water values. Cost effective management systems and techniques are used to achieve this goal. May involve conversion of Forest, includes administrative pastures or other specially seeded areas under intensive management. Multiple use is not a constraint. Measurement is in acres of suitable range affected by the level of management practiced.

Table 155. Two Examples of Integrated Prescriptions.

Prescriptions	Description
3	Current timber, Maximum wildlife, Low intensity range (RB), Current engineering, Maximum soils and watershed, Low current recreation, Current lands, Current minerals, Maximum fire, Current planning, Current general administration.
19	Moderate timber, Low current wildlife, Maximum range (RE), Current engineering, Maximum soils and watershed, Low intensity recreation, Current lands, Current minerals, Maximum fire, Current planning, Current general administration.

Minimum Management Requirements

The requirements for the National Systems Land and Resource Management Planning (36 CFR 219) specifies: 1) the minimum legal management requirements to be met for accomplishing the goals and objectives of the National Forest System (36 CFR 219.27) and 2) the minimum requirements for integrating individual Forest resource planning into the Forest plan (36 CFR 219.14 through 219.26). These are collectively called Minimum Management Requirements (MMR's).

The minimum legal requirements defined in (36 CFR 219.27) can be categorized as either resource protection requirements that must apply to all management prescriptions or to prescriptions which specify practices involving 1) vegetative manipulation of tree cover for any purpose, 2) timber harvest and cultural treatment, or 3) even-aged silviculture.

The Forest complied with (36 CFR 219.27) primarily within the specific standards and guidelines associated with the individual resource management practices developed for prescription levels.

The low intensity prescription level contains the standards and guidelines for mitigation measures required to be present in all prescriptions. The low intensity level is the least management activity and cost to meet legal requirements. Therefore, low intensity level standards, activities, costs, and outputs are the minimum to be met or exceeded in all other prescription levels.

Standards and guidelines which comply with requirements involving vegetative manipulation of tree cover or silvicultural practices were developed primarily for prescription levels other than low intensity where these types of activities were emphasized.

The minimum resource integration requirements specified in (36 CFR 219.14 through 219.26) were achieved through the Forest's planning process and in prescription standards and guidelines. (A more complete discussion of MMR's can be found in the Forest's Technical Report on MMR's. This technical report is available at the Forest Supervisor's Office in Springerville, Arizona.)

COEFFICIENTS

A coefficient is a number that quantifies the value, cost, or amount of an activity or output at a given point in time in the model. The planning horizon extends 200 years. It is divided into 20 decadal (ten year) time periods. Production coefficients for prescriptions were developed by resource specialists on the Interdisciplinary Team for timber, fuelwood, and products (pulpwood), permitted livestock use and grazing capacity, developed and dispersed recreation including wilderness, cover habitat, squirrel habitat, turkey roost habitat, old growth habitat, wildlife animal unit months of herbaceous forage and cover habitat and associated wildlife recreation, water yield increase and on-site soil loss. Cost coefficients were developed for activities supporting resource protection and utilization.

Assignment of a prescription to an analysis area results in outputs and costs calculated in the model from the coefficients for each time period within the planning horizon. Coefficients can be either per acre or per area, per year or per time period. Costs relative to managing the Forest and producing goods and services are called "activities".

Not all outputs were included in the FORPLAN model. Some outputs, such as timber, are relatively easy to model. The Forest has control over the harvest of timber along with a legal responsibility to regulate production and the ability to influence the rate of growth of the product. Mineral production by contrast is not controlled by the Forest. The market determines when a mineral resource is utilized. Mineral outputs, therefore, are not included in the model, but the cost of administering a basic minerals program is included. Outputs and environmental effects from the minerals program are included in the analysis process described in Chapters 2 and 4.

All coefficients used in FORPLAN were generated and entered in one of two ways. The first method used ECOSIM and a companion utility program to generate coefficients for commercial timber and enter them into FORPLAN. The method used for other outputs was to manually generate and enter the coefficients.

ECOSIM is a computer simulation model for estimating timber growth characteristics over time and the effects of timber treatment and harvest. It was used to estimate all timber inventory changes and harvest volumes for several treatment schedules and silvicultural options. It also was used to estimate timber characteristics such as average diameter, basal area, growing stock level, and stems per acre over time.

Output yield coefficients were generated by each individual resource specialist and reviewed by the ID Team. Methods of output development included simulation models, historically measured output, recent scientific findings, consultation with others, and professional judgement. Occasionally, an output is listed that is not applicable in the strict sense of the definition, but is used as an index to generate special reports or calculate acres of output from other mathematical formulas that are known as "yield composites." For more information on the procedures used to generate outputs, see the individual resource technical reports and documentation that are on file in the Forest planning records.

Outputs

The FORPLAN output codes, output names, and units of measurement included in the model are as follows:

Table 156. List of FORPLAN Outputs

Output Code	Output Name	Units of Measurement
ACR	ACR: ACREAGE	ACRE/PERIOD
1	GRASS-FORB STAGE	ACRE/PERIOD
2	SHRUB-SEEDLING STAGE	ACRE/PERIOD
3A	SAPLING-POLE <40 CCE	ACRE/PERIOD
3B	SAPLING-POLE 40<CC<70	ACRE/PERIOD
3C	SAPLING-POLE >70 CC70	ACRE/PERIOD
4A	MATURE <40 CC	ACRE/PERIOD
4B	MATURE 40<CC<70	ACRE/PERIOD
4C	MATURE >70 CC	ACRE/PERIOD
5	OLD-GROWTH STAGE (SERIAL)	ACRE/PERIOD
V33A	OLD-GROWTH (SPRUCE-FIR)	ACRE/PERIOD
V33B	OLD-GROWTH (PP & MC)	ACRE/PERIOD
V33C	OLD-GROWTH (PJ)	ACRE/PERIOD
V31A	HIDING COVER (SPRUCE)	ACRE/PERIOD
V31B	HIDING COVER (PP & MC)	ACRE/PERIOD
V31C	HIDING COVER (PJ)	ACRE/PERIOD
V31D	HIDING COVER (ASPEN)	ACRE/PERIOD
V32A	THERMAL COVER (SPRUCE)	ACRE/PERIOD
V32B	THERMAL COVER (PP & MC)	ACRE/PERIOD
V32C	THERMAL COVER (PJ)	ACRE/PERIOD
V32D	THERMAL COVER (ASPEN)	ACRE/PERIOD
Q52	Q52:DEVELOPED REC STD	RVD/PERIOD
Q53	Q53:DEVELOPED REC LSTD	RVD/PERIOD
Q55	Q55:DISPERSED REC STD	RVD/PERIOD
Q56	Q56:DISPERSED REC LSTD	RVD/PERIOD
Q57	Q57:DEVELOPED REC PVT	RVD/PERIOD
Q58	Q58:HIGHWAY USE REC	RVD/PERIOD
Q62	Q62:WILDERNESS STD	RVD/PERIOD
Q63	Q63:WILDERNESS LSTD	RVD/PERIOD
V41	V41:PERMIT. GRAZING USE	AUM/YEAR
V42	V42:GRAZING CAPACITY	AUM/YEAR
V45	V45:INITIAL RANGE TREAT	ACRE/PERIOD
V51C	V51C:NET SAWTIMBER 9-12	MBF/PERIOD
V51	V51:NET SAWTIMBER (MBF)	MBF/PERIOD
V51A	V51A:SAWTIMBER (MCF)	MCF/PERIOD
V52A	V52A:PRODUCTS(MCF)	MCF/PERIOD
V52	V52:PRODUCTS (MBF)	MBF/PERIOD
V53A	V53A:FUELWOOD, TIMB BYPROD	MBF/PERIOD
V53B	V53B:FUELWOOD, GRN PJ/TIMB	MBF/PERIOD
INV	INV:LAST PD TIMB INV	MCF/YEAR
SAV	SAV:STAND AVE VOLUME	MCF/YEAR
LRSY	LRSY:LONG RUN SUST YLD	MCF/YEAR
CMAI	CMAI FLAG	FLAG/PERIOD

Table 156.	List of FORPLAN Outputs (Continued)	
Output Code	Output Name	Units of Measurement
V60	V60:UNSAT WATERSHED COND	ACRE/PERIOD
V61B	V61B:WATER YLD BKGRND	AC-FT/PERIOD
V61T	V61T:WATER YLD TREND	AC-FT/PERIOD
V62B	V62B:SOIL LOSS BACKGRND	MTON/PERIOD
V62T	V62T:SOIL LOSS TREND	TON/PERIOD
VD1	VD1:VERTICAL DIV(NH/KO)	ACRE/PERIOD
VD2	VD2:VERTICAL DIV(EVAGE)	ACRE/PERIOD

Benefit Values

Priced in the FORPLAN model are of two types, market outputs, and other outputs that are assigned a benefit value.

Market outputs are those that have a known measurable value in the marketplace. These include Net Sawtimber, Net Products, all fuelwood, Developed Recreation, Permitted Grazing, and Water Yield Increase.

Other outputs that were assigned benefit values in FORPLAN are those that have no well-defined market value. These include Dispersed Recreation, Wilderness Recreation, and free fuelwood.

WFUD's (Wildlife and Fish User Day's) were evaluated outside of the FORPLAN model. Estimates of WFUD's were based on the habitat characteristics (output codes 1 through 5) and the wildlife activities that were produced by each FORPLAN run. The benefit values associated with WFUD's are included in the economic evaluations of alternatives in Chapter 2.

Prices are expected to increase at the same rate as inflation (no real price increase). All benefit values are in January 1, 1982 dollars. All prices benefits are based on the "willingness-to-pay price", whether or not that price is actually collected by the Forest. Any outputs tracked in FORPLAN and not assigned a benefit value in Table 155 were tracked to address issues or for analysis purposes. All priced outputs that were included in present net value calculations were tracked in the FORPLAN model and were assigned benefits at the point the benefit was expected to occur. A detailed description of the benefit values and how they are calculated is in the Regional Office planning record. A complete description of how outputs were developed and tracked over time, is included in the Apache-Sitgreaves National Forests Technical Report on Outputs (available at the Forest Supervisor's Office).

Table 157.	Benefit Values for Outputs	
Output	Units of Measure	All Decades
Net Sawtimber		
9" - 12" diameter	$/MBF	$103.97
12" - 16"	$/MBF	144.97
16" - 20"	$/MBF	153.30
20" - 99"	$/MBF	177.84
Net Products	$/MBF	8.90
Wilderness Rec Standard	$/RVD	13.75
Wilderness Rec less than Stnd.	$/RVD	7.28
Dispersed Rec Standard	$/RVD	10.72
Dispersed Rec less than Stnd.	$/RVD	5.68
Developed Rec Standard	$/RVD	9.55
Developed Rec less than Stnd.	$/RVD	5.37
Grazing Permitted Use	$/AUM	8.17
Water Yield	$/AC. FT.	43.05
All Fuelwood	$/MBF	7.67
Developed Rec-Private	$/RVD	9.55
Highway Use Rec	$/RVD	5.52
Wildlife & Fish User Days	$/WFUD	
Big Game		30.00
Other Game		18.00
Non-game		25.00
Fishing		13.00

Costs

Costs for management prescriptions were developed from the Forest's planned budget for 1983. They are represented in the FORPLAN model as 1982, January 1 dollars.

Where possible, costs were tracked per some unit of output. This allowed the development of fewer costs and still provided a wide range of costs between prescriptions. When it was not possible to track a cost as a unit cost, the total cost of implementing a prescription was calculated and the cost item was entered in the FORPLAN as dollars per area or as dollars per acre. Costs that could not be applied to a specific land area were tracked as Forest-wide costs.

Real price increases in costs were not used. It was estimated that all costs would increase at the same rate as inflation. Any increase in costs through time was a result of an increase in management intensity.

Activities tracked in FORPLAN are displayed in Table 155. Units of measure displayed in the table are the activity units by which costs are tracked. Unit costs multiplied by the actual activity units calculated in FORPLAN result in total costs for the activity. If the activity units were dollars, the costs were entered into FORPLAN as dollars and not tracked per unit of output. All costs were tracked in the FORPLAN model and were assigned at the point that they were expected to occur. A more detailed description of activities and how activities were tracked in FORPLAN can be found in the Apache-Sitgreaves National Forests Technical Report on Economic Efficiency available at the Forest Supervisor's Office).

Table 158. List of FORPLAN Costs/Activities

Code	Description	Unit
A201	Program Cost-Developed Recreation Public, Standard.	$/area/period
A202	Program Cost-Developed Recreation Public, less than Standard.	$/area/period
A203	Program Cost-Developed Recreation Private.	$/area/period
A204	Program Cost-Dispersed Recreation, Standard.	$/area/period
A205	Program Cost-Dispersed Recreation, less than Standard.	$/area/period
A301	Recreation Project Cost.	$/acre/period
A302	Trail $.	$/acre/period
A303	Trail Construction/Reconstruction.	Miles/acre/period
B101	Program Cost-Wilderness Standard.	$/acre/period
B102	Program Cost-Wilderness less than standard.	$/acre/period
C201	Program-Cost-Wildlife Operations & Maintenance.	$/acre/period
C301	Wildlife Project Cost.	$/acre/period
D201	Range Project Costs.	$/acre/period
D301	Forest Service Range Structural Improvement.	Structure/acre/period
D302	Forest Service Range Non-structural Improvements.	$/acre/period
D303	Permittee Structural Improvement.	Structures/acre/period
D304	Permittee Non-structural Improvements.	$/acre/period
E401	Natural Reforestation/Site Preparation.	Acres/period
E402	Artificial Reforestation/Site preparation.	Acres/period
E501	Precommercial Thinning.	Acres/period
E801	Timber Plans/Exams.	Acres/period
E802	Timber Local, Arterial, Collector Roads.	$/acre/period
E803	Sawtimber Preparation, Administration.	MBF/acre/period
E804	Purchaser Credit Roads.	Miles/acre/period
CABL	Purchaser costs.	$/acre/period
E805	Roundwood Preparation, Administration.	MBF/acre/period
E806	Green PJ Fuelwood Cost Preparation, Administration	MBF/acre/period
E807	Other Fuelwood Costs Preparation, Administration.	MBF/acre/period
F201	Soil, Water, Air Operations and Maintenance.	$/acre/year
F301	Soil, Water, Air Projects.	$/acre/year
G101	Minerals Management.	$/acre/year
J201	Land Management Planning Program Cost.	$/acre/period
J301	Land Ownership Program.	$/acre/period
L201	Road Maintenance.	$/acre/period
L202	Other Facility Maintenance.	$/acre/period
L301	Road Construction/Reconstruction.	$/acre/period
L302	Other Facility Construction/Reconstruction.	$/acre/period
P201	Forest Fire Protection.	$/acre/year
P301	Fuel Treatment. (Residual)	$/acre/year
T101	General Administration.	$/acre/period
FFFF	Fight Forest Fires.	$/acre/year

ECONOMIC EFFICIENCY

Efficiency is the relationship between the quantity of an input and the amount of resulting outputs. One of the primary measures of economic efficiency is present net value.

Present Net Value (PNV) is defined as the discounted difference between the dollar value of all priced outputs and the dollar value of all expenditures for management and investment. The greater the PNV, the greater the net economic return. 1982 was used as the base year and four percent was used as the discount rate in determining the PNV.

Economic efficiency is one of the driving forces in planning. As a result, all alternatives had the maximization of PNV as the final objective. This objective alone would have the effect of maximizing the economic return from the Forest. There are, however, desired benefits that cannot be converted to monetary returns. These are called non-priced benefits and include things like threatened and endangered species habitat maintenance, reduction in soil loss, natural and scientific areas, historical or anthropological sites, visual quality, diversity, and recreation quality. These non-priced benefits were included in the model as constraints and as coefficients that reflected the costs of managing for these benefits. Non-priced benefits, together with the sum of PNV, yield net public benefit, which is a more inclusive measure of total social welfare.

ANALYSIS PRIOR TO FORMULATION OF ALTERNATIVES

This section of the appendix, describes the benchmark analysis that was conducted prior to the formulation of alternatives. Other analysis conducted before alternatives were formulated related to the development of prescriptions and coefficients. These were discussed in the sections of this appendix titled "Prescriptions" and "Coefficients".

INTRODUCTION

Table 159 displays the supply, projected future use assumptions used to calculate future use:

Table 159. Supply and Projected Future Use.

		Average Annual					
		Proposed Plan		Potential Supply		Projected Future Use	
Resource Output	Unit of Measure	Period 1	Period 5	Period 1	Period 5	Period 1	Period 5
Sawtimber Sales	MBF	99,000	139,928	173,483	155,088	163,000	163,000
Wood Products (Roundwood)	MBF	20,356	25,000	20,356	25,000	20,356	25,000

Table 159. Supply and Projected Future Use. (Continued)

Resource Output	Unit of Measure	Average Annual Proposed Plan Period 1	Proposed Plan Period 5	Potential Supply Period 1	Potential Supply Period 5	Projected Future Use Period 1	Projected Future Use Period 5
Fuelwood	MBF	15,780	15,489	21,091	20,713	25,000	110,000
Grazing Capacity	MAUM	204	200	213	249	213	249
Permitted Livestock Use	MAUM	204	200	213	249	213	249
Wilderness Recreation (excluding wildlife)	MRVD	19	32	35	75	35	75
Developed Recreation (including skiing)	MRVD	1,035	2,293	1,035	2,293	1,035	2,293
Dispersed Recreation [Excludes Highway Use]	MRVD	714	1,553	900	2,700	891	1,850
Water Yield	MACF	379	381	379	385	379	385

Supply represents the amount of a good or service which could be supplied if that output were emphasized at the expense of other goods or services. Some of the Proposed Plan outputs are produced at levels well below their potential supply. One example of this is sawtimber, which is a little over one-half of the potential supply in the first period. Roundwood product outputs in the plan are the same as potential supply for all 5 periods and meet the projected future use in period 1. For period 5, however, supply is less than one-half of projected use. Fuelwood in the plan will be supplemented with outputs from logging slash and other residual material from various activities, but will never satisfy demand.

Grazing capacity and use in the plan are only slightly below potential supply and projected future use for period 1, and fall to about 80 percent by period 5.

Wilderness recreation outputs in the proposed plan for period 1 is a little over one-half of the projected supply and future use and less than one-half by period 5.

Most of the difference is explained by the amount of use in the Mt. Baldy Wilderness Area being limited to standard service level capacity in the plan.

Developed recreation output remains in line with supply and projected use through period 5. Dispersed recreation is below both supply and projected use throughout the planning horizon. However, the actual demand for dispersed recreation will probably be met because of the higher amount available developed recreation opportunities.

Water yield is equal to potential supply and projected future use for period 1 and about 99 percent in period 5.

BENCHMARK ANALYSIS

Prior to alternative development, analyses were conducted to define the range within which integrated alternatives could be constructed. Benchmark analysis sets the threshold of feasibility for the alternative development decision space. An Analysis of the Management Situation was completed to determine the ability of the planning areas to supply goods and services (36 CFR 219.5 [a]). The purpose of the analysis was to evaluate all potentials for multiple uses in formulating a reasonable range of alternatives. Twelve benchmarks representing a broad range of feasible options were generated through the FORPLAN model to identify opportunities for resolution of issues, concerns, and opportunities and to delineate the limits of the decision space, given physical, biological, and legal criteria, in which feasible alternatives for resource mixes could be considered.

Maximum benchmarks analysis falls into two categories. First, the monetary benchmarks projected maximum present net value of those resources having an established market value or an assigned value. Second, the biological and physical benchmarks maximized various resource outputs.

The objectives of these analyses were to:

1. Explore the maximum economic and biological use, and development opportunities of individual resources.

2. Evaluate capabilities between priced and non-priced resource outputs and effects.

3. Determine the ability of the Forest to respond to major issues and concerns.

In addition to meeting the objectives, the benchmarks analysis will:

1. Comply with the minimum legal management requirements of 36 CFR 219.27.

2. Estimate the schedules of management activities, resource outputs, effects, discounted benefits and costs, PNV, and acreage of prescription assignments appropriate to achieving the purposes of the benchmark.

3. Be approximately implementable.

4. Will not be constrained by budget, except for the Low Budget and Current direction benchmarks.

5. Use a Maximum PNV objective function to obtain a final analytical solution when FORPLAN is used.

Each FORPLAN benchmark consists of one or more objective functions and a set of constraints. Prior to describing the benchmarks in detail, the objective functions and constraints used in this analysis must be clearly defined. The objective functions used are defined in Table 158 which follows. Constraint definitions are contained in three separate tables: Table 160 defines the timber legal and policy constraints that are used in both benchmarks and alternatives. The standards and guidelines for most of the minimum management requirements are incorporated into the activity and output coefficients described earlier in this appendix; an exception to this rule is the minimum management requirement for the minimum number of acres that need to be included in old growth prescriptions on tentatively suitable timber lands; these old growth requirements are defined in Table 161. Floor and ceiling constraints on the level of timber harvest permitted are defined in Table 160. Finally, budget constraints and prescription controls are defined in Table 161. The definition of each objective function and constraint contains a three or four character code which is used as an abbreviation in the discussion of the benchmark analyses which follows these tables.

Table 160. Objective Functions Used in Benchmarks and Alternatives	
Code	Definition and Discussion
PVA =	Indicates that both assigned and market benefit values are used to determine present net value.
PVM =	Indicates that only market benefit values are used to determine present net value.
TIM =	This is the net merchantable timber volume harvested in the first decade.
RAN =	This is the sum of the grazing capacity over the planning horizon.
YLD =	This is the sum of the water yield over the planning horizon.

Note to the reader: The PVA objective function is the only objective function that is used in most of the benchmark and alternative computer runs. Whenever another objective function was used the results were "rolled over." This means that the value of the first objective function that was attained in the solution to the FORPLAN run was constrained to be equal to that amount in a subsequent run which maximized PVA.

Table 161. Timber Legal and Policy Constraints Used in Benchmarks and Alternatives.	
Code	Definition and Discussion
EI =	This is known as the Ending Inventory constraint. It specifies that the Forest inventory at the end of the planning horizon must be greater than or equal to the average inventory of the regenerated stands. The idea behind this legal requirement (36 CFR 219.16 [a][2][iv]) is to have enough inventory to maintain a perpetual timber harvest. Since this constraint must appear in all benchmarks and alternatives it will not be mentioned again in the text.
NDY =	This policy constraint is known as the Nondeclining Yield Constraint (36 CFR 219.16 [a][1]). This specifies that the timber sale quantity planned in each decade must be greater than or equal to the quantity planned in the preceding decade. LTSYC (Long Term Sustained Yield Capacity) is defined (36 CFR 219.3) as "the highest uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity consistent with a multiple use objective."

Table 161. Timber Legal and Policy Constraints Used in Benchmarks and Alternatives. (Continued)

Code	Definition and Discussion
	NDY is linked to LTSYC through a constraint that specifies that the timber harvest in the last decade is less than or equal to LTSYC.
SLUB =	The purpose of sequential lower and upper bounds is to control the rate of timber harvest increase and decrease (from one decade to the next) when the NDY constraint is not enforced. Because benchmarks must be approximately implementable a SLUB of plus or minus 20% was used in this analysis.
CMAI =	The culmination of mean annual increment policy (36 CFR 219.16) states that, "...in accordance with the established standards, assure that all even-aged stands scheduled to be harvested during the planning period will generally have reached culmination of mean annual increment of growth." This means that the total yield from each regenerated stand at harvest age is equal to or greater than 95% of the volume corresponding to CMAI.

Note to the reader: All of the constraints defined in this table are based on the net merchantable timber volume harvested in cubic feet.

Table 162. Timber Floor and Ceiling Constraints Used in Benchmarks.

Code	Definition and Discussion	DECADE	FLOOR	CEILING (MMBF)
F/C1	V51, Sawtimber	1	89	90
	V52, Products	1	14	16
F/C2	V51, Sawtimber	1-20	70	153
	V52, Products	1	15	250
	V52, Products	2	8	250
	V53, Products	3-20	15	250
	V51C,Sawtimber 9"-12"	2	7	250
F/C3	V51, Sawtimber	1-20	70	153
	V52, Products	1	15	250
	V52, Products	2	8	250
	V52, Products	3-20	15	250

Note to the reader: In general, floor and ceiling constraints were used to establish a lower limit below which timber harvest could not fall, and specify an upper limit above which timber harvest could not exceed based on mill capacities within the Forest's zone of influence. One exception to this rule is for the Current Benchmark in which case the current Timber Management Plan was used to specify the permissible harvest levels for the first decade.

Table 163. Minimum Management Requirements, Budget Constraints, and Prescription Controls.

Code	Definition and Discussion	
MMR =	Indicates MMR constraints for wildlife. These specified the minimum number of acres that must be included in old growth prescriptions. The acres used are:	
	Escudilla-Terry Flat	207 acres
	Escudilla-Scenic Backdrop	403
	Escudilla-Alpine Watershed	236
	On less than 40% slope land:	
	Ponderosa Pine, seedlings & saplings	23,623
	Ponderosa Pine, poles	21,264
	Ponderosa Pine, sawtimber	12,147
	Mixed Conifer, seedlings & saplings	1,364
	Mixed Conifer, poles	3,638
	Spruce/Fir, sawtimber	617
	Aspen, sawtimber	454
BUD =	The budget constraint was only used for two of the benchmark runs. The Current Benchmark used $12,462,000 as an upper limit in the first two decades. The Low Budget Benchmark used $9,346,000 (i.e., 75% of Current) as the upper limit in the first five decades.	
RXC =	Prescription controls may be used to specify either that certain prescriptions will be used for a particular run, or that certain prescriptions will be excluded from consideration in a given run. This constraint was used in two benchmark runs. The Current Benchmark was constrained to only use Current Prescriptions in the solution. In the Low Budget Benchmark, analysis areas with slopes greater than 40% slope were not allowed to harvest timber by specifying "no harvest prescriptions."	

The definition of each benchmark analyzed by the Forest follows:

1. Minimum Level: The Minimum Level defines the least cost program for keeping the Forest in Public ownership. It provides for protection of soil and water resources and productivity of the land. This benchmark also provides for the protection of life, health, and safety of the users of the Forest. The prevention of environmental damage to adjoining lands or downstream areas, and the administration of established special uses and minerals also is assured. The minimum level benchmark was determined outside of FORPLAN. The purpose was to identify naturally-occurring outputs that are produced without direct management actions and associated costs. The outputs of water, minerals, dispersed and wildlife related recreation use, and soil loss that were estimated, as well as the resulting costs are illustrated in Chapter 2 in the comparison of alternatives.

2. Basic Model Validation Run. The purpose of this run is to debug the model. This is identical to Run 5.
   Objective Function: PVA.
   Constraints: NDY, CMAI, EI, MMR

3. Low Budget Benchmark. This benchmark is used to define the lower end of the feasible and legal decision space; it represents the lowest intensity of management which realistically can be implemented.
   Objective Function: PVA.
   Constraints: NDY, CMAI, EI, MMR, F/C3, BUD, RXC.

4. Current Benchmark. This is the "no action" alternative. It is used to evaluate the consequences of continuing the current program with current standards and guidelines.
   Objective Function: PVA.
   Constraints: NDY, CMAI, EI, MMR, F/C1, BUD, RXC.

5. Maximize PNV with Assigned Values. This is a monetary benchmark. The PNV produced in this run is used as the reference point in Chapter 2 to evaluate the impact on PNV resulting from constraints in other runs. This run represents the most cost efficient method of managing the Forest when all priced outputs (market and nonmarket) are included in the objective function.
   Objective Function: PVA.
   Constraints: NDY, CMAI, EI, MMR.

6. Maximize PNV with Market Values. This is another monetary benchmark. It represents the most cost efficient method of managing the Forest based on resources having established market values since only market outputs are assigned benefit values in the objective function.

Objective Function: PVM.

Constraints: NDY, CMAI, EI, MMR.

7. Maximize Grazing Benchmark. This run maximizes grazing capacity over the entire planning horizon.

Objective Function: RAN with automatic PNV rollover (using PVA).

Constraints: SLUB, CMAI, EI, MMR, F/C2.

8. Maximize Water Yield Benchmark. This run maximizes water yield over the entire planning horizon.

Objective Function: YLD with automatic PNV rollover (using PVA).

Constraints: SLUB, CMAI, EI, MMR, F/C2.

9. Maximize Period 1 Timber Production Benchmark. This run maximizes timber production in decade 1.

Objective Function: TIM with automatic PNV rollover (using PVA).

Constraints: NDY, CMAI, EI.

10. NDY: Evaluation of the NDY Constraint Benchmark. This run can be compared with the fifth benchmark in order to evaluate the opportunity cost of the NDY constraint.

Objective Function: PVA.

Constraints: SLUB, CMAI, EI, MMR.

11. NDY-CMAI: Evaluation of the NDY and CMAI Constraints. This run can be used for two kinds of comparisons.

a. This run can be compared with the following run, Run 12 in order to evaluate the opportunity cost of the NDY constraint.

b. This run can be compared with Run 5 in order to evaluate the opportunity cost of the CMAI.

Objective Function: PVA.

Constraints: NDY, EI, MMR.

12. MMR-CMAI: Evaluation of CMAI. This run can be used for two kinds of evaluations:

a. This run can be compared with the preceding run, Run 11 in order to evaluate the opportunity cost of the NDY constraint.

b. This run can be compared with Run 10 in order to evaluate the opportunity cost of the CMAI.

Objective Function: PVA.

Constraints: SLUB, F/C2, EI, MMR.

The outputs by time period for all benchmark analyses other than the Minimum Level Benchmark (displayed in Chapter 2) and the basic model validation run are shown in the following tables.

Table 163 displays the average annual outputs by benchmark.

Table 164 displays the total discounted benefits, total discounted costs and the present net value for each benchmark run.

Table 165 displays the acres allocated to each prescription level for each benchmark run.

Table 164. Average Annual Output By Benchmark

Output: Total Net Merchantable Timber Volume (MCF/Year)

	Period				
Benchmark	1	2	3	4	5
Low Budget	10538	10538	10538	10538	10538
Current	17475	24790	31262	31262	31262
Max Assigned Value	34502	34502	34502	34502	34502
Max Market Value	33332	33332	33332	33332	33332
Max Grazing	32892	32524	33325	34430	27544
Max Water Yield	32562	32527	33690	33960	27168
Max Timber	35705	35705	35705	35705	35705
NDY	32305	32527	32362	33847	27078
NDY-CMAI	36330	36330	36330	36330	36330
MMR-CMAI	32169	32527	32494	34046	35148

Output: Net Sawtimber (MBF/Year)

	Period				
Benchmark	1	2	3	4	5
Low Budget	55080	53913	52132	42981	25482
Current	88415	129898	150440	127736	113065
Max Assigned Value	178400	170164	169859	150744	125382
Max Market Value	172768	173013	163769	144939	123892
Max Grazing	153000	153000	153000	151712	112842
Max Timber	173483	172885	172383	149728	155088
NDY	153000	153000	153000	153000	112291
NDY-CMAI	187120	176942	181450	168618	138232
MMR-CMAI	153000	153000	153000	153000	153000

Table 164. Average Annual Output By Benchmark (Continued)

Output: Total Net Products (MBF/Year)

Benchmark	Period 1	2	3	4	5
Low Budget	112	352	3269	13518	34136
Current	1585	213	13222	36081	49182
Max Assigned Value	1331	4513	10250	26299	51290
Max Market Value	1155	1074	10899	29091	49134
Max Grazing	15200	8000	19295	25000	25000
Max Water Yield	15000	8000	25000	25000	25000
Max Timber	12783	5952	8687	37621	21024
NDY	15000	8000	15000	25000	25000
NDY-CMAI	1459	5644	8017	15558	46936
MMR-CMAI	15000	8000	15000	25000	25000

Output: Long-term Sustained Yield (MCF/Year)
(LSTY) is calculated at the end of the planning period)

Low Budget	34392
Current	35986
Max Assigned Val.	39396
Max Market Val.	39246
Max Grazing	36267
Max Water Yield	33847
Max Timber	39521
NDY	38469
NDY-CMAI	38824
MMR-CMAI	37948

Output All Fuelwood (MBF/Year)

Benchmark	Period 1	2	3	4	5
Low Budget	6197	6065	5865	4835	2867
Current	13572	18239	20550	17995	16345
Max Assigned Value	22020	23713	23679	20549	16472
Max Market Value	18893	23089	22049	19327	16094
Max Grazing	20323	22051	22750	15612	18671
Max Water Yield	21016	21782	21419	19743	12233
Max Timber	21191	24019	23466	19246	20712
NDY	18290	21782	21419	21216	14119
NDY-CMAI	21452	24476	24983	22560	18422
MMR-CMAI	17545	21782	21419	21313	21782

Table 164. Average Annual Output By Benchmark (Continued)

Output: Developed Recreation (MRVD/YR)

Benchmark	Period 1	2	3	4	5
Low Budget	1035	1364	1686	1988	2293
Current	773	892	1060	1132	1191
Max Assigned Value	1035	1364	1686	1988	2293
Max Market Value	1035	1364	1686	1988	2293
Max Grazing	1035	1364	1686	1988	2293
Max Water Yield	1035	1364	1686	1988	2293
Max Timber	1035	1364	1686	1988	2293
NDY	1035	1364	1686	1988	2293
NDY-CMAI	1035	1364	1686	1988	2293
MMR-CMAI	1035	1364	1686	1988	2293

Output: Wilderness Recreation (MRVD/YR)

Benchmark	Period 1	2	3	4	5
Low Budget	35.5	44.3	55.4	66.5	75.4
Current	35.5	44.3	55.4	66.5	75.4
Max Assigned Value	35.5	44.3	55.4	66.5	75.4
Max Market Value	35.5	44.3	55.4	66.5	75.4
Max Grazing	35.5	44.3	55.4	66.5	75.4
Max Water Yield	35.5	44.3	55.4	66.5	75.4
Max Timber	35.5	44.3	55.4	66.5	75.4
NDY	35.5	44.3	55.4	66.5	75.4
NDY-CMAI	35.5	44.3	55.4	66.5	75.4
MMR-CMAI	35.5	44.3	55.4	66.5	75.4

Output: Dispersed Recreation (MRVD/YR) (Does not include Highway RVD's)

Benchmark	Period 1	2	3	4	5
Low Budget	761	987	1175	1361	1361
Current	463	1208	1512	1845	1845
Max Assigned Value	757	982	1228	1467	1708
Max Market Value	868	1201	1450	1734	1737
Max Grazing	823	1089	1385	1543	1675
Max Water Yield	741	959	1193	1419	1639
Max Timber	765	997	1249	1497	1740
NDY	763	993	1243	1489	1734
NDY-CMAI	763	993	1243	1488	1731
MMR-CMAI	764	993	1243	1490	1739

Table 164. Average Annual Output By Benchmark (Continued)

Output: Wildlife Recreation (MWFUD/YR)

Benchmark	Period 1	2	3	4	5
Benchmark	948	927	906	885	865
Low Budget	953	920	887	854	821
Max Assigned Value	987	975	963	951	941
Max Market Value	953	927	901	875	849
Max Grazing	947	930	913	896	880
Max Water Yield	942	922	902	882	861
Max Timber	993	977	961	948	928
NDY	947	924	901	878	856
NDY-CMAI	902	889	876	863	849
MMR-CMAI	944	924	904	884	864

Output Permitted Use (MAUM/Yr.)

Benchmark	Period 1	2	3	4	5
Low Budget	219	205	194	180	177
Current	221	206	193	192	191
Max Assigned Value	219	202	198	191	190
Max Market Value	219	203	192	179	176
Max Grazing	224	217	225	241	248
Max Water Yield	219	203	199	192	191
Max Timber	219	202	198	191	190
NDY	219	203	198	192	190
NDY-CMAI	219	202	197	191	190
MMR-CMAI	219	203	198	191	190

Output Grazing Capacity

Benchmark	Period 1	2	3	4	5
Low Budget	203	193	188	180	177
Current	204	196	193	192	191
Max Assigned Value	204	196	195	191	190
Max Market Value	203	191	187	179	176
Max Grazing	211	217	226	241	248
Max Water Yield	204	196	196	192	191
Max Timber	204	195	195	191	190
NDY	204	196	195	192	190
NDY-CMAI	204	195	194	191	190
MMR-CMAI	204	196	195	191	190

Table 164. Average Annual Output By Benchmark [Continued]

Output: Water Yield [Ac.Ft./Yr.]*

Benchmark	Period 1	2	3	4	5
Low Budget	3789644	3744713	3745056	3727868	3711250
Current	3790000	3774598	3787705	3731599	3742046
Max Assigned Value	3789644	3862074	3892982	3798215	3793297
Max Market Value	3789644	3848326	3843846	3768509	3758311
Max Grazing	3789644	3870971	3883369	3851576	3864293
Max Water Yield	3789644	3845956	3934845	3959263	3927465
Max Timber	3789644	3835924	3892791	3821947	3785373
NDY	3789644	3855397	3900988	3837090	3823779
NDY-CMAI	3789644	3843142	3898116	3838873	3842323
MMR-CMAI	3789644	3837639	3895508	3849520	3842319

*These computations were done outside the FORPLAN Model by the Soil & Water Staff.

Table 165. Comparison of Cumulative Economic Benefits, Present Net Value of Benchmarks to Max PNV Assigned Value Benchmark.

Benchmarks	Present Net Value	Percent Change in PNV from Max PNV Assigned	Order
Max PNV Assigned Value	1701	0	2
Max PNV Market	884	-49	10
Max Timber Period 1	1687	-1	3
Max Grazing	1474	-13	8
Max Water Yield	1628	-4	6
Low Budget	1488	-13	7
Current (SLUB)	1302	-23	9
Evaluate NDY	1649	-3	5
Evaluate MMR-CMAI	1662	-2	4
Evaluate NDY-CMAI	1719	+1	

Table 166. Acres by Management Intensity By Benchmark [M/ACRES]

Intensity Level		BA	BB	BC	BD	BE	BF	BG	BH	BI
TIMBER	NH	1190	1190	1190	1189	1239	1190	1174	1195	1190
	TL	5	5	5	14	343	5	5	9	7
	TN	84	160	190	70	46	405	314	177	120
	TC	724	648	618	730	375	403	510	622	686
WILDLIFE	A1	227	223	223	1209	1471	551	223	233	223
	A2	97	41	67	774	8	73	34	61	34
	A3	784	915	790	0	154	1284	768	820	917
	A4	124	115	105	0	215	34	111	138	64
	A5	577	620	585	16	33	12	549	575	583
	A6	194	89	233	4	122	49	318	176	182

Table 166. Acres by Management Intensity By Benchmark (M/ACRES) Continued

Intensity Level		BA	BB	BC	BD	BE	BF	BG	BH	BI
RANGE	RA	0	0	0	0	0	0	0	0	0
	RB	1021	932	376	1268	645	85	1075	990	976
	RC	351	393	283	727	1287	99	97	294	387
	RD	589	644	699	0	71	502	788	674	597
	RE	42	43	45	8	0	1317	43	45	43
RECREATION	GL	231	223	223	1201	1143	221	223	1201	225
	GE	0	0	0	8	0	350	0	8	34
	GC	90	41	67	774	8	75	34	774	0
	GH	254	215	229	0	192	75	130	0	259
	GM	1428	1524	1484	20	660	1282	1616	20	1485

*Where:

BA = Max Timber Period & Rollover
BB = Max PNV Assigned Values
BC = Evaluation of Non-Declining Yield
BD = Max PNV Market Value
BE = Low Budget
BF = Max Grazing Capacity
BG = Max Water Yield
BH = Evaluation of MMR & CMAI
BI = Evaluation of NDY & CMAI

Timber Intensities:

NH = No Harvest
TL = Low Intensity - No precommercial thinning, only regeneration cuts.
TN = Moderate Level - No precommercial thinning; 2 or more intermediate cuts; regeneration cuts.
TC = Current Level - Precommercial thinning plus one or more intermediate cuts and regeneration cuts.

A1 = Minimum Intensity
A2 = Low Intensity
A3 = Moderately Low Intensity
A4 = Moderately High Intensity
A5 = High Intensity
A6 = Maximum Intensity

RA = No Grazing
RB = Low Intensity
RC = Moderate Intensity
RD = Moderate High Intens.
RE = Maximum Intensity

GL = Minimum Intensity
GE = Low Current Intensity
GC = Current Intensity
GH = High Current Intensity
GM = Maximum Intensity

The section on Coefficients explained the difference between market and assigned values for priced outputs. Two benchmarks were developed to examine the significant effects, if any, that market versus assigned values have on output levels. The Max PNV Assigned Benchmark has all priced outputs with market and assigned values available in the objective function of the model. The Max PNV Market Benchmark has only market value outputs in the objective function. Table 164 displays a comparison of the two benchmarks.

It was expected that the PNV of the Max PNV Assigned Benchmark would be larger than the Max PNV Market Benchmark. The results of the solutions show this to be the case. It was also expected that the market value outputs would occur at higher levels in the Max PNV Market Benchmark. This expection comes from the assumption that achieving significant levels of assigned value outputs can only occur by trading off significant amounts of market value outputs. This assumption was not true. The reason for this is that each prescription in the model produced both market and nonmarket outputs and contained the costs of producing both market and nonmarket outputs. The assigned value benchmark contained benefit values for all outputs; this gave prescriptions which produced market outputs a higher value so market outputs were produced at a higher level. In the market value benchmark, the costs of both market and nonmarket outputs were accounted for but only the benefits of the market outputs was considered. Therefore, the output levels of the market outputs were reduced because the market outputs had to bear the cost but not the benefits) of the nonmarket outputs. Therefore, the Max PNV Assigned value benchmark often produces levels of market value outputs higher than occur in the Max PNV Market value benchmark. This result is due to the compatibility of high levels of market and non-market outputs.

Table 167. Comparison of Average Annual Outputs Having Market and Assigned Values for the Max PNV Market and Max PNV Assigned Benchmarks

	Period 1	Period 5
Net Sawtimber (MBF)		
Max PNV Assigned	178400	125382
Max PNV Market	172766	123891
Percent Change	-3	-1
Net Products (MBF)		
Max PNV Assigned	1331	51290
Max PNV Market	1155	49134
Percent Change	-13	-4
Fuelwood (MBF)		
Max PNV Assigned	22020	16472
Max PNV Market	18893	16094
Percent Change	-14	-2

Table 167. (Con't.) Comparison of Average Annual Outputs Having Market and Assigned Values for the Max PNV Market and Max PNV Assigned Benchmarks

	Period 1	Period 5
Developed Rec (MRVD)		
Max PNV Assigned	1035	2293
Max PNV Market	1035	2293
Percent Change	0	0
Permitted Use (AUM)		
Max PNV Assigned	219510	190537
Max PNV Market	219389	176307
Percent Change	-1	-1
Dispersed Rec (MRVD)		
Max PNV Assigned	757	1708
Max PNV Market	868	1737
Percent Change	+15	+2
Wilderness Rec (MRVD)		
Max PNV Assigned	35	75
Max PNV Market	35	75
Percent Change	0	0
Water Yield (AC. FT.)		
Max PNV Assigned	3789644	3793297
Max PNV Market	3789644	3758311
Percent Change	0	-1
Wildlife (MRVD)		
Max PNV Assigned	9878	9406
Max PNV Market	9535	8491
Percent Change	-3	-10

FORMULATION OF ALTERNATIVES

An alternative is a feasible management strategy that attempts to satisfy management goals. Different alternatives are generated by varying the type or emphasis of goals. Each alternative represents a different set of objectives, outputs, or constraints which respond to different viewpoints to satisfy identified public issues and management concerns, and take advantage of resource management opportunities.

The stages of the planning process preceding the formulation of alternatives include: Identification of ICO's, development of criteria, data inventory and collection, and analyzing, supply projected future use and production capabilities-- the analysis of the management situation (AMS).

The AMS analysis explored a "reasonable range" of production possibilities within the parameters of supply, expected future use, and production capabilities.

The benchmark analysis provided the decision space within which integrated alternatives were formulated. An integrated alternative is one in which individual resource objectives are compatible with the minimum legal and resource integration requirements of 36 CFR 219.13 through 215.27.

The formulation of alternatives step examines a set of alternatives that reflect the complementary and competitive relationships among the goods, services, and uses produced by the Forests.

The National Forest Management Act (NFMA) implementing regulations (36 CFR 219.12 [f]) specify guidelines and criteria which determine the reasonable range of alternatives. These are:

> Alternatives shall be distributed between the minimum resource potential and the maximum resource potential to reflect, to the extent practicable, the full range of major commodity and environmental resource uses and values that could be produced from the Forest. Alternatives shall reflect a range of resource outputs and expenditure levels.
>
> Alternatives shall be formulated to facilitate analysis of opportunity costs and the resource use and environmental tradeoffs among alternatives and between benchmarks and alternatives.
>
> Alternatives shall be formulated to facilitate evaluation of the effects on present net value, benefits, and costs of achieving various outputs and values that are not assigned monetary values, but that are provided at specified levels.
>
> Alternatives shall provide different ways to address and respond to the major public issues, management concerns, and resource opportunities identified during the planning process.

Reasonable alternatives which may require a change in existing law or policy to implement shall be formulated, if necessary, to address a major public issue, management concern, or resource opportunity identified during the planning process (40 CFR 1501.7, 1502.14[c]).

At least one alternative shall be developed which responds to and incorporates the RPA Program tentative resource objectives for each forest displayed in the regional guide.

At least one alternative shall reflect the current level of goods and services provided by the unit and the most likely amount of goods and services expected to be provided in the future if current management direction continues. Pursuant to NEPA procedures, this alternative shall be deemed the "No Action" alternative.

Each alternative shall represent, to the extent practicable, the most cost efficient combination of management prescriptions examined that can meet the objectives established in the alternative.

Each alternative shall state at least: the condition and uses that will result from long-term application of the alternative; the goods and services to be produced; the timing and flow of these resource outputs together with associated costs and benefits; resource management standards and guidelines; and the purposes of the management direction proposed.

The Chief's policy letter of December 4, 1981, and FSM 1920.85--1 through 85--3 provide direction for formulating the following types of alternatives in addition to those specified in the MFMA regulations:

1. An alternative that emphasizes market opportunities.

   Emphasis for the alternative is on timber, range, minerals, and other outputs that have the potential to produce income to the Government. Management for other resources will be at economically and environmentally feasible levels consistent with the emphasis on market-oriented outputs.

2. An alternative that emphasizes non-market opportunities.

The emphasis is on water, fish and wildlife, recreation, and other amenity values. Management for other resources will be at economically and environmentally feasible levels consistent with the emphasis on amenity values.

Alternative Feasibility

Specific requirements to be addressed in the alternative formulation process are presented in FSM 1920.85 through 85--2, ID No. 6. Forest Service Manual 1920.85, R-3 ID No. 6 specifies the range of reasonable alternatives which should be within the limits established by:

1. Technical feasibility - the inherent capability of the land and resource as modified by varying levels of management and within the limits of existing or anticipated technology.

2. Economic and financial feasibility-the amount of funds expected to be available to conduct proposed and probable activities.

3. Legal feasibility-within the limits established by law, regulation, executive order, or service-wide or regional policy.

Alternative Formulation Process

A single FORPLAN solution that meets all objectives of the alternative and can be implemented administratively is very unlikely. The Max PVN Assigned Benchmark was used as the starting point for developing the market emphasis, non-market emphasis, and proposed action alternatives. The current (no action), low budget, and RPA alternatives were developed according to direction from the R-3 Regional Office.

The first step in the process of alternative formulation was to identify the management goals for the alternative and develop a list of tentative objectives (constraints) for achieving the goals.

An initial attempt was made to develop the objectives for the alternatives required by NFMA Regulations and the Chief's 1981 policy letter to provide separate alternatives which emphasize: RPA objectives, market opportunities, and non-market opportunities. Because the Current Benchmark is the "No Action" alternative required by NEPA and NFMA, no adjustments were made in the benchmark solution to address issues. Also, the Low Budget Benchmark is used "as is" for the Low Budget Alternative.

Constraints reflect output, funding levels, or management practices considered necessary by the Forest ID Team to achieve the goals and objectives of an alternative, and to ensure that the alternative is administratively feasible.

Description of Alternatives

Alternatives considered in detail in the EIS are described below. It must be noted that the outputs and effects resulting from the alternatives must fall within the benchmark decision space. The following assumptions are common to all alternatives:

Meet the legal minimum management requirements as specified in 36 CFR 219.27.

All alternatives provide for protection and study of the following potential Research Natural Areas: 1) North Fork Thomas Creek is 500 acres and features spruce/fir as a major ecosystem; 2) Escudilla Mountain is 909 acres featuring Arizona fescue and mountain muhley ecosystems; 3) Hayground Creek is 316 acres featuring blue spruce as a major ecosystem, and; 4) Wildcat Canyon is 513 acres featuring pinyon and juniper.

All Alternatives provide for continuation of the existing electronic sites and power corridors.

The Blue Range Primitive Area is managed to protect its wilderness qualities.

All alternatives provide for expansion of communities surrounded by National Forest System Lands.

In all alternatives, the General Crook Trail wich crosses the Chevelon, Heber, and Lakeside Ranger Districts is proposed for designation as a National Historic Trail (see Appendix D, Coconino N.F. DEIS).

All alternatives provide for the acquisition of 16.5 miles of rights-of-way.

The base-for-land exchange of 12,060 acres is identified along with 27,576 acres identified as desirable private lands.

In addition to the assumptions listed above the following harvest constraints were common to all alternatives to comply with legal requirements of 36 CFR 291.16[a][1], [a][2][iii] and [a][2][iv]: non-declining yield (NDY), the link between non-declining yield and long-term sustained yield capacity (NDY LTSYC), harvest of even-aged stands at or beyond culmination of mean annual increment (CMAI); and perpetual timber harvest or ending inventory (EI).

The alternatives are described in this section in the same order as in the main body of the DEIS. Constraints common to most alternatives that have been defined in the benchmarks discussion will be identified using abbreviations in order to make the discussion as concise as possible.

PA--THE PROPOSED ACTION ALTERNATIVE:

Objective Function: PVA.

Commonly Used Constraints:

Description: NDY, CMAI, EI, MMR, F/C1.

Discussion: These were needed to meet legal and policy requirements.

Budget Constraint:

Description:

Decade	Annual $
1	11,435,000
2-5	14,571,000

Discussion: Regional Office direction established the maximum budget that realistically could be expected for the Proposed Action Alternative.

Wilderness RVD'S:

Description: All RVD's in the Mt. Baldy Wilderness Area should be managed at a standard level.

Discussion: This is due to the high level of use in the area.

Old Growth:

Description: A minimum requirement for each old growth acreage constraint was set at twice the MMR level which was used in the benchmarks and all of the other alternatives.

Discussion: This was done to assure that the habitat available for species that are dependent on old growth would be well above the MMR level.

Permitted Use:

Description: Permitted AUM's were constrained to be greater than or equal to 200,000 per year throughout the planning horizon.

Discussion: In order to reduce the range issue, the Forest wanted to balance use and capacity in the first decade. From an implementation point of view this could most easily be accomplished by keeping use and capacity at a high level.

A--THE REDUCED BUDGET ALTERNATIVE:

Discussion: This is the Low Budget Benchmark (Benchmark Run 3) described in the discussion of the benchmarks.

B--THE MARKET EMPHASIS ALTERNATIVE:

Objective Function: PVA.

Commonly Used Constraints:

Description: NDY, CMAI, EI, MMR.

Discussion: These were needed to meet legal and policy requirements.

Budget Constraint:

Description:

Decade	Annual $
1	11,942,000

Discussion: Regional Office direction established the maximum budget that realistically could be expected for the Market Emphasis Alternative.

Non-Market Outputs:

Description: Non-market outputs (total dispersed recreation RVD'S and water yield) were constrained to be less than or equal to an upper limit. The upper limit was equal to the sum of two numbers, 1) the minimum value achieved in the benchmark analysis; and 2) 75% of the difference between the minimum and maximum benchmark values.

Discussion: This was done to assure that the model would emphasize market outputs.

C--THE NON-MARKET EMPHASIS ALTERNATIVE:

Objective Function: PVA.

Commonly Used Constraints:

Description: NDY, CMAI, EI, MMR.

Discussion: These were needed to meet legal and policy requirements.

Budget Constraint:

Description:

Decade	Annual $
1	11,942,000

Discussion: Regional Office direction established the maximum budget that realistically could be expected for the Non-Market Emphasis Alternative.

Non-Market Outputs:

Description: Market outputs (total developed recreation RVD'S, permitted use AUM's and total timber MBF) were constrained to be less than or equal to an upper limit. The upper limit was equal to the sum of two numbers, 1) the minimum value achieved in the benchmark analysis; and 2) 75% of the difference between the minimum and maximum benchmark values.

Discussion: This was done to assure that the model would emphasize non-market outputs.

D--THE RPA ALTERNATIVE:

Objective Function: Minimize Forest Service budget costs on the first run; then do a Maximize PNV rollover run.

Commonly Used Constraints:

Description: NDY, CMAI, EI, MMR.

Discussion: These were needed to meet legal and policy requirements.

Budget Constraint:

Description:

Decade	Annual $
1	11,942,000

Discussion: Regional Office direction established the maximum budget that realistically could be expected for the RPA Alternative.

Output Constraints:

Description: In the Regional Guide, the Forest was assigned RPA production targets for each one of the following outputs: dispersed recreation, developed recreation, permitted grazing use, total MBF, and total water yield. On the minimize budget cost run, constraints directed the model to produce all outputs at a level that was greater than or equal to the targets in each one of the first five decades. The output levels achieved in this run were locked in as upper bounds in a subsequent run which maximized PNV.

Discussion: This was done to assure that the model would meet RPA targets in the most economically efficient way.

E--THE CURRENT ALTERNATIVE:

Discussion: This is the Current Benchmark (Benchmark Run 4) described in the discussion of the benchmarks.

Alternative Results

Results of the final variations of the alternative runs are discussed in Chapter 2 of the DEIS. The resource outputs for the first five ten-year time periods are displayed as well as costs, benefits, and present net value for each alternative. The environmental consequences of each alternative are discussed in Chapter 4.

Departure Analysis

Departures from non-declining yield were not developed for any of the alternatives except the Proposed Alternative.

In order to justify implementation of a departure, the departure should meet some or all of the following criteria according to NFMA regulations:

1. Reduce mortality losses.
2. Improve age class distribution.
3. Improve economic conditions in dependent communities.
4. Is necessary to meet the goals of RPA.
5. Improve overall multiple use management.

This departure does not appear to reduce mortality losses. The departure does not improve age class distribution.

The early high harvest level, followed by lower harvest, later would create a boom and bust cycle which would be detrimental to local economies. Current mill capacity can be maintained and even increased without resorting to a departure.

Alternatives PA, B, C, and D all meet or exceed RPA targets without departure.

This departure results in poorer multiple use management because, as discussed above, it would take too much of the limited budget to implement it.

Based on this analysis, this alternative was rejected and was not analyzed in further detail. A more in depth discussion of the departure alternative is contained in the Timber Technical Report which is available in the Forest Planning records.

SOCIAL & ECONOMIC IMPACT ANALYSIS

Social Overview

Social impact analysis is defined as "the determination of how Forest Service policies and actions affect the quality of people's lives or social well-being. The primary goal is to enable managers to take into account important social concerns in making decisions. Social analysis is accomplished by comparing current social conditions in an area influenced by Forest Service actions with conditions likely to occur as a result of implementing management alternatives" (FSM 1973).

The objectives of social impact assessment are to:

- Determine in a systematic manner the social effects of Forest Service planning and decision-making.

- Provide the decision-maker with an assessment of social effects which can be considered along with the assessments of economic, physical and biological effects in order to make a balanced decision, one which promotes the goal of attaining "productive and enjoyable harmony" between people and their environment.

- Satisfy the requirements of law (NEPA, NFMA) and of Forest Service policy (most often stated as the promotion of community stability).

Analysis

These steps were followed in the social analysis:

- Delineation of geographic zones of influence. The primary zone is within and adjacent to the Forest, and is defined as a multi-county area where the emphasis is on dependence on commodity outputs. The secondary zone lies beyond the primary zone, consisting primarily of consumers of the Forest's amenity opportunities. The third zone is the Native American, and consists of the tribes with historic or recent ties to the Forest.

- Evaluation of eight variables potentially affected by Forest activities. These variables are: Employment, Income, Population, Lifestyles, Social Organization, Relationship to Minority Groups, Land-use Patterns, and Attitudes, Beliefs and Values [FSH 1909.7]. Evaluation is conducted in terms of changes from the current situation for each alternative.

- Collection of data and information. Data analysis for Population used U.S. Bureau of the Census publications for enumerations and Arizona Department of Economic Security reports for projections. Arizona Statistical Review," an annual publication of the Valley National Bank, provided data on Employment and Income. Evaluation of the remaining, qualitative variables primarily relied on review of draft assessments by the Forest management and ID teams.

Findings

Although the Forest spans portions of four counties, only three were included in the primary influence zone. Coconino County was excluded from further analysis because social ties are negligible and economic flows are relatively insignificant.

The secondary zone was found to be dominated by the Phoenix and Tucson metropolitan areas. There is little influence on other urban centers, such as Flagstaff and Albuquerque, most likely because of equivalent intervening opportunities for their residents. Sources of other secondary zone inhabitants appear to be fairly well dispersed.

Because of limited commodity or amenity uses of the Forest, the main issue defined for the Native American zone focused on sacred sites. Available information indicated little or no conflict potential. Comments on the DEIS and Plan are to be specifically solicited from five tribal governments.

Additional findings were based on the results of the IMPLAN analysis, discussed below. Chapter 3 provides a summary discussion of the recent history and present state of the Forest's social setting.

Economic Overview

Objective

Potential effects on social well-being, more than being evaluated qualitatively, may be measured directly in economic terms. Change in current management direction may result in changes in number of jobs and level of income. Such resultant changes are predictable using a known base of flows through the multi-county economy, then deriving that portion which, directly and indirectly, results from Forest activities. The objective is to provide quantitative measures of changes in these flows due to the alternative actions being considered.

Analysis

IMPLAN, an economic input/output model, is the tool used to derive the quantitative measures for affects assessment. The following table illustrates the derivation of IMPLAN input data from FORPLAN output data (or other sources). For some categories, the numbers are the same. For the remainder, however, conversion factors needed to be applied in order to fit the needs of the IMPLAN model. It is assumed that these conversion factors remain constant among alternatives and through time. In this table the "*" (asterisk) symbol means "multiplied by the factor which follows".

RECREATION: Factors were developed from Recreation Information Management System (RIM) reports of historic use of the Forest.

WILDLIFE: Factors were developed from a 1981 "Comprehensive Plan" prepared by Arizona Game and Fish Department, and are also Forest-specific. The base data uses FORPLAN outputs which were then transformed using the Habitat Capability Relationship (HCR) program; this documentation for this program is available in the planning records in the Forest Supervisor's office.

GRAZING: Factors were developed on the basis of an assumption that sheep AUM's would be unlikely to change from Current levels. Hence, the changes modeled by FORPLAN are expected to affect only cattle AUM's among alternatives. Given the management decision to bring permitted grazing use into line with carrying capacity, the base data for the Proposed Action Alternative were developed outside of FORPLAN.

BUDGET: Factors were developed using the FY82 and FY84 Forest budgets, both of which provided similar results. While the 35:65 ratio of Employee Compensation:O&M/Investment is low compared to other Forests in the Region, consolidation of the Sitgreaves with the Arizona portion of the Apache in 1974 (increase in scale) together with more recent consolidation resulting in two fewer Ranger Districts (decrease in overhead and personnel) might well explain these efficiencies. Because FORPLAN outputs are in 1982 dollars and IMPLAN is modeled in terms of 1977 dollars, a deflation factor of .6753 was used to convert the former to the latter.

Table 168. Derivation of IMPLAN Input Values. Categories shown in upper-case letters are IMPLAN input categories; categories in lower-case are raw data from which inputs were derived, as indicated.

Input Sector	Category (unit of measure)	Derivation of Category Value
Timber	SAWLOGS (mmbf)	from FORPLAN
	PRODUCTS (mmbf)	from FORPLAN
	FUELWOOD (mmbf)	from FORPLAN
Recreation	tot.rec (mrvd)	from FORPLAN
	PICNICKING (mrvd)	tot.rec *.0219
	CAMPING (mrvd)	tot.rec *.4861
	SKIING (mrvd)	tot.rec *.0182
	WATER-BASED (mrvd)	tot.rec *.0428
	DISPERSED-NONMOTOR (mrvd)	tot.rec *.0989
	DISPERSED-MOTOR (mrvd)	tot.rec *.1412
	SNOWMOBILING (mrvd)	tot.rec *.0080
	OTHER REC (mrvd)	tot.rec *.1829
Wildlife	tot.consumptive (mrvd)	from FORPLAN/HCR
	BIG GAME (mrvd)	tot.con *.1730
	SMALL GAME (mrvd)	tot.con *.0339
	GAME BIRDS (mrvd)	tot.con *.0739
	FISHING (mrvd)	tot.con *.7192
	NONCONSUMPTIVE (mrvd)	from FORPLAN/HCR
Grazing	tot.grazing (maum)	from FORPLAN
	CATTLE (maum)	tot.graz - SHEEP
	SHEEP (maum)	from Forest records

Table 168. Derivation of IMPLAN Input Values (Continued).		
Budget	tot.budg ('82 mm$)	from FORPLAN
	emp.comp ('82 mm$)	tot.budg *.3457
	o&m/inv ('82 mm$)	tot.budg *.6543
	EMP.COMP ('77 mm$)	emp.comp *.6753
	O&M/INV ('77 mm$)	o&m/inv *.6753

Analysis of the IMPLAN outputs proceeded from the general to the more specific. Initial inspection revealed three alternatives showing a net change of greater than 10% relative to Alternative E, the No Action alternative which provides the analytic baseline. This finding led to inspection of the outputs on an industry-sector by industry-sector basis for each of the alternatives. It was found that six sectors fairly consistently reflect the employment and income effects of the different situations modeled. These sectors may be paired logically to form three categories: the Trade category is a combination of the "Retail Trade" and "Wholesale Trade" sectors; Lodging & Dining combines "Hotels and Lodging Places" with Eating and Drinking Places" from the service industries; and, from the manufacturing industries, "Logging Camps and Logging" is joined with "Sawmills and Planing Mills" in a category labeled Logging & Mills. The remaining 92 industries making up the multi-county model were lumped into an Other category for general monitoring purposes.

The economic analysis is based on the "IMPLAN Users Manual" and IMPLAN, the Forest Service Model to assess economic impacts required by NEPA, NEMA, and to help assess demand. The IMPLAN model and economic analysis were developed and conducted according to direction given in "IMPLAN Users Guide", September, 1933 and "IMPLAN Analysis Guide", preliminary draft, in the "IMPLAN Users Manual".

Findings

Chapter 4 contains the discussion of potential effects for the various alternatives. In general, although this Forest plays a larger role in its multi-county economy than most other Forests in the Region, expected changes under any alternative would be, at best (or worst), slight.

RECEIPTS

The alternatives displayed in Chapter 2 show an estimate of the receipts returned to the United States Government and distributed to the States. The procedures described below were used to compute the values shown in Chapter 2.

Receipts to U.S. Government

Receipts to the United States Government were calculated by using outputs of each alternative which generate receipts and multiplying the outputs by the dollar receipt value per unit of output. The output and unit receipt values are displayed below:

Table 169. Outputs and Receipt Values

Output	Receipt Value (Dollars/Unit of Output)
Sawtimber	
9" - 12" diameter	$103.97/MBF
12" - 16" diameter	144.97/MBF
16" - 20" diameter	158.30/MBF
20" + diameter	177.84/MBF
Timber Products	8.90/MBF
Grazing Permitted Use	2.00/RVD's
Developed Recreation (Total RVD's)	0.20/RVD's

Distribution to States

Distribution of receipts to States was estimated for each Alternative by multiplying the receipts calculated above by 0.25.

SAWTIMBER ANALYSIS FOR APACHE-SITGREAVES N.F.'S

The following tables were used to determine sawtimber demands from the Apache-Sitgreaves National Forests for the 10-year planning period.

Table No. 1 is historical demand from the Forest by individual operators.

Table No. 2 is the anticipated sawtimber needs from the Forest as submitted to the Forest from a meeting in Springerville on May 21, 1986.

Table No. 3 is the volume available from timber sources other than the Apache-Sitgreaves National Forests that has historically gone to one or more of the operators in Table No. 2.

Table No. 3a is the six year average (1980-85) of sawtimber harvested from other timber sources and processed by operators in Table No. 2.

TABLE NO. 1

HISTORICAL SAWTIMBER DEMAND FROM APACHE-SITGREAVES N.F.'s

Purchasers	Volume From Forest
1. Southwest Forest Industries	33,770 MBF * 46,731 MBF **
2. Duke City Lumber Company	18-20,000 MBF
3. Reidhead Lumber Company	6-9,000 MBF
4. Reidhead Brothers Lumber Mill	4-6,000 MBF
5. Parker Lumber Company	3-4,000 MBF
6. Kaibab Industries	1-2,000 MBF
7. Precision Pine & Timber	< 3,000 MBF ***
8. Evergreen Lumber Company	10-12,000 MBF ****

The Timber Technical Report displays the average annual sawtimber harvested from the Forests for the period 1974-1983. (From Cut and Sold Report)

* Six-year average 1980-1985, includes (Aztec) timber rights volume of 7,379 MBF/year.

** Three-year average 1983-1985, includes (Aztec) timber rights volume of 1,999 MBF/year. Represents the two-shift production of S.W.F.I. new facility in Eagar, Arizona.

*** New mill which has only purchased one large sale and several small salvage sales to date.

**** Closed sawmill in Heber in 1983. Sawmill facility is being removed from the site.

Harvest volume (cut volume) was used rather than sold volume since the volumes for the sawmills are mill production and not purchases.

TABLE NO. 2

ANTICIPATED SAWTIMBER NEEDS STATED BY EACH OPERATOR

Purchaser	Total Volume Needed	Volume From A/S
Southwest Forest Industries	60-65,000 MBF for Eagar 28,000 MBF for Snowflake	60-65,000 MBF 15,000 MBF
Duke City Lumber Company	25-30,000 MBF	18-20,000 MBF
Reidhead Lumber Company	8,000 MBF	6-9,000 MBF
Reidhead Brothers Lumber Mill	5-6,000 MBF	5,000 MBF
Parker Lumber Company	3-5,000 MBF	3-4,000 MBF
Precision Pine & Timber	20-22,000 MBF	16-18,000 MBF
Kaibab Industries	18-20,000 MBF	1-2,000 MBF
TOTALS	167-184,000 MBF	124-135,000 MBF

TABLE NO. 3

ANNUAL VOLUME AVAILABLE FROM OTHER SOURCES

	Source	Volume
1.	Tonto N.F.	7,000 MBF
2.	Gila N.F.	30,000 MBF
3.	Blue Ridge R.D. (Coconino)	18,000 MBF
4.	Long Valley R.D. (Coconino)	28,000 MBF
	TOTAL	83,000 MBF

TABLE NO. 3A

ANNUAL TIMBER VOLUME HARVESTED FROM OTHER SOURCES

Purchaser	Source & Volume				
Average 1980-85					
	Kaibab	Gila	Coconino	Tonto	Aztec
Southwest Forest Inds.		6,174 MBF			7,379 MBF
Duke City Lumber Company			1,642 MBF		
Reidhead Lumber Company					
Reidhead Brothers Lumber Mill		500 MBF			
Parker Lumber Company				100 MBF < 500 MBF	
Precision Pine & Timber	950 MBF		400 MBF		
TOTAL	950	6,674	2,042	100	7,879 MBF

* Purchase two SBA sales on the Kaibab National Forest. When harvesting is completed on these sales, does not plan any future purchases on Kaibab N.F. New facility commenced operation in late 1984.

ASSUMPTIONS MADE FOR EACH MILL

1. Southwest Forest Industries

   a. Eagar Sawmill

      1. Plan to continue two shifts.
      2. New facility, no plans to increase production.
      3. Total of 60,000 MBF to come from Apache-Sitgreaves N.F.'s.

   b. Snowflake Pulpmill

      1. Will continue to use top logs from ponderosa pine for chips and ground wood. 10,000 MBF from operation on the Coconino National Forest and 15,000 MBF from Apache-Sitgreaves N.F.'s. This volume includes top logs and logs from 9-12" trees.

2. Duke City Lumber Company

   a. Plan to continue two shifts.
   b. Plan to renovate Winslow Facility in 1987 to increase annual production to 31,000 MBF.
   c. Volume required for increased mill production will probably come from the Coconino National Forest.
   d. Approximately 1,000 MBF of top logs will be processed by Snowflake pulpmill.
   e. 18-20,000 MBF to come from Apache-Sitgreaves National Forests.

3. Reidhead Lumber Company

   a. Will continue one shift.
   b. Will continue to process top logs at mills.
   c. 8,000 MBF to come from Apache-Sitgreaves N.F.'s.

4. Reidhead Brothers Lumber Mill

   a. Will continue one shift.
   b. Will continue to process top logs at mill.
   c. 5,500 MBF to come from Apache-Sitgreaves N.F.'s.

5. Parker Lumber Company

   a. Will continue one shift.
   b. Will continue to process top logs at mill.
   c. 3,000 MBF to come from Apache-Sitgreaves N.F.'s.

6. Precision Pine and Timber

a. Will continue split-shift operation.
b. Plan to operate two shifts in 1987.
c. Installed resaw and increased productivity in June, 1986.
d. Volume required for increased mill production will probably come from Coconino and Tonto N.F.'s.
e. Will not purchase any additional sales on Kaibab N.F.
f. 10,000 MBF to come from Apache-Sitgreaves N.F.'s.

7. Kaibab Industries

a. Majority of timber volume needed for this facility will continue to come from the Tonto and Coconino N.F.'s
b. 2,000 MBF to come from Apache-Sitgreaves N.F.'s.

8. Other Small Sawmills Within or Adjacent to Forest

a. Demand for volume by these facilities will continue at current levels.
b. 1,000 MBF to come from Apache-Sitgreaves N.F.'s.

Other Assumptions

Historically, the full Allowable Sale Quantity (ASQ) has not been available to the timber processors. The Forest has not always been fully funded to sell the full sale quantity. In the past ten years, all sawtimber sales offered were sold, with the exception of three sales. Two of these sales were cable sales. The original cable sale on the Forest was called Snake and did not sell. This sale was reprepared and sold as McKibbins and South McKibbins. The other two sales, Draw and Jersey Horse are scheduled in the ten-year sale plan and will be reprepared and reoffered. The Draw Sale was a cable sale, and at the time of offering was considered uneconomized of timber industry standpoint. The sale does not meet current LMP standards (Integrated Stand Management) and must be reprepared. The Jersey Horse Sale was considered too expensive (over-priced) from timber industry viewpoint. It too, does not meet current LMP Standards (ISM) and will be reprepared.

SUMMARY

The sawmill facilities which are dependent for part or all of their timber needs from the Apache-Sitgreaves N.F.'s show an annual need of 107,500 to 109,500 MBF. This volume exceeds actual harvest levels experienced by the Forest from 1974-1983. During this ten-year period, the average annual sawtimber harvest was 64,470 MBF. During 1982, which was the lowest point of the depressed timber harvest market, only 12,145 MBF was harvested on the Forests. If a nine year average is used and 1982 is excluded, the Forest average harvest is 70,235 MBF.

Several factors contribute to the difference between indicated sawtimber needs and harvest history. These factors are:

1. Southwest Forest Industries mill in McNary was destroyed by fire in late 1979. This mill's annual production was approximately 50,000 MBF.

2. Southwest Forest Industries old mill in Eagar was dismantled in 1982. The one shift capacity for this mill was 10-12,000 MBF. During 1980 and 1981 this mill operated on a double-shift and was S.W.F.I.'s only mill production on the Forest.

3. Southwest Forest Industries constructed a new, modern sawmill in Eagar with a rated capacity of 65,000 MBF. This mill began operation in 1983.

4. Timber harvesting activities on Aztec sections will be completed in 1987. Timber rights on these sections will revert to the Forest Service in 1987. The annual harvest level on these sections averaged 7,879 MBF for the six-year period 1980 through 1985.

5. 15,000 MBF of small logs and top wood are being used for pulpwood by S.W.F.I.'s pulp mill at Snowflake.

6. Evergreen Lumber Company closed their sawmill in Heber in 1983. This facility is presently being dismantled.

7 Precision Pine and Timber constructed a new sawmill east of Heber. Production began at this mill in October, 1984. The volume for this facility came from the Kaibab N.F. in 1984 and a significant volume in 1985. The capacity rating for this facility is comparable with the former Evergreen facility in Heber.

8. Reidhead Brothers Lumber Mill modernized their mill in Nutrioso, doubling their annual production from 3,000 MBF to 6,000 MBF.

9. Parker Lumber Company has modernized their mill in Clay Springs and increased production from ± 1,000 MBF to 4,000 MBF.

10. Southwest Forest Industries plans to operate their sawmill in Reserve, New Mexico, and reduce the volume from New Mexico processed in the Eagar mill.

1985 was a "normal" operating year for sawmill facilities on the Forest. Following is a summary of their production:

85,536 MBF	CY-85	Harvest Level A/S N.F.'s
12,313 "	CY-85	Gila N.F. - S.W.F.I.
1,715 "	CY-85	Aztec - S.W.F.I.
5,898 "	CY-85	Coconino N.F. - Duke City
950 "	CY-85	Kaibab N.F. - Precision Pine
483 "	CY-85	Aztec - Parker
400 "	CY-85	Coconino N.F. - Precision Pine

*Total 107,295 MBF Total Production - sawlog scale

*Precision Pine did not achieve rated production rates until mid 1986.

SUMMARY

The estimated volume of sawtimber needed to meet average production levels of existing facilities (as listed in Table No. 2) was used to provide a logical proposed annual sawtimber volume for the Apache-Sitgreaves National Forests. The following is a summary of volumes by mill and a total proposed volume/year for the Apache-Sitgreaves N.F.'s through the first decade of the plan.

Southwest Forest Industries	60,000 MBF Eagar
	15,000 MBF Snowflake
Duke City Lumber Company	16,000 MBF first 5 years
	22,000 MBF second 5 years
Reidhead Lumber Company	8,000 MBF
Reidhead Brothers Lumber Company	5,000 MBF
Parker Lumber Company	3,000 MBF
Precision Pine & Timber	10,000 MBF first 5 years
	15,000 MBF second 5 years
Kaibab Industries	1,000 MBF first 5 years
	3,000 MBF second 5 years
	118,000 MBF/YR 1st 5 years
TOTAL	131,000 MBF/YR 2nd 5 years

The preferred alternative proposes a 990,000 MBF sawtimber harvest level for the first decade. 1/ 90,000 MBF/year for the first five years and 108,000 MBF/year for the second five years. For the decades, this is 105,000 MBF less than the sawtimber volume which is indicated to be needed to maintain average production levels of existing facilities (as listed in Table No. 2).

The timber industry has experienced periodic cycles of high and low production. The mill production levels on the Forest has only increased by 5-10,000 MBF in the past decade. The harvest level for the Forest for 1974-1983 was 70,285 MBF. A positive adjustment to this harvest level for increased mill capacity, reduction in "Aztec" volume, NcNary fire, and closing of Evergreen Mill, would be less than 103,000 MBF. The Forest believes 990,000 MBF for the decade is a reasonable harvest level.

1/ This is the sawtimber portion of the Allowable Sale Quantity. The Allowable Sale Quantity is 119,000 MBF/year; 99,000 MBF sawtimber and an additional 20,000 MBF products.

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