EIS

United States
Department of
Agriculture

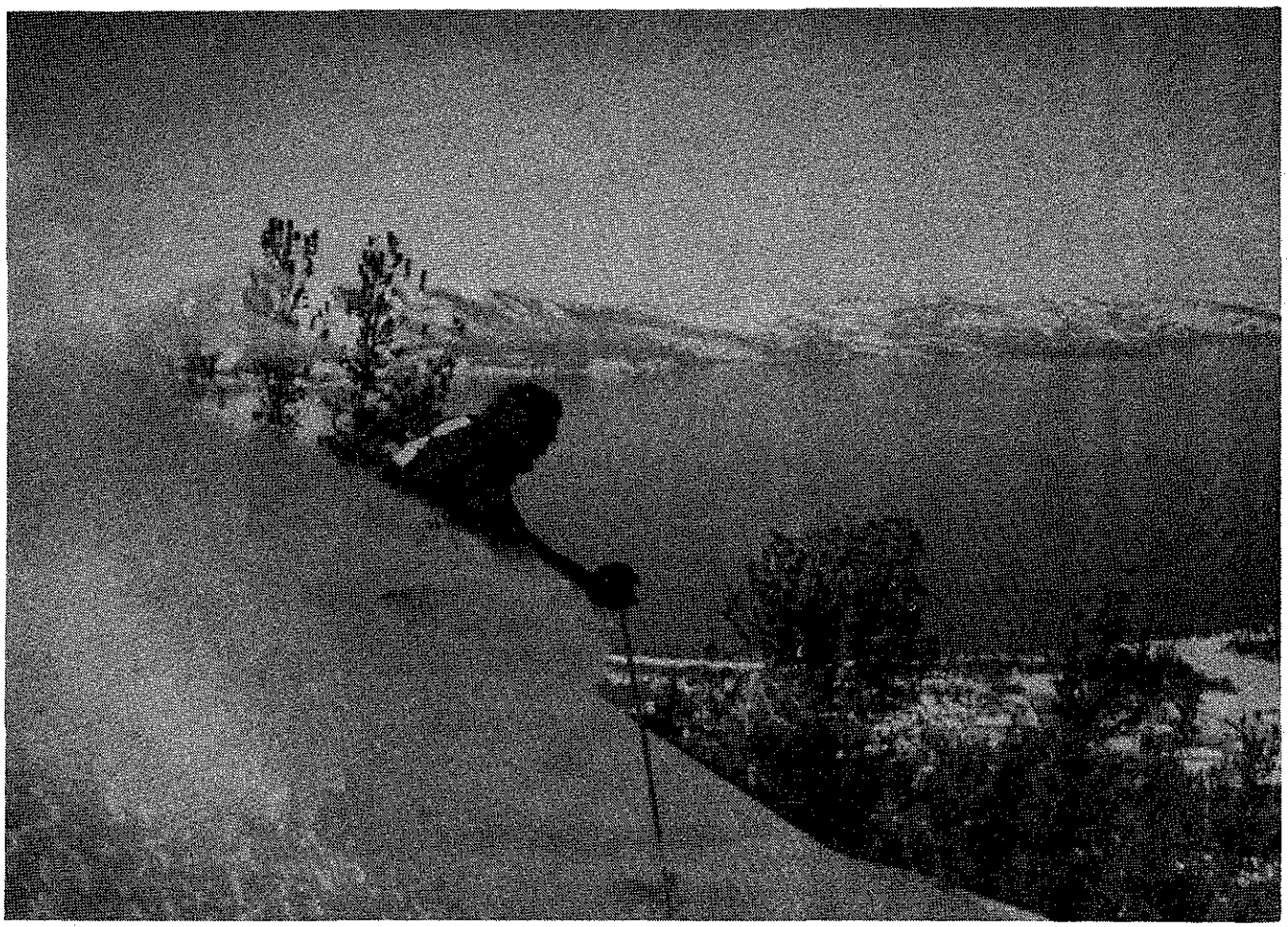
Forest Service

Pacific
Southwest
Region

Final Environmental Impact Statement

Land and Resource Management Plan

Lake Tahoe Basin Management Unit



This document and its supportive analysis provides specific disclosure of estimated environmental and economic effects of alternative management strategies for a period of 10 to 15 years. Estimates beyond this period are displayed for decision-maker and public information only.

1988

Cover Sheet

FINAL ENVIRONMENTAL IMPACT STATEMENT

Lake Tahoe Basin Management Unit
Forest Land and Resource Management Plan

El Dorado, Placer, and Alpine Counties, California;
Washoe and Douglas Counties, and Carson City Rural Area, Nevada

Lead Agency:	USDA - Forest Service Lake Tahoe Basin Management Unit P.O. Box 731002 South Lake Tahoe, California 95731-7302
Responsible Official:	Paul Barker , Regional Forester Pacific Southwest Region USDA, Forest Service 630 Sansome Street San Francisco, California 94111
For Further Information Contact:	Robert E. Harris, Forest Supervisor Lake Tahoe Basin Management Unit P.O. Box 731002 South Lake Tahoe, California 95731-7302 Telephone: (916) 573-2600

Abstract: This Environmental Impact Statement describes the selected action and alternatives for managing the land and resources administered by the Lake Tahoe Basin Management Unit. The action and alternatives allocate a varying range and mix of management prescriptions and intensities to the National Forest System land base, which results in a variety of outputs, goods, and services at varying costs. The area affected, 147,733 acres of National Forest System land, and the issues, concerns, and opportunities addressed are described. The environmental consequences of the action and alternatives are displayed.

CONTENTS

Title Page

Contents
List of Tables 4
List of Figures 6
Maps 6

Summary of the Final Environmental Impact Statement

Chapter 1. PURPOSE AND NEED

A. Purpose and Nature of the Action 1-1
B. Vicinity 1-5
C. Relationship of the Forest Plan to the Regional Plan for the Lake Tahoe Basin 1-8
D. Scope of Issues, Concerns, and Opportunities to be Addressed ... 1-9

Chapter 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

A. Introduction 2- 1
B. Alternative Development Process 2- 2
1. Introduction 2- 2
2. Description of Process..... 2- 2
3. Range of Alternatives 2- 2
C. Benchmarks 2- 4
D. Alternatives Considered But Eliminated From Detailed Study 2- 7
E. Alternatives Considered in Detail 2-11
1. Introduction 2-11
2. Direction Common to All Alternatives 2-12
3. Management Prescriptions and Management Areas 2-16
4. Individual Alternative Descriptions 2-23
5. Comparison of Alternatives 2-77
a. Narrative 2-77
b. Acres by Prescription 2-82
c. Outputs and Other Key Comparisons 2-82
d. Timber Land Classification (Suitability)..... 2-82
e. Treatment of Issues 2-82
f. Economic Effects 2-99

Chapter 3. THE AFFECTED ENVIRONMENT

A. Introduction and General Description of the LTBMU 3- 1
B. The Economic Environment 3- 2
C. The Social Environment 3- 3

D. The Resource Environment 3- 8
1. Air Quality and Noise 3- 8
2. Adjacent Ownerships 3-11
3. Diversity 3-12
4. Facilities 3-15
a. Roads 3-16
b. Trails 3-17
c. Dams and Diversions 3-19
d. Administrative Facilities 3-20
5. Fire and Fuels 3-21
6. Fish (including threatened, endangered, and sensitive species) 3-22
7. Forest Pests/Integrated Pest Management 3-26
8. Geology and Groundwater 3-28
9. Historical and Cultural Resources 3-32
10. Lands 3-35
a. Landownership Adjustment
b. Landline Surveys
c. Non-Recreational Special Uses and Utility Corridors
d. Withdrawals
e. Rights-of-Way Acquisition
11. Minerals (including energy minerals) 3-38
12. Prime Agricultural Lands, Wetlands, and Floodplains 3-40
13. Range 3-41
14. Recreation 3-42
a. Developed Recreation
b. Dispersed Recreation
c. Winter Sports
d. Off-Highway Vehicle Use
e. Recreation Opportunity Spectrum Classes
15. Research Natural Areas 3-48
16. Riparian Areas and Stream Environment Zones 3-48
17. Sensitive Plants 3-49
18. Soils 3-50
19. Special Interest Areas 3-51
20. Timber and Vegetation 3-54
21. Visual Resources 3-57
22. Water 3-58
23. Wilderness (and Roadless Areas) 3-66
24. Wildlife (including threatened, endangered, and sensitive species) 3-66

Chapter 4. ENVIRONMENTAL CONSEQUENCES

A. Introduction 4-1
B. Direct, Indirect, and Cumulative Economic Consequences 4-1
C. Direct, Indirect, and Cumulative Social Consequences 4-5
D. Direct, Indirect, and Cumulative Resource Consequences 4-8
1. Air Quality and Noise 4-8
2. Adjacent Ownership 4-13
3. Diversity 4-14

4. Facilities 4-20
a. Roads
b. Trails
c. Dams and Diversions
d. Administrative Facilities
5. Fire and Fuels 4-25
6. Fish (including threatened, endangered, & sensitive species).4-29
7. Forest Pests 4-30
8. Geology and Groundwater 4-32
9. Historical and Cultural Resources 4-33
10. Lands 4-38
a. Landownership Adjustments
b. Landline Surveys
c. Nonrecreational Special Uses and Utility Corridors
d. Withdrawals
e. Rights-of-Way Acquisition
11. Minerals (including energy minerals) 4-39
12. Prime Agricultural Lands, Wetlands, and Floodplains.....4-41
13. Range 4-41
14. Recreation 4-42
a. Developed Recreation
b. Dispersed Recreation
c. Off-Highway Vehicle (OHV) Use
d. Winter Sports
e. Recreation Opportunity Spectrum
15. Research Natural Areas 4-56
16. Riparian Areas and Stream Environment Zones..... 4-57
17. Sensitive Plants 4-59
18. Soils 4-59
19. Special Interest Areas 4-62
20. Timber and Vegetation 4-63
21. Visual Resources 4-66
22. Water 4-73
23. Wilderness (and Roadless Areas)..... 4-86
24. Wildlife (including threatened, endangered, and sensitive species) 4-89
E. Means to Mitigate Adverse Impacts 4-95
F. Adverse Environmental Effects Which Cannot Be Avoided 4-95
G. Relationship Between Short Term Use and Long Term Productivity of the Environment..... 4-96
H. Irreversible and Irretrievable Commitment of Resources 4-97
I. Possible Conflicts With Federal, State, and Local Land Use Plans 4-98
J. Energy Requirements and Conservation Potential 4-99

Chapter 5. LIST OF PREPARERS
A. ID Team Members 5-1
B. Management Team 5-3
C. Support Staff 5-3
D. Other Specialists and Areas Consulted 5-4

Chapter 6. MAILING LIST
A. State and Federal Elected Officials 6-1
B. Federal Agencies 6-1
C. California State Agencies 6-2
D. Nevada State Agencies 6-3
E. Local and Regional Agencies 6-3
F. Libraries 6-3
G. Individuals 6-4
H. Organizations and Businesses 6-7
I. News Media 6-8

GLOSSARY

BIBLIOGRAPHY

INDEX

LIST OF TABLES

Table Number	Title	Page
1	Comparison of Average Annual Outputs by Alternative for the First Decade	5
1.1	Land Area by Jurisdiction	1-7
2.1	Benchmarks (Outputs and Activities & Acreage Allocation by Prescription)	2-8
2.2	Acres Preallocated for Each Alternative	2-23
2.3	Acreage Allocations by Management Prescriptions and Management Areas/Alternative A - Selected	2-27
2.4	Average Annual Outputs - Alternative A	2-28
2.5	Acreage Allocations by Management Prescriptions and Management Areas/Alternative B - Current	2-33
2.6	Average Annual Outputs - Alternative B	2-34
2.7	Acreage Allocations by Management Prescriptions and Management Areas/Alternative C - Conservation	2-39
2.8	Average Annual Outputs - Alternative C	2-40
2.9	Acreage Allocations by Management Prescriptions and Management Areas/Alternative D - Economic Efficiency	2-45
2.10	Average Annual Outputs - Alternative D	2-46
2.11	Acreage Allocations by Management Prescriptions and Management Areas/Alternative E - Market	2-51
2.12	Average Annual Outputs - Alternative E	2-52
2.13	Acreage Allocations by Management Prescriptions and Management Areas/Alternative F - Amenity	2-57
2.14	Average Annual Outputs - Alternative F	2-58
2.15	Acreage Allocations by Management Prescriptions and Management Areas/Alternative G - Low Budget	2-63
2.16	Average Annual Outputs - Alternative G	2-64
2.17	Acreage Allocations by Management Prescriptions and Management Areas/Alternative H - RPA	2-69
2.18	Average Annual Outputs - Alternative H	2-70
2.19	Acreage Allocation by Management Prescriptions and Management Areas/Alternative I - Wilderness	2-74

2.20	Average Annual Outputs - Alternative I	2-75
2.21	Acreage Allocations by Prescription and Alternatives	2-83
2.22	Wilderness Acreage by Benchmark and Alternative	2-84
2.23	Comparison of Average Annual Outputs by Alternatives for 1st and 5th Decades	2-85
2.24	Environmental Consequences and Other Key Comparisons by Alternative	2-89
2.25	Timber Land Classification by Alternative	2-94
2.26	Comparison of Treatment of Issues and Planning Questions	2-95
2.27	Summary Comparison of Economic Effects in Million of 1982 Dollars Per Year	2-101
2.28	Present Net Value Comparison (of Alternatives) - Part 1	2-105
2.29	Present Net Value Comparison of Alternatives - Part 2	2-106
2.30	Indicators of Responsiveness to Major Issues and National Concerns	2-107
2.31	Annual Cash Flow and Noncash Benefits	2-108
3.1a	Population and Dwelling Units Projections	3-3
3.1b	Population Projections by County	3-4
3.2	Summary Comparison of Relationships of Social Groups to LTBMU Resources	3-6
3.3	Vegetative Associations in the Lake Tahoe Basin	3-13
3.4	Forest Diversity by Seral Stage	3-14
3.5	Number of Wildlife Species Associated with Wildlife Habitat Relationships	3-15
3.6	Distribution of Trails	3-19
3.7	Fish Management Indicator Species	3-23
3.8	Current and Potential Stream Quality	3-24
3.9	Fish Species Occurrence	3-25
3.10	Landline Location Backlog	3-36
3.11	Special Use Permits by Category	3-37
3.12	Mineral Material Used by the LTBMU	3-40
3.13	ROS Capacity, Dispersed Use, and Demand in National Forest Lands	3-47
3.14	ROS Class Distribution	3-48
3.15	Sensitive Plants of the Tahoe Basin	3-50
3.16	Soil Associations and Timber Management	3-52
3.17	Existing Visual Conditions	3-58
3.18	Acreage of Impervious Surface Coverage and Total Disturbance at Various Levels of Management	3-61
3.19	Water Demand	3-65
3.20	Wildlife Management Indicator Species	3-68
3.21	Status of Management Indicator Wildlife Species	3-69
4.1	Economic Consequences of Alternatives	4-2
4.2	Air Quality Effects From Prescribed Burning	4-10
4.3	Effects of Recreation Use On Air Quality	4-11
4.4	Forest Diversity	4-17
4.5	Road Maintenance Levels	4-21
4.6	Trail System by Alternatives	4-22
4.7	Expected Average Annual Acres Burned	4-25
4.8	Proposed Average Annual Fuel Treatment by Alternative	4-26
4.9	Forest Pest Management	4-31
4.10	Activities Affecting Cultural Resources	4-35
4.11	Landline to Mark and Post by Alternative	4-38
4.12	Effects on Mineral Resources by Alternative	4-40

4.13	Developed Recreation by Alternative	4-43
4.14	Winter Sports - Downhill Skiing by Alternative	4-52
4.15	Recreation Opportunity System	4-54
4.16	Activities Which Affect Soil Disturbance by Alternative	4-60
4.17	Timber Program Quantity	4-64
4.18	Acres Scheduled for Harvest by Land Capability	4-65
4.19	Acres of Existing and Future Visual Conditions	4-70
4.20	Acreage of Existing and Visual Quality Objectives by Variety and Class	4-71
4.21	Impervious Surface Coverage	4-75
4.22	Land Disturbance	4-76
4.23	Indicators of Effects on Water Quality	4-78
4.24	Average Annual Water Yield	4-83
4.25	Maximum Consumptive Water Use	4-85
4.26	Roadless Area Evaluation	4-88
4.27	Habitat Capability in Acres for Management Indicator Species	4-91
4.28	Average Annual Energy Consumption and Yield	4-100

LIST of FIGURES

Figure Number	Title	Page
1.1	Framework of the Forest Plan	1- 4
1.2	Lake Tahoe Basin	1- 6
2.1	Management Area Map	2-17
4.1	Percentage of Distribution of ROS Classes	4-55
4.2	Visual Condition (VC) - Visual Quality Objective (VQO)	4-67
4.3	Percent Distribution of Visual Quality Objective by Alt.	4-67
4.4	Change in Visual Quality Index by Alternative	4-69
4.5	Visual Condition Decline by the Year 2030	4-69

MAPS

Alternative Maps - Map Packet Inside Pack Cover

SUMMARY OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT

This is a summary of the Final Environmental Impact Statement (FEIS) for the Lake Tahoe Basin Management Unit (LTBMU) National Forest Land and Resource Management Plan. This summary does not replace the FEIS, but condenses each chapter and highlights the major ideas discussed.

The summary is for those readers who want a brief overview of the six chapters contained in the FEIS.

The FEIS relates to the development and adoption of a comprehensive, integrated management plan for the LTBMU. It will guide the management of the forest for the next 10 to 15 years.

The Forest Service mission at Lake Tahoe is to manage, protect, and enhance the environment of this national treasure for the benefit of the people. The planning goal is to develop a plan that obtains the highest net public benefit (36 CFR 219.1a), which is the overall value to the nation of all goods and services less the costs to provide them.

The Final Environmental Impact Statement proposes a course of action and alternatives to the proposed action for managing the lands and resources of the Lake Tahoe Basin Management Unit. The FEIS also describes the environmental consequences and alternatives to the proposed action. Estimates beyond 10 to 15 years are displayed for decision makers and public information only.

Chapter 1 - Purpose and Need

This chapter cites the laws and regulations to which the FEIS must conform. The preparation of a FEIS is required by the National Environmental Policy Act (NEPA), the Council of Environmental Quality (CEQ), Regulation 40 CFR 1500, and the National Forest Management Act (NFMA) Regulation 36 CFR 219. The proposed action identified in the FEIS is the basis for the National Forest Land and Resource Management Plan (forest plan) which is a separate document. The preparation of a forest plan is required by the Forest and Rangeland Renewable Resources Planning Act (RPA) as amended by NFMA. For purposes of NEPA disclosure, the FEIS and the forest plan are treated as companion documents.

The format established in 40 CFR 1502.10 of the CEQ regulations is followed in this FEIS. Once the forest plan is approved, all management activities affecting the forest, including all permits, contracts, and other instruments for the occupancy and use of National Forest System land, must conform with the forest plan. The forest plan will be reviewed periodically and amended or revised as needed, but it will be revised at least every 15 years. The documents and files that record the planning process are available for public inspection at the LTBMU main office, South Lake Tahoe, California.

Chapter 1 also describes the relationship of the forest plan to the Regional Plan for the Lake Tahoe Basin. The Tahoe Regional Planning Compact, Public Law 96-551, directed the Tahoe Regional Planning Agency (TRPA) to develop environmental threshold standards for the basin and then a Regional Plan that

would achieve the thresholds. It includes policies and land use zoning that guides development and use of all lands including national forest lands.

The location of the LTBMU is also described in Chapter 1. It is located in the north-central Sierra region in California and includes portions of El Dorado, Placer, and Alpine Counties of California, and portions of Washoe and Douglas Counties and Carson City Rural Area in Nevada. It is an administrative unit within the Pacific Southwest Region (PSW Region 5), Forest Service, U.S. Department of Agriculture.

The major issues in the LTBMU examined in the plan are:

1. Water Quality - How does national forest management affect water quality in the LTBMU, and what are our opportunities to improve water quality?

2. Recreation - What kinds and amounts of outdoor recreation opportunities should be provided on national forest land?

3. Forest Management/Thresholds - What portion of the public's "fair share" of the basin carrying capacity should be allocated to forest management other than recreation use, and what is the appropriate blend of resource outputs to be contributed toward meeting national demands?

4. Further Planning Areas - How should the roadless and undeveloped areas in the "further planning" category be managed?

5. Management of Environmentally Sensitive Lots - How should environmentally sensitive lots, acquired through the Santini/Burton Act, be managed?

Resource use and development opportunities are also listed.

The forest plan replaces the previous Forest Land Management Plan prepared in 1980. Many resource plans have been incorporated by reference.

Chapter 2 - Alternatives Including the Proposed Action

This chapter describes the alternatives. It shows how each alternative responds to issues, local and national goals and objectives, and supply - demand factors taken from the economic analysis. It provides the basis for the Regional Forester and the public to select a final course of action.

The alternatives were formulated using NFMA criteria and Pacific Southwest Regional direction.

A range of alternatives was identified, including those alternatives considered but eliminated from detailed study and those considered in detail. The LTBMU interdisciplinary and management teams were responsible for formulating these alternatives. Nine alternatives were described by the theme of the alternative, the resource program direction, the environment to be created, acreage allocations by prescription and management area, and by outputs, costs and activities. The themes of alternatives considered in detail including the Selected Alternative are listed below:

Alternative A - Selected

This alternative emphasizes protection of the special environmental values of the Lake Tahoe Basin while providing a mix of developed and dispersed recreation opportunities to meet demand. Modest levels of other resource outputs would be provided where compatible with meeting environmental thresholds or as by-products of activities designed to achieve the thresholds.

Alternative B - Current

This alternative would continue the current directions, policies, and practices to depict the actual operating program on the LTBMU. Goods and services would be provided at the fiscal year 1982 level. The budget would remain equivalent to that of 1982. A mixed program of developed and dispersed recreation opportunities would continue, but the current restriction on new recreation site development would also continue.

Alternative C - Conservation

This alternative emphasizes environmental protection, establishment of wilderness, and provisions for a high level of dispersed recreation.

Alternative D - Efficiency

This alternative is the most economically efficient allocation and schedule for meeting minimum management and implementation requirements. This determines the highest present net value that can be legally and feasibly achieved.

Alternative E - Market

This alternative emphasizes high levels of market goods, timber, grazing, and developed recreation, to help satisfy the national demand. Nonmarket outputs can also be produced where they do not conflict with production of the market resources and are economically efficient. Production of market resources would only be limited by Minimum Management Requirements.

Alternative F - Amenity

Here the emphasis is on high levels of nonmarket resources and environmental protection. High quality dispersed recreation is favored, while fish and wildlife habitat, water quality, scenic quality, and air quality would be enhanced above minimal levels.

Alternative G - Low Budget

The low budget alternative is similar to the current alternative, except that by 1990 the budget would be reduced by 25%. The purpose is to estimate the levels of goods and services that could be produced with a smaller budget. Most outputs are reduced from current levels.

Alternative H - RPA

The Regional Guide for the Pacific Southwest Region (R-5) assigns targets to each forest from the 1980 RPA program which emphasizes moderately high levels of both commodity and amenity benefits. This alternative presents the most economically efficient way to meet those targets in the Tahoe Basin.

Alternative I - Wilderness

This alternative recommends all further planning areas for wilderness while management on nonwilderness land is intensified to maintain or increase production of market goods.

Direction common to all alternatives was considered in this chapter. The direction was grouped into three types:

- Minimum Management Requirements (MMR) to meet legal obligations including timber management policies established by the Chief of the Forest Service,
- Minimum Implementation Requirements (MIR) that consider operational limitations,
- Forestwide standards and guidelines common to all alternatives.

Finally, Chapter 2 compares alternatives. The acres by prescription, outputs by period, timber suitability, economic effects, present net value (PNV) and tradeoffs, key physical and biological effects, and treatment of issues are compared by alternative. See Table 1 - Comparison of Average Annual Outputs.

Chapter 3 - The Affected Environment

This chapter describes the economic, social, and resource environment of the LTBMU. It also provides background on unresolved issues and concerns and presents management opportunities that are available.

The chapter begins with a general description of the LTBMU. The Lake Tahoe Basin encompasses about 500 square miles of which more than a third is the lake itself. The basin is located 150 miles east-northeast of San Francisco on the California-Nevada border. The lake, at an elevation of 6,229 feet, has a maximum depth of 1,645 feet and is most famous for its crystal clear water. Of the 205,250 acres of land in the Lake Tahoe Basin, 144,796 are federal lands administered by the Forest Service. An additional 2,937 acres outside the basin are managed as part of the LTBMU.

Table 1. Summary Comparison of Average Annual Outputs by Alternative for First Decade

Resource Element	Units of Measure	Base Yr. 1982	1990 RPA Goals	A Selected	B Current	C Conserv.	D Efficiency	E Market	F Amenity	G Low Budgt	H RPA	I Wilderness
Recreation-Developed Public	MRVD	434	1550	460	347	460	460	460	460	143	455	460
Recreation-Developed Private	MRVD	959		1088	1088	1088	1088	1088	1048	1088	1087	1088
Recreation-Dispersed	MRVD	913	1340	1073	1094	1017	1056	1083	1056	1028	1056	1056
Wilderness	MRVD	106		127	106	144	144	117	144	106	144	144
Research Natural Areas	number	0		1	0	1	0	0	1	0	0	0
	acres	0		360	0	360	0	0	360	0	0	0
Sawlog Volume	MMBF	2		2.4	1.9	2.4	0.8	11.2	2.4	0.9	5.8	3.0
Firewood Volume	M cords	4		4	4	4	0	8	4	2	8	4
Grazing	AUM	1400	1000	1400	1400	1400	0	3000	0	0	2300	1400
Wildlife and Fish	M WFUD	50		51	51	51	50	50	52	51	52	51
Watershed Restoration	acres	40		110	22	110	22	22	110	22	55	22
Water Yield	M afa	316.7		318.2	317.9	318.5	317.9	319.7	318.1	317.8	318.9	318.2
Consumptive Water Use	afa	1334		2017	1558	2334	1803	1813	1413	1344	1952	1953
Trail Construction	miles	0	0	6.0	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.9
Trail Reconstruction	miles	2	4	2.0	2.0	7.5	2.0	2.0	7.5	2.0	2.0	4.0
Trail Maintenance	miles	198		258	254	257	254	254	254	254	254	257
Road Construction	miles	0		.2	0	0	0	0	0	0	0	0
Road Reconstruction	miles	1		3	1	3	1	1	3	1	2	1
Road Maintenance	miles	240		242	240	240	240	240	240	207	240	240
Open OHV Roads & Trails-Summer	miles	231		236	241	234	206	247	105	132	236	192
Useable Winter OHV Area	M acres	74		83	74	74	66	73	56	74	64	56
Total Budget	MM$	3.8	3.8	5.3	3.8	5.1	3.8	5.7	4.9	3.0	5.6	4.3
Present Net Value	MM$			650.1	499.4	638.4	683.4	605.3	568.5	455.3	615.8	679.3

Employment in the basin is tourist oriented. Activities on national forest land generate approximately 5% of the average annual employment. Most of the revenues generated on national forest land in the basin come from recreation and special use fees. The 1982 budget was about $3.8 million, but it has been declining for most programs. An exception is land acquisition and watershed restoration.

The significant social variables that may be affected by the forest plan have been identified. The most important are the effects on the population, on the values and lifestyles of different social groups, and on public services.

The resource environment affected by the alternatives is summarized as follows:

Air Quality

Air quality and visibility have declined at Lake Tahoe, although they are still superior to most urban areas. Recreation development-induced traffic and burning of slash on the national forest have contributed to the decline. The Forest Service has helped to protect air quality. Perhaps the most significant approach has been through purchasing land, the development of which would have increased auto and home emissions. Also, bicycle trails have been built and public transit to recreation sites has been supported to cut back on private vehicle use.

Diversity

Forest diversity was reduced because of extensive logging over 100 years ago. Much of the basin has medium sized trees with very few young and old growth stands. Urbanization has also depleted some habitats, such as marsh and other wetlands. There are relatively small acreages of several unique plant and animal communities, such as remnant high elevation marshes, peat bogs, cushion plant communities, large alpine meadows, and beaches, which contribute to the overall diversity of the basin. These unique communities are afforded protection through a variety of special management considerations. Current management direction is to maintain healthy, diverse plant communities. More early succession vegetation would be desirable to maintain viable populations of wildlife. This can be accomplished by vegetative management, especially timber harvesting.

Facilities

Roads - The roads under Forest Service jurisdiction includes 240 miles of general forest roads. Erosion from roads is the most significant impact on water quality from national forest land. There is a program to eliminate many miles of roads which are not needed for accessing resources. Land acquisition will increase the backlog of roads to be upgraded.

Trails - The LTBMU has 128 miles of inventoried system trails. Another 70 miles of existing trail are suitable for inclusion in the system and will be added when inventoried. 26 miles of existing trail are open for motorized vehicle use. There are 31 miles of trail identified as nationally significant. Approximately 3/4 of the trail system needs major investment to fully meet water quality standards and recreation needs.

Dams and Diversions - There are 15 dams on the LTBMU. Reservoirs provide both fisheries and recreation and represent a water right allocation.

Administrative Facilities - There are 16 administrative sites and 69 government owned buildings or trailers. The main headquarters is in a

leased building. Many facilities need replacement or heavy maintenance. Some have potential for nomination to the National Register of Historic Places.

Fire and Fuels

Fire management includes fire protection and fuels management. The ten year average is 83 fires per year, with 71 of these caused by people. Complete disposal of fuels generated by timber harvest has occurred in the past, primarily to meet visual quality standards rather than fire management needs.

Fish

Fishing results in over 45,000 Wildlife and Fish User Days (WFUD) each year. A total of 14 species of fish are known to occur in lakes and streams of the basin. One of these, the Lahontan cutthroat trout, is a federally threatened species for which there is interest in expanding populations. Management indicator species, including both resident and migratory fish, have been identified to help ensure maintenance of viable populations. Many miles of stream could be restored or improved as fish habitat.

Forest Pests

Insect pests have had a significant effect upon the health of forests, at least in localized areas. An integrated forest pest management approach has been used to reduce and/or maintain pest-caused losses at acceptable levels.

Geology

The primary geologic hazards on the LTBMU consist of rockfalls and debris slides. Snow avalanche hazard also exists. Earthquakes, faulting and volcanic activity are lower potential hazards. Groundwater use for domestic purposes may become significant. Before development occurs on the national forest, more study is needed to assure adequate quantity and quality of the groundwater resources. There are several areas of geological interest in the basin, but none have been identified for special designation.

Historical and Cultural Resources

The LTBMU is responsible for managing cultural resources as a nonrenewable resource and for maintaining their scientific, historical, and social integrity. Three historic sites, the Pope, Baldwin, and Valhalla Estates, have been listed on the National Register of Historic Places. Several other sites have been determined eligible, but have not yet been formally nominated. There is not a complete cultural resources inventory and overview of the LTBMU to use as a basis for determining the significance of cultural sites and the potential effect of national forest activities on these sites.

Lands

Land Adjustment - The land adjustment program is intended to improve resource management by consolidating ownership of national forest land, acquiring important public recreation resources, and acquiring environmentally sensitive land areas. Acquisition of land by Nevada and

California, along with the Forest Service, is expected to place over 85% of the basin in public ownership.

Landline Survey - There are approximately 350 miles of property line between the national forest and other ownerships. About 230 miles are not currently posted to standard. The backlog of survey needs will increase as more land is acquired. Insufficient property line location is detrimental to resource program implementation and the prevention of unauthorized occupancy.

Nonrecreational Special Uses and Utility Corridors - The LTBMU administers 113 nonrecreational special use permits encompassing 1,018 acres of national forest land. Many of these support urbanization within the basin and are expected to expand substantially in number.

Withdrawals - There are 14 mineral withdrawals covering approximately 7,930 acres. These have not been reviewed to determine if they should be continued.

Rights-of-way Acquisition - The use of national forest lands, resources, or services is occasionally prevented because there is no public right-of-way to allow access. It is estimated that 14 miles of road and 17 miles of trail rights-of-way are needed.

Minerals

There are no active mines. No large increases in mineral and energy exploration and development are expected. Common variety materials are mostly imported from out of the basin.

Prime Agricultural Lands, Wetlands, and Floodplains

No areas of the basin are considered prime agricultural lands. Wetlands and floodplains are included in the riparian area/stream environment zone discussion.

Range

Three cattle allotments, two horse pastures, two pastures for Forest Service horses, and part of two sheep allotments are administered. The rangeland is in fair to good condition. Grazing use may conflict with water quality, recreation, wildlife, and fisheries in some locations and may require changes from current management.

Recreation

Recreation facilities include 6 campgrounds, 5 swimming beaches, 4 picnic areas, and 4 interpretive sites for a combined use of 434,000 recreation visitor days (RVD) in 1982. Also, special use permits are administered for recreation residences which generated 606,000 RVD in 1982. In addition, an average of 350,000 RVD of ski use occurs at Heavenly Valley ski resort. Total dispersed recreation is just over one million RVD. Recreation development and use has adverse effects on traffic, air, water quality, and visual quality, all of which are significant issues at Lake Tahoe. Appropriate levels of use and mitigation measures that do not degrade the resources or the desired recreation experience must be determined.

Research Natural Area

There are no Research Natural Areas in the LTBMU. Grass Lake Moss Bog (peatland) is a candidate.

Riparian Areas and Stream Environment Zones

Stream environment zones, including riparian areas, are important, especially in maintaining water quality. Most land disturbing improvements are prohibited on them. The LTBMU has 7,500 acres of stream environment zone.

Sensitive Plants

The LTBMU has seven listed sensitive plant species. More information is needed on location and population in the basin for three of the seven. Protection has been provided through implementation of interim management plans, project-specific surveying, habitat maintenance and/or improvement, and through overall avoidance of adverse impacts.

Soils

Most of the soils are granitic or volcanic, geologically young, and poorly developed. Many are shallow, coarse textured, and have low cohesion and small amounts of organic matter. The soils are low to moderate in productivity. The soil resource has been impacted as a result of past activities associated with ski area development, road construction and timber harvesting, with the greatest adverse effects on areas with steep slopes.

Special Interest Areas

No special interest areas have been currently designated, but the Tallac Historic Site is a candidate. Emphasis in this area is on the nationally significant historic resource. Emerald Bay, Osgood Bog, Freel Peak Cushion Plant Community, and Taylor Creek Wetlands are among the other areas having potential for designation. There are no candidate rivers for wild and scenic status.

Timber and Vegetation

Timber management activities have been aimed at maintaining healthy, diverse timber stands of high scenic quality for watershed protection, recreation use and wildlife habitat. Most recent activity, however, has been in salvaging dead and dying trees and removing hazards from recreation sites. More attention is needed in creating openings that are beneficial to wildlife.

The timber inventory is over two billion board feet, growing at a rate of about 32 million board feet per year. There are 78,550 acres classified as tentatively suitable for timber production (capable of producing at least 20 cubic feet per acre per year). There is no regulated timber harvest. However, there is an average annual harvest of 2.4 million board feet of saw log and 2.0 million board feet of firewood.

Visual Resources

Protection of scenic quality has been a high priority. About 45% is Class A-Distinctive, the other 55% is classified as Class B-Common. About 94% shows no evidence of human disturbance and another 3% show disturbance that is evident but does not dominate the natural landscape. A system for rating visual conditions along major highways and the shoreline of Lake Tahoe is used and indicates where improvements are needed.

Water

Both the quality and quantity of water in the Lake Tahoe Basin are of great concern. The primary threat to water quality has been increased nutrients being transported to the lake via erosion from land disturbing activities. Deposition of impurities from the atmosphere may also contribute significantly to reduced water clarity. The Forest Service uses Best Management Practices to minimize environmental impacts of land disturbing projects. A land capability system is used by all agencies to locate and restrict development based on tolerance to disturbance. Through the Santini/Burton Act, federal support is provided to local governments in their efforts to remedy watershed problems and environmentally sensitive land is being acquired to prevent development. A program of watershed restoration needs to be expanded to remedy past problems and bring facilities into compliance with standards.

The quantity of water that can be used by both California and Nevada has been governed by the California-Nevada Joint Interstate Compact Commission. Demand for water in the basin appears to exceed the quantity available.

Wilderness

The LTBMU has 21,330 acres of wilderness, with 21,300 acres in Desolation Wilderness and 30 acres in the Granite Chief Wilderness. Two roadless areas (22,265 acres) remain in further planning from RARE II which requires analysis for wilderness and nonwilderness values. In addition, a new roadless area resulted from land acquisition on LTBMU land near Incline Village and on the Toiyabe National Forest. This area is also evaluated for wilderness recommendation.

Wildlife

Over 250 species of wildlife inhabit the basin. Management indicator species (MIS) were identified to help ensure maintenance of viable populations. These include representatives from recovery, sensitive, harvest, and special interest species groups. The Forest Service has managed the habitat for wildlife primarily through protection from disturbing activities and through vegetation management, especially timber harvest.

Chapter 4 - The Environmental Consequences

This chapter forms the scientific and analytic basis for the comparison of alternatives described in Chapter 2. Each element of the environment is discussed as to the direct, indirect, and cumulative effects of implementing the alternatives.

Economic

Numerous economic indicators were measured. Only the most significant to the basin are summarized.

All alternatives result in benefits about ten times greater than federal expenditures. However, most of the benefits are non-cash. That is, there are no returns to the U.S. Treasury for much of what the forest produces.

Cash benefits per year range from less than $1 million to $1.8 million, primarily from recreation fees and timber sales. Alternative E has the highest return to the Treasury and Alternative G the lowest. Costs exceed returns to the Treasury in all alternatives. The degree to which this cash flow is negative is primarily influenced by the costs, which vary more between alternatives than the receipts do. Alternatives E and H have the greatest negative cash flow in the first decade due the timber harvest cost and land acquisition programs. Alternative G has the least negative cash flow because capital investments and other government costs are kept low. Rankings of alternatives in relationship to cash flow remain the same in the fifth decade except for alternatives F and H which improve with completion of the watershed restoration and land acquisition programs. Alternative E, where timber is harvested on lands requiring high logging and mitigation cost, has the greatest negative cash flow in the fifth decade.

Present net value is influenced primarily by recreation and timber harvest. Recreation provides high benefits (primarily non-cash) in relationship to costs and therefore increases PNV. The costs of timber harvest, on the other hand, exceeds the benefits. This is the case for all harvest levels including the minimum management requirement (MMR) which requires cutting at least 40 acres per year for diversity to maintain viable wildlife populations. Wilderness increases PNV, while improvements for water, air, visual quality, and wildlife habitat conditions decrease PNV. Fire programs that increase the budget for environmental protection reduce PNV. Alternative D is the most efficient and thus has the highest PNV ($683 million). Alternative A (Selected) is the third highest ($650 million), and Alternative G (Low Budget) is the lowest ($455 million) because it cannot provide the benefits to PNV from recreation expansion.

Income and employment does not vary substantially between alternatives. Those with the highest level of ski area and other recreation development create the most jobs.

Purchase of environmentally sensitive land is the only significant speculative and currently unquantified economic value. Though some resource benefits would be derived from these acquisitions, they would be insignificant when compared to cost. It is the value of protecting the irretrievable clarity of the water in Lake Tahoe that is the unquantified benefit. Purchase costs to prevent development may be much less than the cost to mitigate impacts if the land were developed.

Social

Social benefits vary greatly by alternative and cannot be measured as best or worst in relationship to different social groups. Generally social groups which benefit from the production of marketable goods and services would favor alternatives A, D, E, H, and I since they provide the highest level of developed recreation and skiing. Environmentalists would benefit the most from alternatives C and F which are the most protective of water quality and change the natural appearance of the basin the least.

Air

Air quality would be affected most by increased auto emissions, recreation activities, and smoke from slash burning. Alternatives having the largest

increases in recreation have the potential for increasing auto emissions. However, mitigation measures required to offset the increases in auto emissions are expected to improve air quality. Alternatives A and C also implement programs to expand bicycle and pedestrian trails and other measures to help reduce dependence upon the auto. The amount of smoke is related both to amount of slash caused by timber activities and the amount disposed of through burning. Alternatives D, F, and G produce much less smoke than current management, whereas E and H produce much more.

Diversity

Diversity would be affected by the amount of timber cutting in each alternative. A minimum of 40 acres would be regenerated in alternatives A, B, C, D, and G. This should maintain diversity, but not achieve the desired level unless natural processes such as wildfire and forest pests assist in the creation of early successional stages. Alternative E has the greatest potential for diversity with a high level timber program and the clearing of trails for skiing.

Facilities

Other than improvements to roads and the closure of unneeded roads, few changes would occur. Some roads would be built to access new recreation sites. Alternative E would be an exception as roads are also built to access timber after the 4th decade. Alternative G also closes about 16% of the existing system roads to save maintenance costs. Trail mileage would be added in all alternatives. Administrative sites would not change substantially in any alternative. Dams currently maintained for fish and recreation would be reduced substantially in Alternative E and to a lesser extent in B, D, and G.

Fire

Acreage burned by wildfire would be within a narrow range of 30 to 75 acres per year even though there is a large range in the size of the fire protection organization and the method of response between alternatives. There is greater potential for loss of improvements, including homes and businesses on the edge of communities, in alternatives D and G where the protection organization is smallest.

Fish

Fish habitat should improve in all alternatives, but the most in A, C and F, since lake and stream protection and improvement measures are required to meet water quality thresholds. In addition, some alternatives place greater emphasis on direct habitat enhancement.

Forest Pests

Integrated pest management practices would vary in kind and intensity between alternatives based upon the need to control damage from pests. Most alternatives would have more emphasis placed upon the use of these practices than is currently employed. Alternatives B, D, and G would have less emphasis than current because of smaller recreation programs.

Geology

Hazards from natural geologic related incidents would not vary substantially from the current low potential. Significant increases in timber harvest, road construction, mining, hydroelectric development or recreation development could increase the risks of rockfall and landslide. Groundwater quality and quantity is not likely to be adversely affected.

Historical and Cultural Resources

Activities planned in each alternative have the potential to disturb cultural resources. Alternatives A, D, E, H, and I have the greatest potential because of ski area and other recreational development, and timber harvesting. These same alternatives, however, would require cultural resource surveys before the activities are performed and thus knowledge of the resource would be enhanced at an earlier time than in alternatives B, C, F, and G. Alternatives A, C, and F emphasize evaluating and nominating sites to the National Register and interpreting them for public enjoyment.

Lands

All alternatives acquire environmentally sensitive land to protect water quality and to enhance public recreation opportunities. Average annual rate of acquisition would be about 300 acres for the first decade. Landline surveys are completed in relation to activity and land acquisition levels. Alternatives A, C, D, and F would have 18 miles surveyed for the first decade, which is greater than the current six mile average. Alternative G would survey about two miles per year. All alternatives would have about the same level of nonrecreation special use activity. Alternatives A, C, D, F, and I with the largest acreage of wilderness might have special land uses spread over less area. Alternatives D and E would designate a utility corridor through the south end of the basin. All alternatives would acquire road and trail rights-of-way.

Minerals

Mineral exploration and development is not expected to differ between alternatives and probably would remain at a very low level. Alternative C would have largest land area withdrawn from mineral entry (37%), whereas other alternatives would have from 15 to 29% of forest land withdrawn from mineral entry.

Range

All alternatives increase forage through transitory range following timber harvesting. Grazing in the basin is marginally economical on existing use areas and would be continued at the present rate in Alternative A. Grazing would be much less cost effective on areas not currently grazed. Only Alternative E (which favors market goods) more than doubles the grazing and uses a substantial portion of the 3,800 animal unit month potential. Alternative H meets a 46% increase target, while D, F, and G have no grazing, favoring economic efficiency and amenity values. Grazing would be phased out in Alternative C.

Recreation

The summer and winter recreation opportunity in the basin is large and is used in nearly all alternatives. Only alternatives B and G would fall short of meeting future demand because of budget limitations on

construction of facilities and meeting operational costs. Alternative F would not increase developed recreation use and skiing in order to protect water, air, and visual quality and wildlife habitat. Alternative C would delay development of most recreation facilities except those supporting dispersed recreation activities until the second decade. Ski area development would fall below demand in 40 to 50 years in Alternative A to avoid excessively disturbing the watershed. Dispersed recreation would increase in all alternatives. There would be greater emphasis on roaded recreation and OHV use in alternatives E and H, but alternatives A, B, C, D, F, and I favor unroaded recreation.

Research Natural Areas

Grass Lake Moss Bog is recommended to the RNA system in alternatives A, C and F. None of the alternatives adversely affect the area for RNA purposes.

Riparian Areas and Stream Environment Zones

These environmentally sensitive areas are significant to meeting water quality thresholds. Thus in all alternatives they would receive protection. In alternatives A, C, H, and especially F restoration of disturbed stream environment zones would be high priority. Increased timber management and dispersed recreation use above current levels (as occurs in alternatives A, C, D, E, F, H and I) could result in more potential adverse effects to manage.

Sensitive Plants

Increased use of Lake Tahoe beaches would occur in all alternatives and would have potential effects upon Tahoe Yellow Cress. Other species are less accessible because they grow at high elevations and would not be as vulnerable from increased recreation use or other disturbances.

Soil

Soil disturbance, both temporary and permanent, would occur in all alternatives as a result of ski area and other recreation development, trail and road construction, timber management and other planned activities. Alternatives B and F would remain at about current levels of disturbance, and G would actually decrease with the closure of some recreation sites and roads. Other alternatives, including A, would have an increased level of disturbance with E having the highest level. Alternative C would defer the disturbance from recreation development at least through the first decade.

Special Interest Areas

Alternatives A, C, and F designate the Tallac Historic Site as a SIA with management emphasis on the nationally significant historical resources; and Emerald Bay, Osgood Bog, Freel Peak Cushion Plant Community, and the Taylor Creek Wetlands are recommended for evaluation in this planning period as possible SIAs. Alternatives B, D, E, G, H and I do not designate or recommend further study of any SIAs. None of the alternatives nominate any rivers to wild and scenic status.

Timber and Vegetation

Management activities would change the structure and condition of the forest over time. Changes would be relative to the amount of timber harvest and the kind of treatment. All alternatives, except C, would create 40 acres or more of openings each year to enhance diversity. Alternative C allows selective harvesting only and thus would not induce openings in the forest. Natural change would continue to occur on high hazard land, except in alternatives E and H, where timber treatment occurs on some high hazard land. More older and younger trees would be present on the low hazard land in alternatives A, F, and I including small openings (typically 1-2 acres) in the forest. Alternatives D and E would do about the same, but with large openings (20 acres). Fire and forest pests would be active on a small scale in changing forest conditions.

Visual

Ski area construction and timber management activities would cause the greatest disturbance to the visual landscape. Location and design would play an important role controlling the effect. Alternatives A, B, C, F, G, H, and I would remain similar to existing visual quality with more than 90% of the land area appearing natural even after 50 years. Alternative D would appear about 75% natural, and Alternative E would have about half of the land area appearing natural. Alternative F would be the most natural appearing.

Water

Ski area development and timber harvesting on high hazard land have the greatest potential for adverse effects upon water quality through soil erosion. Alternative E would have the greatest potential for adversely affecting water quality. Alternatives F and G would result in less impact than currently exists. Alternatives A, C and F would have the largest watershed restoration program, completing the inventory of remedial work in 20 years. Alternate H would have a moderate level program, while alternatives B, D, E, G, and I would have a small program taking over 50 years to complete the inventory. Deposition of airborne nutrients from auto emissions and smoke would also adversely effect water quality. This impact would be directly related to the level of recreation use and amount of slash burning, but activities off of the forest would contribute the greatest adverse effect. None of the alternatives would exceed the allowable land coverage limits of the Land Capability System. Water yield would increase in all alternatives as a result of timber harvesting and ski area clearing. The amount of increase is related to the size of the timber and ski programs, with Alternative E having the greatest and B, C, F and G the least. Water consumption and necessary water rights are relative to the size of the recreation, wildlife, and erosion control program.

Wilderness

Desolation would continue in wilderness management in all alternatives. Roadless and undeveloped land north of Incline Village, near Mt. Rose, would be recommended for wilderness in alternatives A, C, D, F, H, and I and remain unroaded in B and G. Freel roadless area would also be recommended for wilderness designation in alternatives C, D, F, H, and I and remain unroaded in A, B, and G. Only Alternative E builds roads into Freel to access timber. Lincoln Creek is recommended for wilderness in C, D, F, and I. Alternative C is the only alternative which recommends

wilderness for the Dardanelles area, which was released in the California Wilderness Act.

Wildlife

All alternatives improve conditions for wildlife, but there would still be a shortage of some vegetation successional stages. Alternative F is the most beneficial to sensitive wildlife. Nesting bald eagles and Peregrine falcons are expected to occur in the future in all alternatives.

Adverse impacts to the environment are prevented through the use of protection measures and other management direction described in the standards and guidelines to comply with air, water, and noise thresholds in all alternatives. For other thresholds, the standards and guidelines vary by the theme of the alternative. Since the air and water elements of the environment have deteriorated below the threshold, improvement must be made. This is done through investment in remedial measures.

All alternatives would have short-term uses that have the potential to reduce the long-term future condition of Lake Tahoe as a natural irretrievable resource. Alternative E poses the greatest potential for reducing the long-term productivity of the area, while A, C and F are designed to do just the opposite.

Chapter 5 - List of Preparers

The LTBMU Interdisciplinary Planning Team coordinated and conducted the planning activities for development of the forest plan and the FEIS. Team members integrated all socio-economic and resource disciplines according to multiple use principles. Team members employed their specialized experience and knowledge to fulfill the interdisciplinary requirements of NFMA. Other specialists both inside and outside the Forest Service were employed to assist as needed.

Chapter 6 - Mailing List

The mailing list in Chapter 6 names the agencies, organizations and persons to whom copies of the EIS and plan were sent.

Glossary
Bibliography
Index

Appendices - The appendices for this FEIS, bound as a seperate volume, are:

A. Issues, Concerns, and Opportunities.
B. The Modeling and Analysis Process.
C. Roadless Area Descriptions and Evaluation.
D. Economic Efficiency Analysis.
E. Timber Tables and Graphs.
F. Budgets and Their Relationship to the Forest Plan.
G. Public Comment.

(End Summary)

CONTENTS

CHAPTER 1. PURPOSE AND NEED

A. Purpose and Nature of the Action 1- 1
B. Vicinity 1- 5
C. Relationship of the Forest Plan to the Regional Plan for the Lake Tahoe Basin 1- 8
D. Scope of Issues, Concerns, and Opportunities to be Addressed ... 1- 9

CHAPTER 1. PURPOSE AND NEED

A. Purpose and Nature of the Action

In 1974 Congress acted upon the need for coordinated and long-range planning of the uses and resources provided by the national forests. Two pieces of legislation were passed:

The Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), and the

National Forest Management Act of 1976 (NFMA), amending RPA.

This legislation requires that comprehensive, long-range forest plans replace the separate and often uncoordinated resource management plans.

Additional legislation required national forests, prior to developing a complete forest plan, to investigate and make public:

- Alternative approaches which could be used in developing the plan.
- The environment to be affected by the plan.
- Anticipated environmental consequences of the alternatives.

These are the major subjects in this Environmental Impact Statement (EIS), as required by:

-- the National Environmental Policy Act (NEPA), and the

-- Council on Environmental Quality (CEQ) regulations.

The format established in 40 CFR 1502.10 of the CEQ regulations is followed in this EIS.

The alternatives presented in these documents contain specific management actions for the plan period of ten to fifteen years. The plan period is defined by the NFMA regulations as one decade (36 CFR 219.3), while the law permits a 15 year maximum (16 USC 1604(f)(5)). Within the plan period, conditions on the forest will be reanalyzed and a revised plan developed (36 CFR 219.10(g) and (16 USC 1604(f)(5)).

Management actions, outputs, and environmental and socio-economic effects for several decades beyond the plan period are also discussed for the alternatives. The purpose of these discussions is twofold: (1) To present for decision makers and the public a long term analysis of the management necessary for each alternative. Included is disclosure of what is needed to achieve and maintain in perpetuity a high level of regular, periodic outputs of the various resources without impairment to the productivity of the land (16 USC 531); and (2) Program development for the RPA requires information for four decades beyond the plan period (16 USC 1602). In order for the analysis of

alternatives for an RPA program to link with actual conditions and local issues at the forest level, a complete estimate of outputs, costs, and effects for the RPA horizon is needed.

Projection of alternative attributes beyond the plan period, although required by law, does not legally bind the forest to action beyond the plan period. As noted above, the forest is required to revise the plan within 15 years, and this revision may establish different long term goals with different future projections.

From among the alternative approaches described in the EIS for developing the forest plan, one was chosen as the Selected Alternative and has been developed into the forest plan. Published as a separate document, the forest plan:

- guides management of the forest for 10 to 15 years
- defines how land areas will be managed through a combination of activities for which they are most suited
- provides for multiple use and sustained yield of goods and services from the national forest in a way that maximizes long term net public benefits in an environmentally sound manner
- responds to major issues, management concerns, and resource opportunities
- when approved, will supersede the Land Management Plan for the Lake Tahoe Basin Management Unit, 1981.

All existing resource management plans were examined by the forest's interdisciplinary planning team during this planning process. Plans consistent with and appropriate for the forest plan are incorporated by reference. These include:

Range allotment plans for:	
Trout Creek	-1963
Meiss	-1971
Cold Creek	-1981
Carter	-1983
Desolation Wilderness Plan (except the fire management portion)	-1978
Visitor Information Services Plan	-1978
Carson River Deer Herd Plan	-1982
The Loyalton Truckee Deer Herd Plan	-1983
Land Acquisition Plan (PL 96-586)	-1982
Trail Management Plan	-1980
Pacific Crest Trail Management Plan	-1981
Gate Management Plan	-1982
Sensitive plant interim management plans for:	
Rorippa subumbellata	-1982
Lewisia pygmaea	-1981
Carex paucifructus	-1981
Draba asterophora	-1981

Peregrine Falcon Management Plan	-1981
Bald Eagle Winter Management Plan	-1979
Pacific Coast States Recovery Plans for Peregrine Falcon and Bald Eagle	-1982 & 1986
Beaver Management Plan	-1980
Snag Management Plan	-1980

Forest plans are only one part of the Forest Service planning framework. See Figure 1.1. The National RPA Recommended Program sets direction and assigns targets to the Regions for producing goods and services. Each Region in turn provides direction and allocates its share of the national production levels to its forests; each forest plan validates or provides a basis for changing the production levels assigned by the Region.

Locally, site specific activities and projects carry out the direction developed in the forest plan. These local projects can use all of the data, evaluations, and other information in the plan and the EIS as the basis for project environmental analysis. This process of "tiering to" the broader documents and incorporating the plan and EIS by reference permits concentration on issues specific to subsequent smaller projects. Similarly, the forest plan is tiered to the Pacific Southwest Regional Guide which is tiered to the National RPA Program.

The forest planning process, as specified in the National Forest Management Act, is an interdisciplinary approach which, with public participation, gives full consideration to economic, environmental, and social impacts. It includes the following steps:

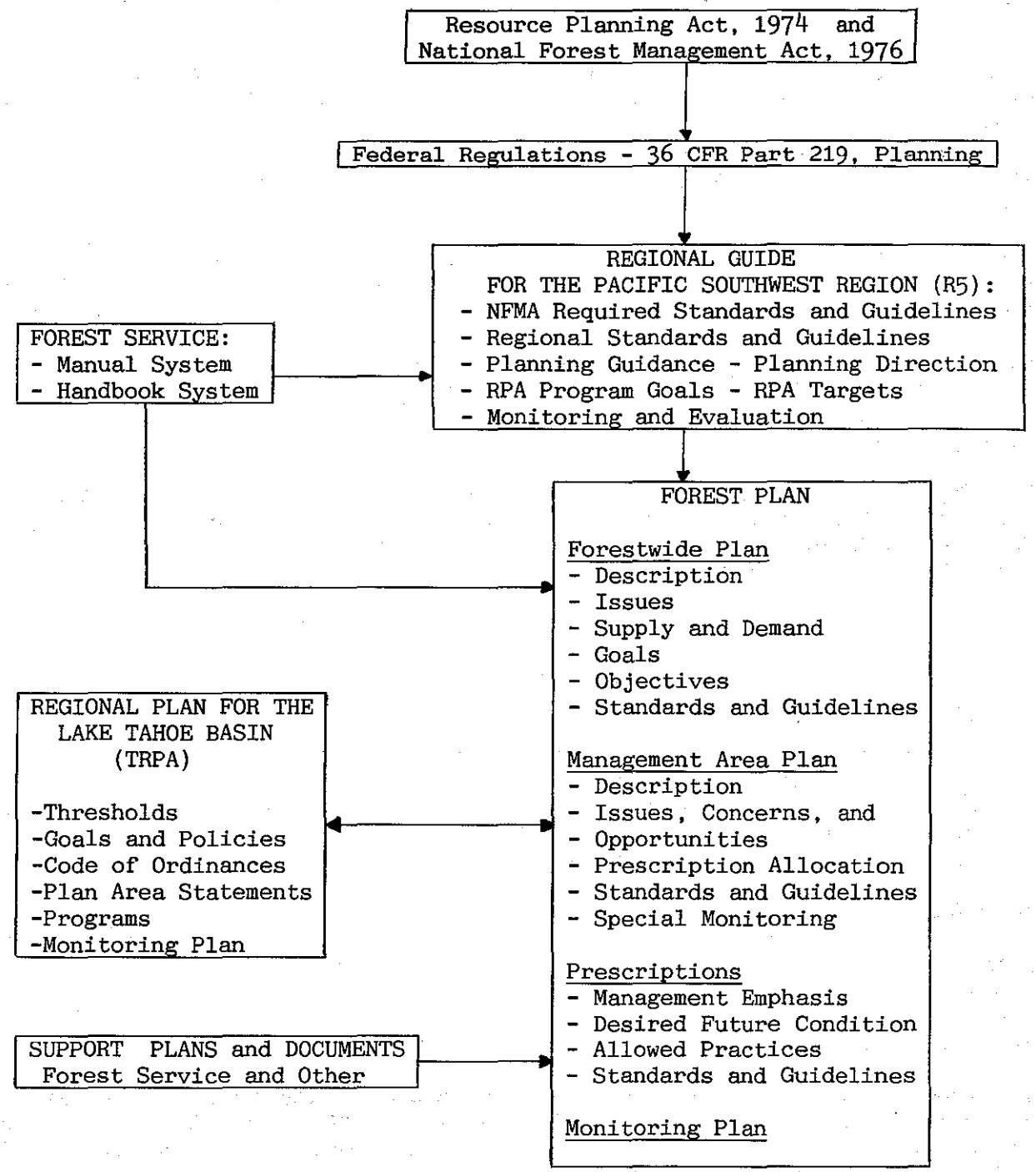
1. Identification of issues, concerns, and opportunities
2. Development of planning criteria
3. Inventory of data and information collection
4. Analysis of the management situation
5. Formulation of alternatives
6. Estimating effects of alternatives
7. Evaluation of alternatives
8. Selection of the preferred alternative (or "proposed action")
9. Plan implementation
10. Monitoring and evaluation

This EIS presents the results of steps 1 through 7 (above) and identifies the Selected Alternative (proposed action) which formed the basis for the forest plan. Public comments on the plan and the EIS were used in developing this Final Environmental Impact Statement and the forest plan. The selection of Alternative A as the forest plan is documented in a Record of Decision by the Regional Forester.

The public may also review the planning records (files containing details of the planning process) at the Forest Supervisor's Office, 870 Emerald Bay Road, South Lake Tahoe, California. These records are referenced throughout the EIS and forest plan at appropriate points.

A glossary is included to aid readers with unfamiliar terms.

Figure 1.1 FRAMEWORK FOR FOREST PLANNING



B. Vicinity

"Lake Tahoe and the surrounding land is a unique scenic and recreational resource of both regional and national significance. Contributing to the scenic resource are the fresh alpine air, the crystal blue lake, mountain vistas, snow-capped peaks, coniferous forests and meadows, and a wide variety of wildlife. The recreational resource includes opportunities to "participate" in this beautiful scenery (hike, ski, camp, swim, boat, fish, and tour by auto) and to gamble and be entertained at the resort hotels/casinos. The scenery together with the recreation provide "The Tahoe Experience". No one wants to spoil that experience. Yet, little by little, Tahoe's breathtaking beauty is blurring, and little by little, the quality of a recreational visit to Tahoe is deteriorating". This is the area as described in the Lake Tahoe Environmental Assessment - Executive Summary, as written for the Western Federal Regional Council in 1979.

The Department of Interior has identified the Lake Tahoe Basin as an area having high priority for nomination to the National Register of Natural Landmarks to give recognition to the unique environmental and recreation values of the area.

A number of Congressional classifications, such as a National Recreation Area or a National Scenic Area, have been proposed for the Lake Tahoe area. Many people have viewed such a classification as the only way to assure adequate regulation of urban development and use to preserve the quality of water in the lake. Currently, with the revitalization of the Tahoe Regional Planning Agency (see next section), interest in a special classification has subsided. Should the TRPA fail to instill confidence that the quality of the area is being protected, renewed interest in a special classification will probably reappear as a major planning issue.

The Lake Tahoe Basin Management Unit (LTBMU) was established in 1973 to consolidate administration of all national forest lands in the Lake Tahoe Basin, which until that time were part of three national forests. In the national forest system, the LTBMU is unique. The consolidation provides for more orderly and direct management in a very complex political jurisdiction. The basin includes portions of two states, California and Nevada, and parts of five counties: Placer, El Dorado, and Alpine in California; and Washoe and Douglas in Nevada. In addition, the rural area of Carson City, Nevada extends into the basin. El Dorado County contains the City of South Lake Tahoe. There are more than 50 other local government authorities as well, most of which are concerned with special functions such as water services, schools, sanitation, and public utilities. All of these entities interact in some manner with the Forest Service, either regularly or from time to time.

The boundary of the LTBMU is defined as the watershed of Lake Tahoe plus the area under permit to Heavenly Valley Ski Area adjacent to the basin. See Figure 1.2 Lake Tahoe Basin. Land area by jurisdiction is contained in Table 1.1.

Figure 1.2

Lake Tahoe Basin Vicinity Map

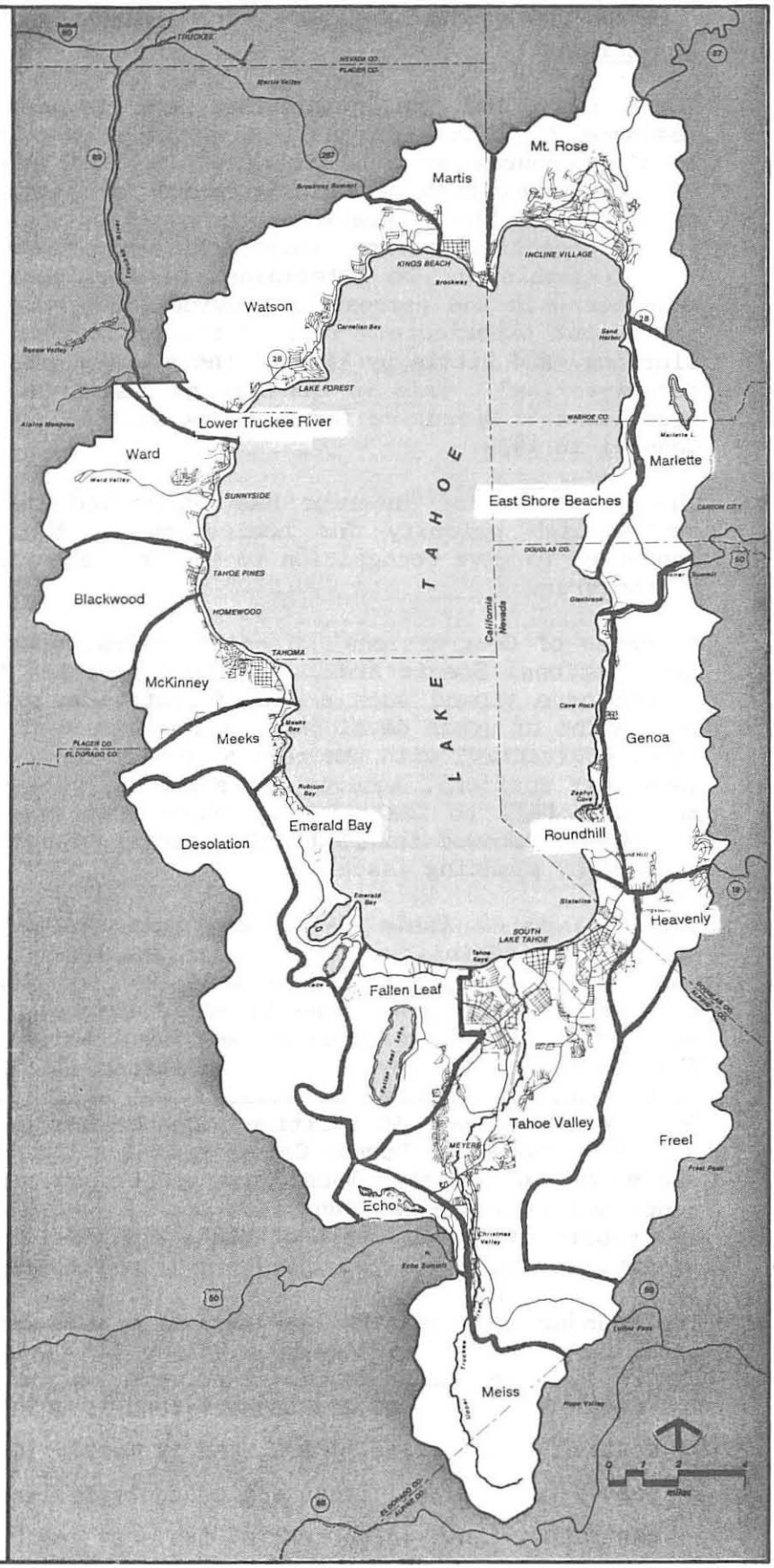


Table 1.1 Land Area and Shoreline by Jurisdiction 1/

LTBMU Acreage Inside Tahoe Basin

	Land Area (acres)	Lake Tahoe Shoreline (miles)
California	155,170	41.4
Nevada	50,080	29.6
Total land area	205,250	71.0
Placer	31,134	
El Dorado	82,268	
Alpine	4,216	total:
Total national forest in California	117,618	3.5
Washoe	6,707	
Carson	3,640	
Douglas	16,831	total:
Total national forest in Nevada	27,178	7.7
Total national forest land	144,796	11.2
Other public lands		
California State Parks	6,871	10.2
Nevada State Parks	6,775	4.1
Tahoe Conservancy	269	0.4
Incline Village GID	18	0.6
Washoe County	****	---
Douglas County	533	---
Placer County	184	(w/ El Dorado)
El Dorado County	12	2.4
Total	14,662	13.7
Total public ownership	159,458	
Private ownership in California	30,949	24.5
Private ownership in Nevada	16,410	17.8
Total private ownership	47,359	42.3

LTBMU Acreage Outside the Tahoe Basin

National forest	2,937	
Nonnational forest	758	
Total	3,695	
	TOTAL:	**TOTAL:**
NATIONAL FOREST OWNERSHIP IN THE LTBMU	147,733	11.2

1/ Acreage figures computed from 10-82 S2K data base (138,311), plus donations, purchases and acquisitions of other property through January 14, 1987; shoreline figures accurate as of December, 1987.

C. Relationship of the Forest Plan to the Regional Plan for the Lake Tahoe Basin

Public Law 96-551, the revised Tahoe Regional Planning Compact, established the Tahoe Regional Planning Agency (TRPA). Often referred to as the Bi-State Compact, it is an agreement between the States of Nevada and California and the Federal government on goals for the Lake Tahoe Basin. Findings in the compact reaffirmed that the Lake Tahoe region has outstanding environmental and recreational values that are being threatened by increasing urbanization. Congress originally gave consent to the compact through PL 91-148 in 1969. Weaknesses in that agreement brought about the revision in 1980.

Directed by the compact, the TRPA established Environmental Threshold Carrying Capacities for the basin. The thresholds are the standards against which all projects and activities are measured for the achievement of the goals established in the compact. In cooperation with many Federal, State, and local agencies, as well as individuals and organizations, the TRPA has developed a new regional plan for the area. While the TRPA Plan deals mainly with urban planning issues, it also establishes a framework for management of the natural environment, including national forest land.

The TRPA is the lead regulatory agency for private land in the basin. While the Forest Service is directed to cooperate with the TRPA, nothing in the Act affects the applicability of any laws or regulations of the United States, such as the NFMA and supporting regulations. In 1978, the Western Federal Regional Council adopted and documented the "Federal Policy for the Lake Tahoe Basin". This statement of policy serves to coordinate the role of the Federal government in the area, recognizing that individual agencies often have conflicting missions and objectives. Upon occasion activities of one agency are at cross-purposes with those of another or with the established goals for the Lake Tahoe Basin.

Federal statutes, other than the Bi-State Compact, require the Forest Service to comply with the environmental thresholds relative to water, air, solid waste, and noise. (Appendix E of the forest plan provides a complete list of the TRPA Environmental Thresholds and Carrying Capacities.) Although not legally bound to the visual, vegetation, wildlife, fisheries, and recreation thresholds, the Forest Service has worked closely with the TRPA, both when the thresholds were developed and with their regional planning process. In fact, the TRPA and the Forest Service have cooperated fully over more than a decade in obtaining information about the resources in the area and performing analyses important to planning matters.

As a result of the cooperative planning efforts and the significant role that water, air, scenery, and outdoor recreation have in the basin, the TRPA Regional Plan and the Selected Alternative for national forest management presented in this EIS have much in common. However, issues for the national forest land were sufficiently different from those upon which the TRPA focused in its planning. Therefore, the Forest Service was required to do independent analysis to meet NFMA regulations.

D. Scope of Issues, Concerns, and Opportunities Addressed

It is clear that the major issues in the basin have to do with the level and types of development and with the protection of the environment. The intensity of planning in the basin over the past decade has allowed the Forest Service to meet and scope with the public on many occasions. The result is a good understanding about what issues are foremost in the mind of the public about management of national forest land in the basin. Some of the issues identified by the public resulted from responses to planning the Forest Service did prior to 1980 in preparing a land management plan for the LTBMU. Other concerns were expressed when the public responded to the planning processes and actions of other governmental agencies in the basin. Preparing the land acquisition plan under the Santini/Burton Act in 1980 also provided additions to the list of issues. (Details on the issue identification process are in Appendix A.)

From an analysis of all the sources of public expression, the following five issues were identified for resolution in this planning process.

1. Water Quality - How does national forest management affect water quality in the Lake Tahoe Basin and what are our opportunities to improve water quality?

2. Recreation - What kinds and amounts of outdoor recreation opportunities should be provided on national forest land, recognizing the carrying capacity limits of the Tahoe Basin?

3. Forest Management/Thresholds - What portion of the public's "fair share" (see the insert block on page 1-11 for an explanation of "fair share") of the basin carrying capacity is appropriate for forest management other than recreation use, and what is the appropriate blend of resource outputs to be contributed toward meeting national demands? Included in this broad issue is the regional fish and wildlife deferred issue DI-2; "What should be the desired future condition of fish and wildlife in the PSW region?".

4. Further Planning Areas - How should the roadless and undeveloped areas in the "further planning" category be managed? (Congress has resolved the wilderness issue for Dardanelles, Pyramid, and the LTBMU portion of Granite Chief through passage of the California Wilderness Act of 1984. Thirty acres of the new Granite Chief Wilderness are inside the basin. The rest of these three released areas are to be managed for nonwilderness uses as determined through this planning process. Freel and Lincoln Creek remained in the further planning category with both wilderness and nonwilderness management options available.)

5. Management of Environmentally Sensitive Lots - How should environmentally sensitive lots, acquired through the Santini/Burton Act, be managed?

Collectively, the issues, concerns, and opportunities (ICO's) indicate the scope and nature of the analysis needed for the EIS, and they act as blueprints in the structuring of alternatives. The ICO's represent important reasons for considering changes in the current management direction and are instrumental in formulating alternatives and understanding the consequences of implementing any of the alternatives.

In the course of the analysis, several other resource use and development concerns and opportunities surfaced. While they may not have been identified as major issues, they do indicate areas where management could be more effective and net public benefits increased. Some of the more important of these are:

- provide more integrated direction for forest management for specific areas to better achieve multiple use objectives

- to clarify consumptive and instream water needs on the national forest as a basis for requesting water rights

- to examine cost-effective alternative fire management strategies and standards, particularly in remote areas

- to negotiate with TRPA the amount of mitigation required for Forest Service activities

- to provide more specific criteria for consideration of special use applications

- to consider the merits of designating a utility corridor for a major trans-Sierra electrical transmission intertie

Public comment following review of the Draft EIS and proposed forest plan, required examination and reanalysis of issues thought by the public to be inadequately considered in preparation of the draft documents. The most significant ones were:

- should additional areas be recommended for wilderness?

- should more or less off-highway vehicle activity be planned? How can the opportunities and restrictions of the OHV plan be made clearer?

- what is the preferred timber program considering public concern for use of clearcutting, commercial logging, and use of herbicides?

- how much recreation development should be planned and at what rate should it be scheduled?

- in how many years should the watershed restoration program be completed?

- which areas, if any, should be identified as Special Interest Areas?

"Fair Share" is a term often used in the Tahoe Basin and in this planning document. Since it is an underlying concept in both Issue #2 and Issue #3, further explanation is warranted. Fair share refers to the portion of the total Lake Tahoe Basin capacity reserved by public agencies to manage for the benefit of the general public. The need to establish and reserve a "fair share" of the capacity results from the expectation that the amount of development which will be permitted to occur will be less than demand. Once the capacity is filled, no new development will be allowed. Both public agencies and private interests are concerned about who will and will not get to build or conduct activities to fill the capacity. The process to date has generally favored those who come forward with a proposal first. This situation has led to speculative, and sometimes "panic" building, particularly in the private sector. Public agencies feel the need to reserve capacity for public facilities to be built in the future, in response to anticipated future demand. Without such a provision, the remaining capacity could be used up by the private sector, leaving the general public with few opportunities available in the future. Thus a "fair share" was sought to reserve a segment of the capacity. The amount was negotiated with the TRPA. When needed, this "fair share" will assure that public lands can be utilized for general public enjoyment and other public purposes.

(End Chapter 1)

CONTENTS

CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

A. Introduction 2-1
B. Alternative Development Process 2-2
  1. Introduction 2-2
  2. Description of Process..... 2-2
  3. Range of Alternatives 2-4
C. Benchmarks 2-4
D. Alternatives Considered But Eliminated From Detailed Study 2-7
E. Alternatives Considered in Detail 2-11
  1. Introduction 2-11
  2. Direction Common to All Alternatives 2-12
  3. Management Prescriptions and Management Areas 2-16
  4. Individual Alternative Descriptions 2-23
  5. Comparison of Alternatives 2-77
    a. Narrative 2-77
    b. Acres by Prescription 2-82
    c. Outputs and Other Key Comparisons 2-82
    d. Timber Land Classification (Suitability)..... 2-82
    e. Treatment of Issues 2-82
    f. Economic Effects 2-99

CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

A. Introduction

This chapter describes what an alternative is, the process used to develop the alternatives, how the analysis demonstrates that a broad range of reasonable alternatives was considered, the limitations of the considered alternatives, and the relationship of the alternatives to each other. It also describes the purpose and function of benchmarks and the alternatives considered but eliminated from detailed consideration.

A planning alternative is a specific choice for managing the forest and its resources. Each alternative carries out a central theme which creates a future forest condition based on the degree of emphasis given to the various resources present. Each alternative tries to reach an individual set of goals and objectives which differ from other alternatives by specifying an assortment of available management prescriptions for each part of the forest.

The laws, regulations, and directions relating to alternatives and how they are formulated are: (1) the Forest and Rangeland Renewable Resources Planning Act (RPA), as amended by the National Forest Management Act (NFMA) which requires the preparation of a National Forest Land and Resource Management Plan; (2) the procedures (36 CFR 219) for implementing RPA, as amended; (3) the National Environmental Policy Act (NEPA) which requires disclosing the consequences of implementing the proposed action and alternatives; (4) the Council on Environmental Quality NEPA regulations (40 CFR 1500) which provide procedures for implementing NEPA; (5) the PSW Regional Guide which provides guidance and direction for national and regional issues; and (6) directions found in Forest Service manuals and handbooks that elaborate upon the objectives and procedures found in laws, regulations, and Department of Agriculture policy statements for the Agency.

Regulations implementing the National Forest Management Act require the identification of current public issues, management concerns, and resource use and development opportunities (ICO's) which provide the basis for the forest planning process. Consequently, the planning process is responsive to changing conditions. A public issue is a subject or planning question of widespread public interest identified through public participation that relates to management. A management concern is a problem requiring resolution or a condition constraining management practices identified by the Interdisciplinary and Management Teams.

Goals describe the desired future condition to be achieved. Objectives are planned, measurable results that respond to the goals. Objectives form the basis for future planning that define the precise steps to be taken and the resources to be used to achieve the identified goals. Forestwide standards and guidelines establish the baseline conditions that must be maintained to carry out broad forest plan direction or goals. The precise steps and necessary resources to achieve the forest plan objectives are collectively referred to as practices or prescriptions. These multiple use prescriptions are a set of

management practices applied to a specific area to attain specific objectives. All multiple use prescriptions are designed to be cost effective. Cost effectiveness is the most efficient way for the Forest Service to achieve resource objectives. All management prescriptions, however, may not contribute to the total present net value (PNV) of the forest (see Appendix D for information regarding present net value).

B. Alternative Development Process

1. Introduction

The formulation of alternatives (planning action 6) is the culmination of actions 1 through 5 of the NFMA planning process. The following summarizes how these actions were accomplished on the LTBMU. Although presented as a list of steps accomplished in sequence, many actions occurred concurrently.

2. Description of Process

Step 1 Public issues were identified through public involvement efforts. Forest Service management concerns were also identified and combined with the public issues to form an integrated list of issues and concerns. Issues and concerns were screened, and those that could be appropriately addressed through the land management planning process were identified and used to guide the remaining steps in the process. Appendix A contains a more detailed discussion of the scoping and screening process.

Step 2 The interdisciplinary planning team (ID Team) completed an analysis of the management situation (AMS) which described resource management opportunities that would respond to the issues and concerns. Where possible, demand levels were determined for developed and dispersed recreation, alpine skiing, grazing use, timber products, and water. Changes in management direction to deal with forest problems were also described. The AMS is available for review in the forest planning records.

Step 3 The ID team developed a comprehensive list of practices and activities that could be applied to the forest land. These activities were built into a computer model, FORPLAN, and are referred to as FORPLAN prescriptions. These practices and activities allow for achievement of the entire range of resource opportunities described in the AMS. Appendix B contains a more detailed discussion of the use of FORPLAN.

Step 4 The forest was divided into land units that would allow estimation of the resource outputs and costs associated with the FORPLAN prescriptions. These units, called analysis areas, were delineated to allow distinction among the different capabilities and suitabilities of sites on the forest.

For each analysis area, the ID team identified the full range of suitable FORPLAN prescriptions that could be applied to an area considering site capability and suitability. In order to make the

suitability determination, the physical and biological attributes of each area, such as vegetation type and slope, were considered.

All practices and activities that were feasible and would not cause permanent impairment of site productivity were identified as suitable. Resource outputs and their associated costs and values for each FORPLAN prescription were also developed. The forest planning records provide detailed documentation of the analysis area suitability determination.

Step 5 A series of computer runs were made to determine the outer limits of the Forest Service decision space on producing goods and services. These "benchmarks" (described below) identified minimum levels of management and maximum levels of outputs and economic efficiency, subject to minimum management requirements.

Step 6 Taking into account the limits and opportunities defined by the analysis of the benchmark, themes for alternatives were developed to provide a broad range of options for future management. This step was guided primarily by NFMA planning regulations and RPA direction to reflect a broad range of commodity and amenity resource uses and values, and funding levels. Within these themes, issues and concerns were considered when developing the specific objectives and constraints of each alternative. As a whole, the alternatives were formulated to allow for a range of responses to each issue and concern where the forest was capable of providing such a range. The alternatives are described in this chapter.

Step 7 FORPLAN was used to determine the most cost efficient combination of activity and timing choices for each alternative. Other objectives which embodied the unique goals of each alternative were added. The individual objectives used for the alternatives along with a rationale for each are discussed in Appendix B. FORPLAN selected the most suitable prescriptions to be applied to each analysis area based on PNV and other objectives.

Step 8 The results of the computer runs for each alternative were evaluated to ensure that the prescriptions and schedule of resource outputs could be implemented on the ground. Adjustments were made when necessary to produce a feasible schedule of outputs and prescriptions meeting the theme and goals of the alternative.

Step 9 Management prescriptions were developed and management areas delineated to spatially distribute FORPLAN alternative solutions. Each management prescription is a set of compatible directions, including standards and guidelines, necessary to attain multiple use goals and objectives while applying the FORPLAN prescriptions. The management prescription provides a particular emphasis that would occur on a defined area. Each management area would have one or more management prescriptions.

Step 10 Comparison of the PNV produced under each alternative provided a means to evaluate alternatives based on the dollar value of goods and

services produced. Specifically, the cost or trade-off of adding individual objectives or sets of objectives were evaluated.

Step 11 With few exceptions, the process actions described above (the analysis of the management situation, the delineation of analysis areas, the development of coefficients, the FORPLAN analysis, and the cost efficiency analysis based on PNV) were developed objectively. Understanding and interpreting issues and concerns and developing themes for alternatives to represent a wide range of emphasis or management options could be considered the more subjective aspects for the planning process. In addition (because it is not possible to assign dollar values to all forest resource outputs or to include them all in the FORPLAN model) consideration also had to be given to nonquantifyable benefits and costs such as the diversity of wildlife and fish species, the quality of recreation experiences, and the value of cultural resources. Though subjective in nature, an assessment of the nonquantifyable benefits and costs associated with each alternative was made jointly by the forest's interdisciplinary and management teams. The evaluation of net public benefits (i.e. the combination of quantitative and qualitative resource benefits) was the final criterion used to arrive at the selected alternative the proposed action in this EIS.

3. Range of Alternatives

A broad range of reasonable alternatives were developed and analyzed. Themes of alternatives were developed that would produce a distribution of major commodity and amenity resource values and also expenditure levels. The distribution was generally between the minimum potential level and the maximum potential levels determined in the analysis.

Statutory obligations limit the range of alternatives. Classification of 21,330 acres as part of the Wilderness Preservation System prevents this land area from being considered for multiple use purposes. Also, existing permitted uses such as roads, utility rights-of-way, recreation residences, resorts, and ski area development limit the uses on occupied land.

C. Benchmarks

Benchmarks are used to determine the maximum physical and biological capabilities of the LTBMU, limit the decision space of feasible alternatives, and to form a basis for comparing alternatives.

The objectives of the benchmarks are:

- to display physical, biological, and technical capabilities. (With the exception of the flow benchmark (FLW), they are limited by Forest Service policy minimum management requirements.) The benchmarks are physically and technically capable of being implemented. Operational limitations usually make benchmarks impractical to consider as alternative plans. Operational limitations would include program mixes and output schedules which may be so distorted that work could not be reasonably accomplished.

- to provide an analytical base for developing alternatives and to provide a reference point to compare alternatives.

Benchmarks explore the resource potential and the current situation, and also determine the need for change and identify the decision space within which change can or must occur. Table 2.1 compares benchmarks by outputs, activities, and acreage of land use by prescription. Table 2.22 compares benchmarks for wilderness recommendations. A complete technical description of and the modeling specifications for each benchmark is located in Appendix B.

The following section describes what was learned from each benchmark during the analysis process.

MLV: Minimum Level Management. This benchmark estimates the background outputs and fixed costs associated with maintaining national forest system lands. The main output is dispersed recreation associated with the highway system in the basin, with the adjacent urban area, and with natural attractions, such as beaches. Background water yield is estimated at 316,700 acre feet per year. By definition, no market goods are produced in this level of management. The budget of fixed costs would be approximately $700,000 annually.

FLW: Unconstrained Maximum Present Net Value with Long Term Sustained Yield Policies. This benchmark provides the most economically efficient level of valued resources. The analysis showed that timber production and grazing are not economically efficient on the LTBMU, despite the large amount of tentatively suitable land. The inefficiency of these outputs is a result of administrative cost in the basin exceeding benefits. Recreation is efficient, and both developed and dispersed forms are increased to meet projected demand, including expansion of skiing at four locations. The annual budget would gradually rise from $3.4 million a year (about the FY82 level) to nearly $5 million as recreation investment and operation increased.

MMR: Maximum PNV with Minimum Management Requirements. This benchmark takes the FLW benchmark and adds NFMA regulation requirements that are outside of Forest Service authority to change. These include preservation of threatened and endangered (T & E) species, viable populations of vertebrate wildlife species, maintenance of diversity, riparian areas, and soil and water productivity. See Appendix B for an explanation of how these requirements were modeled. This analysis shows the collective opportunity costs of the NFMA requirements. For the LTBMU, there is almost no opportunity cost except for meeting the diversity requirement. To maintain adequate diversity, the LTBMU must harvest (through regeneration cutting) 40 acres per year with a timber yield of 1 MMBF. This causes a reduction in PNV of $4 million. This benchmark was carried forward in detail as Alternative D.

1/ Operational limitations would include program mixes and output schedules which may be so distorted that work could not be reasonably accomplished.

MKV: Maximum PNV with Market Values Only. This benchmark estimates the most efficient levels of outputs when only market goods (timber, range, and developed recreation) are valued. Developed recreation is increased to meet projected participation, while dispersed use is only at the minimum level. Since timber and grazing are inefficient on the LTBMU, they are not produced above the MMR level in this benchmark.

TBR: Maximum Timber. This benchmark calculates the biological potential yield, limited only by timber policies and minimum management requirements. For the LTBMU this potential yield equals approximately 33 MMBF annually through intensive clearcutting with openings as large as 20 acres permitted. Dispersed recreation increases to projected participation levels. Developed recreation and skiing increase slightly, but most lands suitable for development would be managed for timber production. PNV would be reduced $265.7 million from the MMR benchmark.

H2O: Maximum Water. The objective in this benchmark is to induce the most water possible through vegetation manipulation. Maximum water yield would be 336,000 acre feet per year, or a 7.5% increase over background. To achieve this would require harvesting timber almost at the maximum timber benchmark level. The slightly higher water yield achieved under the maximum water benchmark is a result of ski area expansion, resulting in increased yield from ski runs which are not reforested after initial harvesting. Developed and dispersed recreation use could be accommodated up to projected participation levels. PNV would be reduced $199 million from the MMR benchmark.

RGN: Maximum Range. This benchmark looks at the LTBMU biological capacity to produce and utilize grazing forage. The LTBMU has forage capacity to produce 3,800 AUM, far more than called for in the President's policy target of 2,250 AUM. To produce this maximum level reduces PNV by $1.2 million.

WLN: Maximum PNV with Maximum Wilderness. The assigned value of a wilderness RVD is greater than that of a dispersed RVD outside of wilderness. Wilderness allocations in the basin involve minimal resource tradeoffs and only slightly increased administration cost. Therefore, wilderness is the most efficient use of further planning areas in the LTBMU, making this benchmark identical to MMR.

NON: Maximum PNV with No Roadless Areas to Wilderness. This benchmark analyzes the opportunity costs of nonwilderness uses in Freel and Lincoln Creek further planning areas. It is identical to the MMR except in this respect. The PNV is reduced $1 million as a result.

General Conclusions: Developed recreation, especially skiing, is always the most economically efficient use of the land up to the projected participation level. To meet this level for skiing requires expansion of all suitable sites. There is enough land potentially suitable for developed recreation to meet projected demand. The standard service level is always selected as most efficient unless limited by budget. Total dispersed recreation use is also efficient (when it is valued), and projected participation can be met. Wilderness is the most economically efficient use of the two further planning areas.

Timber harvesting is not economically efficient and is only selected to meet other objectives such as diversity, specified yields, etc. Range production is also inefficient and only selected to meet assigned targets.

The most limiting factor on timber production in the resource emphasis benchmarks is the dispersion policy that prohibits adjacent openings. This policy forces distributing timber harvesting around the basin, even on high hazard and nonaccessed lands. The MMR for soil and water productivity has little impact on timber production because the dispersion policy is the most limiting.

The watershed restoration program has few benefits that are valued in the conventional sense. Therefore, the least expensive program is always selected in the benchmarks.

D. Alternatives Considered But Eliminated from Detailed Study

This section describes alternatives that were considered but not discussed in detail. These additional alternatives, which broaden the range of alternatives considered, were eliminated from detailed study.

High Productivity Alternative

The High Productivity Alternative required in the regional planning direction was eliminated. For the LTBMU, this alternative was nearly identical to the High Market Alternative (Alternative E). Both had a timber yield target of 20 MMBF. The only difference was that the High Productivity Alternative was expected to reach this level by the second period and the High Market did not have to reach it until the fifth period. Since the High Market can meet the same 20 MMBF target on a nondeclining yield basis, it is presented as an alternative considered in detail and represents the High Productivity Alternative as well.

Maximum Amenity Alternative

Like the Amenity Alternative (Alternative F), this alternative had the theme of improving water quality through a program of limiting and reducing the amount of land disturbing activity on environmentally sensitive land.

To implement the alternative would require phasing out of developed recreation sites and other improvements located on high hazard land and on those sites that are not sewered or suitable for sewering. Sites that would be considered for this action are Heavenly Valley Ski Area, Echo Chalet Resort, Angora Lake Resort, Meeks Bay Resort, and recreation residences at Echo Lakes, Echo Summit, Emerald Bay, Angora Lakes, the Glenn Alpine area, and parts of Fallen Leaf Lake. Also, many system roads on high hazard land would be closed, restored to natural contours, and revegetated.

Table 2.1a. **Benchmarks - Outputs and Activities**

(Decade 1 is the period 1986-1995)

Activity or Resource	MLV	FLW	MMR	MKV	TBR	H2O	RGN	NON
Present Net Value ($Million)	552	1,244	1,240	1,216	978	1,040	1,238	1,239
Timber (million board feet)								
Base Year (1982)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Decade 1	0	0	.8	.8	33.2	29.3	.9	.8
Decade 2	0	0	.9	.9	33.2	29.3	1.0	.9
Decade 3	0	0	1.0	1.0	33.2	29.3	1.1	1.0
Decade 4	0	0	1.1	1.1	33.2	29.3	1.2	1.1
Decade 5	0	0	1.2	1.2	33.2	29.3	1.3	1.2
Grazing (AUM)								
Base Year (1982)	1400	1400	1400	1400	1400	1400	1400	1400
Decade 1	0	0	0	0	600	400	3800	0
Decade 2	0	0	0	0	500	600	3800	0
Decade 3	0	0	0	0	600	600	3800	0
Decade 4	0	0	0	0	500	500	3800	0
Decade 5	0	0	0	0	400	400	3800	0
Water Yield (M acre feet)								
Base Year (1982)	317	317	317	317	317	317	317	317
Decade 1	317	318	318	318	328	329	318	318
Decade 2	317	318	318	318	332	336	318	318
Decade 3	317	318	318	318	333	336	318	318
Decade 4	317	318	319	318	331	334	319	319
Decade 5	317	318	319	318	329	331	319	319
Deer (numbers of animals)								
Base Year (1982)	1300	1300	1300	1300	1300	1300	1300	1300
Decade 1	1304	1282	1318	1368	2456	2595	1334	1368
Decade 2	1293	1267	1333	1423	3309	3637	1362	1423
Decade 3	1293	1267	1333	1423	3309	3637	1362	1423
Decade 4	1293	1267	1333	1423	3309	3637	1362	1423
Decade 5	1293	1267	1333	1423	3309	3637	1362	1423
Deer User Days (WFUD)								
Base Year (1982)	2700	2700	2700	2700	2700	2700	2700	2700
Decade 1	2710	2710	2730	2800	4400	4600	2750	2800
Decade 2	2710	2710	2730	2800	4400	4600	2750	2800
Decade 3	2710	2710	2710	2710	4400	4600	2750	2800
Decade 4	2710	2710	2730	2800	4400	4600	2750	2800
Decade 5	2710	2710	2730	2800	4400	4600	2750	2800
Resident Fish (M pounds)								
Base Year (1982)	87.8	87.8	87.8	87.8	87.8	87.8	87.8	87.8
Decade 1	87.8	88.4	88.4	88.4	87.8	87.8	87.8	88.4
Decade 2	87.8	88.4	88.4	88.4	87.8	87.8	87.8	88.4
Decade 3	87.8	88.4	88.4	88.4	87.8	87.8	87.8	88.4
Decade 4	87.8	88.4	88.4	88.4	87.8	87.8	87.8	88.4
Decade 5	87.8	88.4	88.4	88.4	87.8	87.8	87.8	88.4
Spotted Owl (number of pair)								
Decades 1 through 5	NA	NA	NA	NA	NA	NA	NA	NA
Goshawks (number of pair)								
Base Year (1982)	12	12	12	12	12	12	12	12
Decade 1	16	16	16	13	12	12	13	13
Decade 2	16	16	16	13	12	12	13	13
Decade 3	16	16	16	13	12	12	13	13
Decade 4	16	16	16	13	12	12	13	13
Decade 5	16	16	16	14	12	12	14	14

Table 2.1b. **Benchamrks - Outputs and Activities**

(Decade 1 is the period 1986-1995)

Activity or Resource	MLV	FLW	MMR	MKV	TBR	H2O	RGN	NON
Bald Eagles (potential nesting pair)								
Base Year (1982)	0	0	0	0	0	0	0	0
Decade 1	2	0	2	2	2	2	2	2
Decade 2	2	0	2	2	2	2	2	2
Decade 3	2	0	2	2	2	2	2	2
Decade 4	2	0	2	2	2	2	2	2
Decade 5	2	0	2	2	2	2	2	2
Peregrine Falcon (nesting pair)								
Base Year (1982)	0	0	0	0	0	0	0	0
Decade 1	1	0	1	1	1	1	1	1
Decade 2	1	0	1	1	1	1	1	1
Decade 3	1	0	1	1	1	1	1	1
Decade 4	1	0	1	1	1	1	1	1
Decade 5	1	0	1	1	1	1	1	1
All Other Wildlife Species (M WFUD)								
Base Year (1982)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Decade 1	2.73	2.70	2.70	2.71	4.40	4.60	2.71	2.71
Decade 2	2.75	2.70	2.70	2.72	5.76	6.12	2.71	2.72
Decade 3	2.75	2.70	2.70	2.72	5.76	6.12	2.71	2.72
Decade 4	2.75	2.70	2.70	2.72	5.76	6.12	2.71	2.72
Decade 5	2.75	2.70	2.70	2.72	5.76	6.12	2.71	2.72
Resident Fish other than T & E								
Base Year (1982) (MWFUD)	44.60	44.60	44.60	44.60	44.60	44.60	44.60	44.60
Decade 1	44.60	44.74	44.74	44.74	44.60	44.60	44.60	44.74
Decade 2	44.60	44.85	44.85	44.85	44.60	44.60	44.60	44.85
Decade 3	44.60	44.85	44.85	44.85	44.60	44.60	44.60	44.85
Decade 4	44.60	44.85	44.85	44.85	44.60	44.60	44.60	44.85
Decade 5	44.60	44.85	44.85	44.85	44.60	44.60	44.60	44.85
Developed Recreation (M RVD)								
Base Year (1982)	1393	1393	1393	1393	1393	1393	1393	1393
Decade 1	0	1549	1549	1549	1537	1549	1549	1549
Decade 2	0	1783	1783	1783	1680	1783	1783	1783
Decade 3	0	2005	2005	2005	1793	2005	2005	2005
Decade 4	0	2241	2241	2241	1895	2227	2241	2241
Decade 5	0	2520	2520	2520	1895	2340	2520	2520
Dispersed Recreation (M RVD)								
Base Year (1982)	1019	1019	1019	1019	1019	1019	1019	1019
Decade 1	614	1200	1200	1200	1200	1200	1200	1200
Decade 2	685	1351	1351	1351	1351	1351	1351	1351
Decade 3	741	1470	1470	1470	1470	1470	1470	1470
Decade 4	792	1578	1578	1543	1578	1578	1578	1578
Decade 5	850	1697	1697	1611	1697	1697	1697	1697
Wilderness (acres)								
Base Year (1982)	21330	21330	21330	21330	21330	21330	21330	21330
Decade 1	22265	43565	43565	36900	33752	33752	37545	21330
Decade 2	22265	43565	43565	36900	33752	33752	37545	21330
Decade 3	22265	43565	43565	36900	33752	33752	37545	21330
Decade 4	22265	43565	43565	36900	33752	33752	37545	21330
Decade 5	22265	43565	43565	36900	33752	33752	37545	21330
Total Cost ($Million)								
Base Year (1982)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Decade 1	1.5	3.5	3.6	3.2	8.1	7.9	3.7	3.6
Decade 2	1.5	4.0	4.2	3.7	10.4	10.6	4.3	4.2
Decade 3	1.5	4.7	5.0	4.5	13.4	13.2	5.2	5.0
Decade 4	1.5	5.0	5.4	4.8	14.5	14.5	5.4	5.3
Decade 5	1.5	5.4	5.9	5.2	15.1	15.6	6.0	5.8

Table 2.1c. Benchmarks - Acreage Allocation by Prescription

	Management Prescription 1/	MLV	FLW	MMR	MKV	TBR	H20	RGN	NON
1	Developed Recreation	0	4,508	4,508	4,508	4,448	4,508	4,508	4,508
2	Alpine Skiing	0	7,905	7,905	7,905	3,335	7,905	7,905	7,905
3	Unroaded Recreation	0	45,054	29,958	51,376	11,184	9,700	7,324	47,358
4	Roaded Recreation	0	19,819	19,819	7,000	0	0	7,000	7,420
5	Intensive Dispersed Recreation	3,622	3,622	3,622	3,622	3,622	3,622	3,622	3,622
6	Wilderness	22,265	43,565	43,565	36,900	33,752	33,752	37,543	21,300
7	Administrative Site	48	54	54	54	54	54	54	54
8	Wetlands Management	1,817	1,817	1,817	1,817	1,022	1,817	1,022	1,022
9	Maintenance	72,250	10,763	10,763	10,763	5,875	11,308	5,875	5,875
10	Timber Stand Maintenance	1,593	1,593	1,593	1,593	10,407	18,317	10,407	10,407
11	Reduced Timber Harvest	0	0	626	1,162	950	626	984	0
12	Urban Lots	NA	NA	NA	NA	NA	NA	NA	NA
13	Research Natural Area	NA	NA	NA	NA	NA	NA	NA	NA
14	Utility Corridor	NA	NA	NA	NA	NA	NA	NA	NA
15	Full Timber Harvest	0	0	14,470	12,000	61,641	514,470	46,137	59,445
16	Intensive Grazing	0	0	0	0	2,410	0	6,319	2,410
	TOTAL 2/	138,700	138,700	138,700	138,700	138,700	138,700	138,700	138,700

1/ Management prescriptions are described in detail elsewhere in this chapter.

2/ Only the land area within the 1982 data base is included.

The alternative was eliminated from detailed study for several reasons. This approach to improving water quality would have significant adverse social and economic impacts. Over one half of existing developed recreation use would be eliminated from the national forest system land at Lake Tahoe. Substantial cost would be incurred to replace this amount of use on low hazard land. Even then, some types of use, such as skiing, could not be replaced since it is dependent upon steep lands that are nearly always classed as environmentally sensitive. Concessionaires of the involved resorts would experience financial impacts in the termination of their operations and removal of their improvements. Jobs would be lost. National forest permit holders would not receive comparable treatment to similar uses on private land in that private improvements on environmentally sensitive land have not been targeted for removal. Adequate administrative access (particularly for fire suppression) to some land would be adversely affected by the removal of roads. Rejecting this alternative does not imply that the Forest Service is unconcerned about the adverse environmental effects of improvements. Rather, the Forest Service is dealing with these effects through measures aimed at remedying as much of the impact as possible in order to maintain the base of existing recreation facilities.

1980 RPA Program

This alternative was analyzed in detail in the draft environmental impact statement (DEIS). Analysis and public comment showed this alternative was nearly identical to Alternative H which is also designed to meet the 1980 RPA program targets. This alternative included timber clearcuts up to 20 acres in size. Alternative H meets the RPA objectives without clearcutting and is, therefore, preferred. It is displayed in detail.

E. Alternatives Considered in Detail

1. Introduction

This section describes the alternative themes, issues and concerns, the FORPLAN assumptions used, and the relationships of the concepts.

Nine of the alternatives developed were chosen for detailed analysis to address specific issues or concerns, and requirements of laws, regulations, or policies. A management philosophy or goal (theme) was developed for each alternative. These themes provided a link between the alternatives and the issues and concerns and guided the development of the FORPLAN assumptions.

The alternatives differ from each other in the amount of production targets, in how the environment is affected by the implementation of the alternative (see Chapter 4), and in the total acres of land allocated to a management prescription. Each alternative description includes the specific resource objective to be achieved and the environment to be created.

Average annual outputs were projected for five 10-year periods.

2. Direction Common to All Alternatives

The benchmark analysis shows the maximum capabilities of the LTBMU to produce net value of goods and services. Benchmarks, however, do not consider all the factors that limit management opportunities. These limiting factors, or objectives, are grouped into four types: minimum management requirements, minimum implementation requirements, forest objectives common to all alternatives, and forest objectives that vary between alternatives. Appendix B contains a discussion of the modeling rules and impacts for each of these categories.

Minimum management requirements (MMR) translate the legal requirements of the National Forest Management Act regulations (36 CFR 219.27). They represent a minimum legal basis for managing national forest land and are therefore outside of Forest Service authority to change. They are applied to all alternatives and most benchmarks. The Regional Forester defined the rules for modeling the MMR based on the requirements described in 36 CFR 219.27. The requirements most relevant to the LTBMU plan and model are summarized below.

CFR 219.27(a) All management prescriptions shall-

(1)Conserve soil and water resources and not allow significant or permanent impairment of the productivity of the land;

(3)...prevent or reduce serious, long lasting hazards and damage from pest organisms, utilizing principles of integrated pest management ....

(4)Protect streams, streambanks, shorelines, lakes, and other bodies of water....

(5)Provide for and maintain diversity of plant and animal communities...

(6)Provide for adequate fish and wildlife habitat to maintain viable populations of existing native vertebrate species ....

(8)Include measures for preventing the destruction or adverse modification of critical habitat for threatened and endangered species.

(10)Ensure that any roads constructed .... are designed according to standards appropriate to the planned uses, considering safety, cost of transportation, and effects upon land and resources;

(12)Be consistent with maintaining air quality that .... meets or exceeds applicable Federal, State and/or local standards or regulations.

CFR 219.27(b)Vegetative manipulation. Management prescriptions that involve vegetative manipulation of tree cover .... shall-

(1)Be best suited to the multiple-use goals established for the area ....

(2)Assure that lands can be adequately restocked .... except where permanent openings are created for wildlife habitat improvement, vistas, recreation uses and similar practices;

(5)Avoid permanent impairment of site productivity and ensure conservation of soil and water resources;

(7)Be practical in terms of transportation and harvesting requirements, and total cost of preparation, logging, and administration.

CFR 219.27(c)Silvicultural practices.

(1)No timber harvesting shall occur on lands classified as not suited for timber production .... except for salvage sales, sales necessary to protect other multiple-use values or activities .... if the forest plan establishes that such actions are appropriate. ...

CFR 219.27(e)Riparian areas. Special attention shall be given to land and vegetation for approximately 100 feet from the edge of all perennial streams, lakes, and other bodies of water. This area shall correspond to at least the recognizable area dominated by the riparian vegetation .... (f)Diversity. Management prescriptions .... shall preserve and enhance the diversity of plant and animal communities ..... so that it is at least as great as that which would be expected in a natural forest ....

The MMR are achieved by limiting the choice of activities or by limiting the amount of land that can be treated or disturbed at any one time. Timber policies ensure that timber harvest meets the sustained yield, culmination of mean annual increment, and dispersion policies. Additional information regarding how compliance with the MMR was ensured can be found in Appendix B.

Minimum implementation requirements (MIR) apply only to alternatives, not to benchmarks. They ensure that the alternatives are minimally acceptable and implementable on the ground. They are within agency control, but at the forest level there is little discretionary control on how they are applied. On the LTBMU, protection of sensitive plants and visual resources along scenic highways and operational feasibility are applicable MIR. Standards and guidelines satisfy the first two requirements. Operational feasibility is modeled by limiting the number of acres that can be clearcut in any one decade. The limit is 18% of the total suitable acres available for even-aged management. This restriction is based on the assumption that it is not operationally practical to harvest more than 18% of the acres in one decade.

The Clean Water and Clean Air Acts make the States responsible for setting air, water, and noise standards. All alternatives meet these specific numerical standards and goals which are identified in the environmental thresholds (see forest plan Appendix E). However, to ensure that an adequate range of alternatives and their tradeoffs can be examined, some individual policies - such as limiting the size of forest openings to five acres or less - are only applied to nonmarket emphasis alternatives. In the market emphasis alternatives, these policies may be relaxed on the assumption that either the goal or standard can still be achieved through additional mitigation. If TRPA thresholds are to be violated by the alternative, the violation will be explicitly described.

"In September 1984, the Pacific Southwest Region of the USDA-Forest Service issued an draft environmental impact statement (DEIS) for Vegetation Management for Reforestation. Included in the DEIS are detailed discussions and analyses of a preferred alternative (continuation of the current policy), alternatives to the preferred including no vegetation management, no application of herbicides, and no aerial application of herbicides. Also included are estimates of the consequences of these alternatives on the environment. Based on the preferred alternative in the Vegetation Management EIS, all alternatives in this forest plan EIS are predicated on the continued use of the full range of vegetation treatment methods. The LTBMU forest plan directs that: (1) the selection of any particular treatment method will be made at the project level based on a site-specific analysis of the relative effectiveness, environmental effects, and costs of the feasible alternatives, and that herbicides will be selected only if their use is essential to meet management objectives, and (2) monitoring and enforcement plans to implement specific measures will be developed for site-specific projects and described in the environmental analyses for these projects. If the policy were to change to prohibit the use

of herbicides, site preparation and release costs would increase for those alternatives which include 20 acre clearcuts (Alternatives D and E) by approximately 2 percent. The reason for this relatively small increase is that herbicides would likely be used on only a small portion of the acres receiving site preparation and release treatments.

Some forestwide standards and guidelines are also common to all alternatives. The most significant of these are:

Recreation
- Wherever feasible locate new recreational facilities on capability class 4 to 7 land and in proximity to necessary infrastructure. (See forest plan Appendix F for information regarding the land capability system.)
- Continue all existing recreational special use developments unless established criteria for a higher public use or environmental protection of the land warrants termination.
- Expand skiing facilities based upon a master development plan to be prepared for each ski area.
- Limit off-road vehicle use to designated roads, trails, and areas where water quality and other values will not be impaired. (The amount of roads and trails available may vary by alternative.)

Visual Quality
- Improve visual quality where existing conditions are below the visual quality objective established for the area.

Wilderness
- Continue to manage Desolation Wilderness to preserve wilderness values.

Wildlife and Fish
- Maintain viable populations of wildlife and fish indicator species.
- Survey for the presence of spotted owl.
- Manage bald eagle nesting habitat to encourage establishment of four pair.
- Manage the bald eagle winter forage area near Taylor Creek for low human disturbance from November to February. Provide perch trees.
- Reintroduce one Peregrine falcon pair.
- Protect old growth habitat around each active and recently active goshawk nest site.
- Assure adequate stream flow in Taylor Creek for Kokanee salmon spawning.
- Maintain unobstructed stream channel entrances to Lake Tahoe for upstream spawning of fish.

Forest Pest Management
- Follow an integrated pest management (IPM) approach during the planning and implementation of resource management activities, particularly those influencing vegetation. Pest detection, surveillance, evaluation, prevention, suppression and post-action evaluations are to be an integral components of the integrated pest management approach (36CFR219.27(a)(3)).

Timber and Vegetation
- Prevent disturbance of known sensitive plant species. Enhance potential habitat to prevent placement of these species on federal threatened and endangered lists. Species will be managed through individual plans.
- Prohibit regeneration harvest in stream environment zones.

- Assure that areas of regeneration harvest meet stocking standards in five years.

Water and Soil
- Obtain water rights for existing and foreseeable uses.
- Export all solid and liquid waste from the Lake Tahoe Basin except where a waiver has been granted by the State.
- Use the Bailey Land Capability System (see forest plan Appendix F) as a guide for the location of improvements and the amount of allowable impervious coverage.
- Restore damaged watershed sites contributing to water quality degradation.
- Protect stream environment zone from new disturbance.
- Apply Best Management Practices to all new projects. (See forest plan Appendix H.)
- Retrofit existing facilities with Best Management Practices.

Air
- Apply Best Available Control Technology (BACT) to protect air quality.
- Manage smoke generation to achieve venting and dispersal from the basin.
- Mitigate impacts of auto emissions from new recreation development.

Cultural Resources
- Complete the LTBMU cultural resource overview by 1995.
- Manage in accordance with legislative and administrative direction.
- Prepare archeological reconnaissance reports for all undertakings, including plans for mitigating impacts. Consult with State Historic Preservation Offices as mandated.
- Encourage the Washoe tribe to reestablish its historic cultural ties with the Lake Tahoe area by permitting the construction of a cultural center along Taylor Creek, through other means such as interpretive displays and presentations, and by allowing the tribe to collect native plants traditionally used from national forest lands.

Fire
- Plan for protection of life, property, and natural resources from wildfire in cooperation with other agencies and fire districts.
- Attack wildfire consistent with initial action policy.
- Treat fuels caused by vegetation management activities to a level specified in the stand management prescription for the area being treated.

Lands
- Expand national forest landownership through purchase and exchange using the established priorities.
- Acquire unimproved environmentally sensitive lots according to the established program criteria.
- Determine occupancy for special land uses on the basis of case-by-case review. Availability and suitability of private land will be considered in the review.
- Review existing withdrawals to determine if they should continue.
- Acquire rights-of-way for system roads and trails crossing private land.
- Survey, mark, and post landlines before implementing adjacent resource management activities.
- Resolve existing and new occupancy trespasses in a timely way.

Transportation and Facilities
- Maintain system roads and trails to established standards.
- Construct and maintain the Lake Tahoe Rim Trail with the Lake Tahoe Rim Trail Association, a volunteer organization.
- Construct new administrative facilities on land capability classes 4 to 7 except where the nature of the facility requires development on environmentally sensitive land.

Minerals
- Approve locatable mineral extraction through an operating plan.
- Authorize extraction of mineral materials and leasable minerals through sale contracts and lease documents.

Geology and Groundwater
- Complete an inventory of geologic resources and hazards.
- Conduct on-site geologic/geotechnical investigations wherever land disturbing activities or geologic resource utilization are planned, or where geologic hazards pose a risk to human safety.
- Prevent loss of groundwater quality and quantity; enhance where possible.

3. Management Prescriptions and Management Areas

The previous section looked at direction common to all alternatives. This section begins to examine the ways the alternatives respond differently to the issues, concerns, and opportunities.

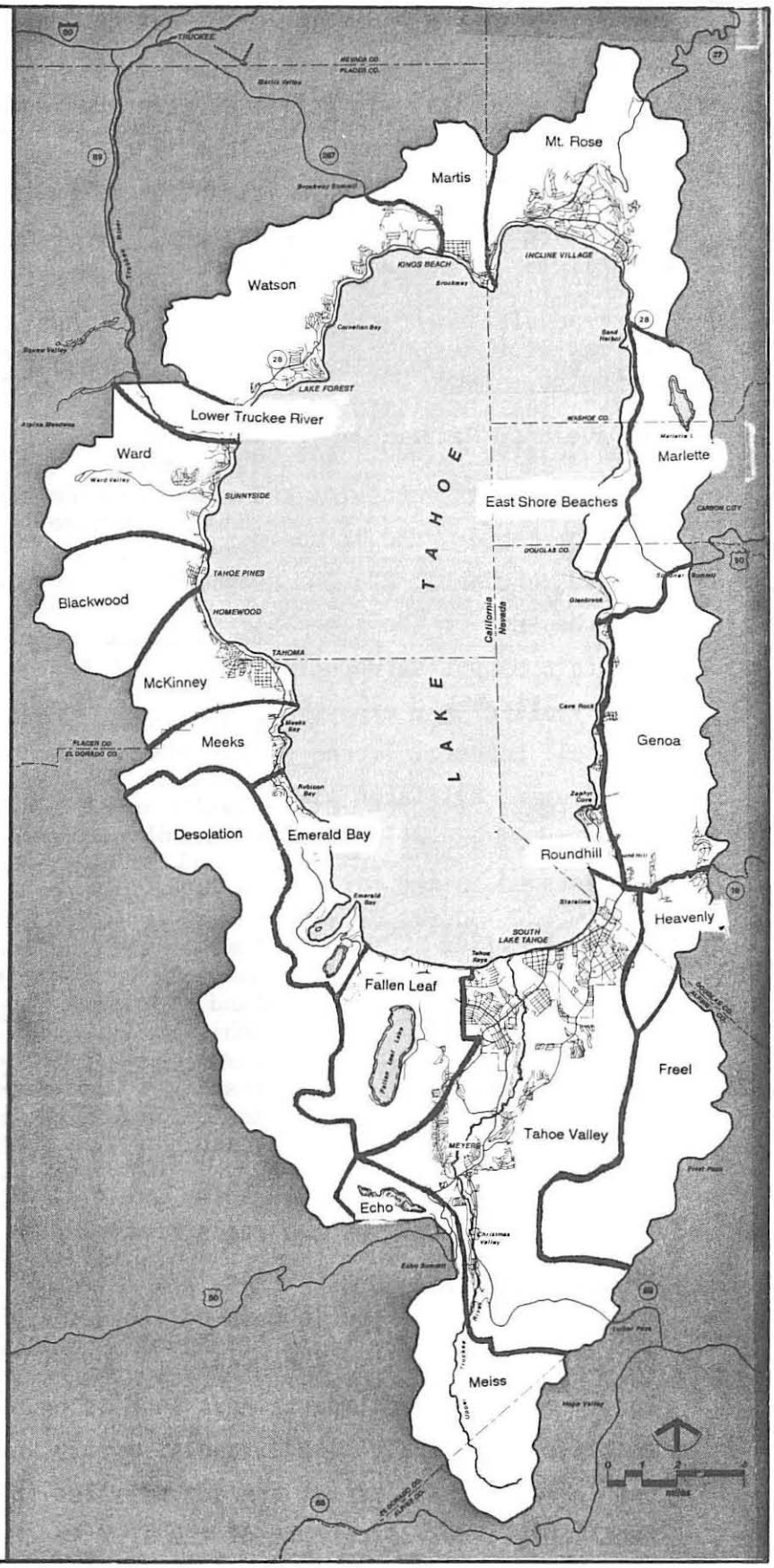
The basic tool for emphasizing different activities on a piece of land is the management prescription. It is defined in the NFMA regulations as "management practices and intensity selected and scheduled for application on a specific area to attain multiple use and other goals and objectives" (36 CFR 219.3). Each prescription emphasizes different activities to vary the costs and the level of goods and services produced. While one resource or activity is usually emphasized in a prescription, other resources may also be produced or managed.

The prescriptions represent the full range of activities that are tentatively suitable on the LTBMU - from wilderness and minimum level management, to various levels of timber management, alpine skiing, and developed recreation.

Land managers find it easier to deal with specific geographical areas, such as a watershed. Therefore, the LTBMU was divided into management areas, which are contiguous lands in some identifiable geographic location, such as Blackwood Canyon. This approach is similar in concept to the 175 plan areas in the TRPA Regional Plan.

Figure 2.1 identifies 20 management areas selected for the LTBMU. The forest plan contains descriptions of and direction for each management area. One additional management area was identified that overlaps with most of the others. That management area, the 21st, is called Urban Lots. It is not shown on the map, but consists of parcels acquired within the urbanized areas of the basin through the Santini/Burton Act. These require special management because of their locations and small size.

Figure 2.1
MANAGEMENT AREAS
LAKE TAHOE BASIN



In formulating alternatives, one or more prescription was assigned to each management area in response to the theme of the alternative and to the issues being emphasized. Therefore, each alternative may have a different mix and acreage number of prescriptions assigned to a management area.

Prescriptions are summarized below. For those prescriptions used in the selected alternative see the accompanying forest plan for a more complete description of each prescription, including the practices allowed or prohibited. Note that not all prescriptions are used in each alternative.

Prescription Number - Name	Management Emphasis Description
1 - Developed Recreation	Construct, maintain, and operate recreation facilities. Ensure an attractive and usable forest setting within and surrounding existing sites. Manage vegetation to ensure a healthy forest to prevent and/or reduce pest-related damage and to reduce numbers of mechanically defective trees. Manage potential recreation development sites so that they remain suitable until they are utilized for recreation improvements. Other activities may be allowed on the undeveloped sites or within existing developed ites where they do not conflict with the primary emphasis on developed recreation. The visual quality objective is Partial Retention when viewed as middleground and Modification or better when viewed as foreground. The preferred ROS setting is Rural or Roaded Natural.
2 - Alpine Skiing	Administer special use permits for existing downhill skiing facilities on national forest land. Ensure that environmental standards are achieved. Expand skiing facilities as needed based upon master development plans. Other resources and activities may be allowed where they do not conflict with the primary emphasis on skiing. The visual quality objective is Partial Retention when viewed as middleground and Modification or better when viewed as foreground. The preferred ROS setting is Rural.
3 - Unroaded Recreation	Maintain a natural forest setting for dispersed recreation, wildlife habitat, and watershed protection. Motorized access will normally not be allowed, except where authorized for winter OHV use. Grazing may be allowed where compatible with the primary emphasis. Timber production is not allowed; however, vegetation management may occur to prevent catastrophic loses in the forest. The visual quality objective is Retention. The

preferred ROS setting is Semi-Primitive Non-Motorized.

4 - Roaded Recreation	Maintain opportunities for use of system roads and designated routes by off highway vehicles. Generally this will be limited to existing routes because the areas are most often high hazard land. Vegetation management practices may occur near roads. Roads will be upgraded with Best Management Practices to achieve water quality standards but would not be upgraded beyond maintenance levels 1 or 2, generally not suitable for sedan travel. Other resources and activities may occur where they do not conflict with the primary emphasis. The visual quality objective is Retention. The preferred ROS setting is Semi-Primitive Motorized.
5 - Intensive Dispersed Recreation	Accommodate large numbers of people engaged in dispersed recreation use on areas that are naturally attractive, such as fragile lake shore or stream sides. Site improvements are limited to those needed to maintain or achieve environmental standards, while leaving the users to have a relatively unconstrained recreation experience. For example, restrooms or portable toilets may be installed to maintain sanitation rather than to provide for the convenience and comfort of the users. Low levels of other resource management may occur where needed to maintain attractive conditions or where compatible with the primary emphasis. The visual quality objective is Partial Retention when viewed as middleground and Modification or better when viewed as foreground. The preferred ROS setting is Semi-Primitive Non-Motorized or Roaded Natural.
6 - Wilderness	Maintain a lasting system of quality wilderness. Provide for public use, enjoyment, and appreciation and for scientific study of the unique characteristics of wilderness consistent with its values. Existing nonconforming uses may be continued where appropriate. Otherwise, only natural ecological changes will be allowed. The visual quality objective is Preservation. The preferred ROS setting is Primitive.
7 - Administrative Sites	Manage sites occupied by facilities needed for national forest administration and protection. Operate and maintain the improvements to established standards. Upgrade facilities with Best Management Practices and energy conservation measures while preserving their historic values. Make them visually compatible with the surrounding

setting. In some cases, administrative facilities may be combined with dispersed or developed recreation facilities. Other resources will not normally be managed intensively in order to protect the facilities. The visual quality objective is Partial Retention when viewed as middleground and Modification or better when viewed as foreground. The preferred ROS setting is Rural.

8 - Wetlands Management

Manage wetlands for their watershed, wildlife, fish, and scenic values. The prescription recognizes the critical importance of wetlands in filtering sediment and nutrients before they reach Lake Tahoe. In most situations, protection from disturbance or unnatural encroachment would be the principle action. Occasionally, encouragement of early successional stages of vegetation would be required through the use of prescribed fire or the removal of invading trees. Other activities may include the construction of nesting islands for waterfowl, controlling water levels, and limiting recreation use. No permanent roads or facilities would be constructed. Grazing may be permitted where compatible with riparian resources. The visual quality objective is Retention. The preferred ROS setting is Semi-Primitive Non-Motorized or Roaded Natural.

9 - Maintenance

Apply minimal management practices needed to maintain watershed conditions, protect from catastrophic fire or insect and disease epidemics, and enforce laws and regulations. There will be almost no practices designed to induce additional outputs or services. Basically, these lands will be scenic backdrop to Lake Tahoe, left in a nearly natural condition. The visual quality objective is Retention. The preferred ROS setting is Semi-Primitive Non-Motorized.

10 - Timber Stand Maintenance

Maintain healthy and diverse vegetation conditions for scenic, watershed, recreational, and wildlife values and to prevent or reduce pest-related damage. Emphasize sanitation cutting and salvage of dead and dying trees where the wood can be harvested and utilized. More intensive timber management may be practiced adjacent to access roads. Timber stands should be maintained at stocking levels that achieve healthy conditions. Dispersed recreation will commonly be associated with this prescription, but will vary from low to high intensity based on the location and characteristics. Habitat improvement projects are encouraged. Grazing and other resource activities

may also be allowed where compatible. The visual quality objective is Retention. The preferred ROS setting is Roaded Natural.

11 - Reduced Timber Harvest

Apply group selection and single tree selection harvest practices to achieve wildlife habitat diversity and a high timber yield over the long term while protecting water quality. Opening size produced by group selection will average about 1 to 2 acres but will not exceed 5 acres. Yields from regenerated stands will be approximately 70% of maximum. Openings will benefit early successional stage species such as deer and quail and will increase diversity from the predominantly medium aged trees in the basin. Existing roads may be reconstructed primarily to meet water quality protection standards. Some temporary roads may be constructed for accessing timber. The visual quality objective is Partial Retention. The preferred ROS setting is Roaded Natural.

12 - Urban lots

Manage the small, environmentally sensitive lots in urbanized areas for their watershed and other environmental values as intended by Congress in PL 96-586. Resource management will be limited to that appropriate in residential neighborhoods, such as removing hazard trees, pest management, law enforcement, watershed protection and restoration, and minor wildlife and fish projects. Occasionally, some facilities may be appropriate to reduce the impact of dispersed recreation uses or to provide access to national forest land. Most of these lots are considered too environmentally sensitive to build upon. A plan will be developed to identify which lots are appropriate to transfer to State and local agencies and to specify the kinds of uses that would be allowed on transferred lots. The visual quality objective is Partial Retention. The preferred ROS setting is Rural.

13 - Research Natural Area

Maintain natural conditions to provide a sample ecosystem suitable for scientific study. Limit uses to research, study, observation, and monitoring and educational activities which are nondestructive and nonmanipulative. Dispersed recreation will not be encouraged, but it may occur to the extent it does not affect natural conditions. The visual quality objective is Preservation. The preferred ROS setting is Semi-Primitive Non-Motorized or Roaded Natural.

14 - Utility Corridor	Designate a corridor of land dedicated to use for major utility and perhaps transportation routes. Service roads may be necessary to maintain the utilities. The needs of the utilities would take precedence over other resource activities, with the exception of water quality. However, the corridor may be wider than the actual right(s)-of-way in it and, therefore, some activity may occur between lines. The visual quality objective is Modification when viewed as foreground and Modification or better when viewed as middleground. The preferred ROS setting is Roaded Natural.
15 - Full Timber Harvest	Obtain optimum yield of wood products over the long term using intensive even-aged management practices, including clearcuts up to 20 acres in size. Timber yields would not usually be reduced for other objectives such as visual quality, smaller opening size, and wildlife habitat. Openings created would also provide temporary benefits for early successional stage wildlife species like deer and could be used for transitory range. Road construction, both permanent and temporary, would be common providing increased motorized access. The visual quality objective is Modification. The preferred ROS setting is Roaded Natural.
16 - Intensive Grazing	Manage primary range (especially meadows) for livestock grazing. This would involve investments for fencing, water developments, noxious weed control, draining wet areas, etc. Encroaching conifers would be removed to produce the maximum forage. Wildlife benefits would not be emphasized. The visual quality objective is Partial Retention. The preferred ROS setting is Roaded Natural.

Where the land is currently committed to a specific use and there is no issue requiring change from that use, the same prescription is assigned in all alternatives. For these areas, the only other choice is Minimum Level in the benchmark analysis. The areas "preallocated" in all alternatives are shown in the Table 2.2.

4. Individual Alternatives Descriptions

Nine alternatives were selected for detailed analysis. This section describes each of the nine in the following format:

- Theme of the Alternative
- Resource Program Direction
- The Environment to Be Created
- Acreage Allocations By Prescription and Management Area
- Outputs, Costs, and Activities

Appendix B contains details about how each alternative was modeled. Section 5 of this chapter includes tables to aid in the comparison of alternatives and to display the differences in outputs, costs, allocations, etc. The maps in the accompanying packet graphically display the allocations of prescriptions.

Table 2.2. Acres Preallocated for Each Alternative

	Area	Prescription	Acres
1.	Desolation and Granite Chief Wilderness	Wilderness	21,330
2.	Existing Ski Areas - Heavenly Valley and smaller area of Alpine Meadows	Alpine Skiing	3,383
3.	Existing Private Sector Recreation Sites	Private Sector Recreation	1,933
4.	Existing Forest Service Recreation Sites	Developed Recreation	636 1/
	Total Preallocation		27,282

1/ In the Current and Low Budget alternatives, some existing sites are not needed to meet objectives and could be closed.

Alternative A. Selected Alternative

a. Theme - This alternative would emphasize protection of the special environmental values of the Lake Tahoe Basin and achievement of the environmental thresholds. A mix of developed and dispersed recreation opportunities would be provided. Modest levels of other resource outputs would be produced, of which some would be by-products of activities designed to achieve the thresholds. (See Tables 2.3 and 2.4)

Water quality (#1), recreation (#2), and forest management/threshold (#3) would be the issues most emphasized for resolution in this alternative.

b. Resource Program Direction

Recreation. Dispersed recreation would be emphasized, particularly nonmotorized forms, through construction of trails and trailhead facilities. The emphasis would be on providing access to undeveloped areas. Some trails would be designed for bicycles and pedestrians to reduce dependence on the automobile. Developed sites would be managed at the standard service level. New recreation facilities would be constructed as needed to meet demand and to obtain a "fair share" of the capacity of the Lake Tahoe area for outdoor recreation. Ski area expansion would be planned for five sites, subject to complying with the environmental thresholds including mitigation of air quality and traffic impacts.

Visual Quality. Existing visual quality would be maintained except where some variation from retention or partial retention for ski area development is required.

Wilderness. Mt. Rose would be recommended to Congress for designation as Wilderness. Freel and Lincoln Creek would not be recommended for wilderness, but would remain undeveloped.

Wildlife and Fisheries. Mule deer, waterfowl, Peregrine falcon, Lahontan cutthroat trout, and rainbow trout are management indicator species (MIS) which would be emphasized in direct habitat improvement projects and through the watershed restoration and vegetation management programs. Substantial improvement would occur for pileated woodpecker and spotted owl mainly through ecological succession of vegetation types. Habitat capability for all other MIS would be maintained at current levels. The moderate fisheries and wildlife program level (equivalent to current program level) includes about two miles of stream habitat improvement per year and 70 acres of terrestrial habitat improvement per year in meadows, brushlands and wetlands. Riparian areas would be protected and restored, mainly as part of the watershed restoration program, but also through the fisheries and wildlife habitat improvement programs.

Forest Pest Management. Emphasis would be on hazard tree and vegetation management in developed sites. Opportunities for prevention of losses due to forest pests would occur as new developed sites are constructed and vegetation management is implemented.

Range. Grazing would continue at the current level, so long as it does not conflict with environmental and recreational objectives.

Timber and Vegetation. Forests would be managed for health and diversity and for a modest level of wood products. The primary activities would be single and group selection harvest and patch cutting with openings less than 5 acres in size. The diversity objectives will require regeneration harvest of approximately 40 acres a year to maintain early successional stages.

Water. Water quality protection and restoration would be a very high priority. The restoration program would be expanded in order to treat the entire backlog in 20 years, at a rate of 110 acres per year. Stream environment zone protection and restoration would be emphasized. Existing facilities would be retrofitted with Best Management Practices. About 2,017 afa of water would be required in water allocations to support new recreation developments, representing slightly more than double existing use.

Air. Mitigation of impacts would occur with all new recreation construction by offsetting new traffic generated by these activities. In addition, the Forest Service would assist in reducing existing traffic by constructing bicycle and pedestrian trails and by supporting other measures outlined in the TRPA Air Quality Plan and the Regional Transportation Plan. Smoke would be reduced from the current level by leaving more activity fuels for natural decomposition.

Cultural Resources. Cultural resources would be managed at a high level. The cultural resource overview for the basin would be completed by 1995. An active program of locating, evaluating, protecting and interpreting cultural sites would be carried out, with a complete inventory by 1995.

Fire. The fire organization would be funded at the 1982 level and would include approximately 33% prevention, 6% detection, 52% attack, and 9% fuels. This combination would protect the environmental values. The wildfire response strategy would be to control all fires within or near urbanized areas, use containment strategy on forested lands outside of urbanized areas, and utilize the confinement strategy in high elevation alpine areas. Activity fuels would be treated to the level specified in the stand management prescription for the area being treated while providing adequate slash for wildlife and watershed protection cover.

Research Natural Areas - Grass Lake Moss Bog would be recommended for inclusion in the system.

Special Interest Areas - The Tallac Historic Site would be designated a Special Interest Area. Other areas are identified for further consideration. Areas to be fully evaluated in this planning period are: Emerald Bay, Osgood Bog, Freel Peak Cushion Plant Community, and Taylor Creek Wetlands. These study areas will be managed in the interim to protect their unique characteristics from adverse impacts.

Other areas have been identified has potential SIAs. While evaluations are not scheduled during this planning period, the areas are recognized as having unique features that may warrant SIA classification. These special values will be maintained and protected with the current management

direction. These areas are: Grass Lake Moss Bog, Hell Hole, Floating Island Lake, Pope and Baldwin Marshes, Cave Rock, Glacial Moraine Deposits, and Ward and Blackwood Canyons. This list is not exhaustive, however, and other areas are not excluded from future consideration.

Land Uses. No utility corridors or windows would be designated. Individual rights-of-way would be considered.

Transportation and Facilities. Trails would be added to the transportation system. Bike and pedestrian routes, important to aiding the basinwide goal of reducing dependency on automobiles for transportation, would be planned with the TRPA. No major roads would be added except those necessary to access new recreation sites. An average of three miles of road would be reconstructed to the desired standard for public use and water quality protection. Developed recreation sites would be added. All recreation and administrative facilities would be made energy efficient, and/or replaced in the most cost efficient manner.

c. The Environment to Be Created - The LTBMU would appear to be very similar in 2030 to what it was like in 1980. There would be more recreation facilities, mostly near the existing areas of development. Regulation of dispersed recreation uses would be more pronounced as a result of larger numbers of users, more crowding, and greater conflict especially near the urban interface. Through active timber management, the forest would be healthier and more diverse. Trees would become older and larger on the high land capability areas, but there would also be more small openings and stands with young trees.

The environmental thresholds would be achieved. Damaged watershed conditions would be restored by 2005, and measures would be installed at facilities to protect water quality. Air quality standards would be attained and maintained through implementation of traffic mitigation measures, management of smoke sources, and replacement of many inefficient appliances.

Table 2.3 Acreage Allocations by Management Prescriptions and Management Areas

Alternative A - Selected

Management Prescription	Lower Truckee	Watson	Martis	Mt. Rose	Marlette	E. Shore Beaches	Genoa Peak	Round Hill	Heavenly	Tahoe Valley
1 Developed Recreation	85	360			288			485		520
2 Alpine Skiing		300		292					4200	
3 Unroaded Recreation			282	2600	4039	750	5704	180		1000
4 Roaded Recreation							4927			
5 Intensive Dispersed Recreat'n	759	30				1159		63		
6 Wilderness				2625						
7 Administrative Site	1		1		2			2		7
8 Wetlands Management								100		120
9 Maintenance				1613					2811	1653
10 Timber Stand Maintenance		2187	1060		520		985	334	185	7040
11 Reduced Timber Harvest		5785	2578							4619
12 Urban Lots		1		378			259	20	212	521
13 Research Natural Area										360
14 Utility Corridor										
15 Full Timber Harvest										
16 Intensive Grazing										
Totals	845	8663	3921	7508	4849	1909	11875	1184	7408	15840

Management Prescription	Freel	Meiss	Echo	Fallen Leaf	Desolation	Emerald Bay	Meeks	McKinney	Blackwood	Ward
1 Developed Recreation			715	1730		85	85		100	40
2 Alpine Skiing								760		2605
3 Unroaded Recreation	16000	12332	775	1490			2817			
4 Roaded Recreation								2140		
5 Intensive Dispersed Recreat'n			220	635		832			1750	600
6 Wilderness					21300				30	
7 Administrative Site				30			5			1
8 Wetlands Management				660			345			250
9 Maintenance			90			1497		139	4211	
10 Timber Stand Maintenance	1135			1350		233		989	1400	1593
11 Reduced Timber Harvest				1075						1437
12 Urban Lots						56	43	54	1	96
13 Research Natural Area										
14 Utility Corridor										
15 Full Timber Harvest										
16 Intensive Grazing										
Totals	17135	12332	1800	6970	21300	2703	3295	4082	7492	6622

Table 2.4a. Average Annual Outputs - Alternative A (Selected)

Decade 1 is the period 1986-1995

Resource Elements	Base Year 1982	1980 RPA Goals 1990	1980 RPA Goals 2030	Decades 1	2	3	4	5
RECREATION								
. Developed Public (M RVD)	434	1550	2160	460	603	716	818	927
. Developed Private (M RVD) 1/	959			1088	1179	1288	1398	1420
. Dispersed (M RVD) (includes WFUD)	913	1340	1790	1073	1223	1343	1451	1573
. Wilderness (M RVD) (includes WFUD)	106			127	127	127	127	127
. Open, usable OHV areas - Summer (acres) X 1000	1.3			0	0	0	0	0
. Open, usable OHV areas - Winter (acres) X 1000	74			83	80	80	80	80
. Roads Open to Public Vehicle Use - Summer (miles)	205			207	209	211	215	223
. Roads Closed to Public Vehicle Use - Summer (miles)	35			35	35	35	35	35
. 4X4 Roads Open to OHV Use - Summer (miles)	20			20	20	20	20	20
. Trails Open to OHV Use - Summer (miles)	26			29	32	34	35	35
. Trails Closed to OHV Use - Summer (miles)	182			239	290	305	319	337
. Snow Covered Roads Open to Winter OHV Use (miles)	210			206	203	203	203	200
. Snow Covered Roads Closed to Winter OHV Use (miles)	30			36	41	43	47	53
. Snow Covered Trails Open to Winter OHV Use (miles)	50			88	123	131	138	153
. Snow Covered Trails Closed to Winter OHV Use (miles)	148			180	199	209	216	216
. Visual Quality Index	10.8			10.9	10.9	10.9	10.9	10.9
WILDLIFE AND FISH								
. Threatened and Endangered Species								
. Bald Eagle (number of nesting pairs)	0			4	4	4	4	4
. Peregrine Falcon (nesting pairs)	0			1	1	1	1	1
. Wildlife -- other than T & E (habitat capability in animal numbers)								
. Deer	1300	1560		1540	1735	1735	1735	1735
. Resident fish other than T & E (M pounds)	88	105		96	103	103	103	103
. Spotted Owls (number of pairs)	0			0	0	0	0	0
. Goshawk (number of pairs)	12			15	15	15	15	15
. Total Wildlife and Fish User Days (M WFUD) (Not to be double counted with dispersed recreation)	50			51	53	54	56	57
. Direct Habitat Improvement (WFUD)								
. Deer				50	160	160	160	160
. All Other Wildlife Species (except T&E)				400	840	840	840	840
. Resident Fish (except T&E)				240	440	440	440	440
. Induced Habitat Improvement (WFUD)								
. Deer				25	65	65	65	65
. All Other Wildlife Species (except T&E)				65	115	115	115	115
. Resident Fish (except T&E)				200	300	300	300	300
. Acres of Direct Habitat Improvement								
. Deer (acres)				70	70	70	70	70
. All Other Wildlife Species (except T&E) (acres)				5	5	5	5	5
. Resident Fish (except T&E) (acres)				2	2	2	2	2
RANGE Grazing (AUM)	1400	1000	1100	1400	1400	1400	1400	1400
TIMBER								
. Allowable Sale Quantity (MMBF)	0	8.5	10.7	0	0	0	0	0
(MMCF)	0	1.3	1.6	0	0	0	0	0
. Programmed Sale Quantity (MMBF)	4.0	8.5	10.7	4.4	4.6	4.9	5.2	5.5
(MMCF)	.6	1.3	1.6	.7	.7	.8	.8	.8
. Long Term Sustained Yield (MMBF)	NA			NA	NA	NA	NA	NA
(MMCF)	NA			NA	NA	NA	NA	NA
. Reforestation (acres)	0			40	40	40	40	40
. Timber Stand Improvement (acres)	0	317	320	40	40	40	40	40

Table 2.4b. Average Annual Outputs - Alternative A (Selected)

Resource Element	Base Year 1982	1980 RPA Goals 1990	1980 RPA Goals 2030	Decades 1	Decades 2	Decades 3	Decades 4	Decades 5
WOOD PRODUCTS OTHER THAN SAWTIMBER								
. Firewood (cords) 2/	4000			4000	4000	4000	4000	4000
WATER								
. Quality (M acre feet at standards)	286	180	180	295	311	319	319	319
. Increased Quantity (M acre feet)	0			1.5	2.0	2.3	2.5	2.5
. Watershed Improvement (acres)	40	220	250	110	110	0	0	0
LANDS AND MINERALS								
. Mineral (operating plans)	0	0	0	0	0	0	0	0
. Land Acquisition (acres)	400	8000	600	300	200	20	20	20
HUMAN RESOURCES								
. PROGRAMS (enrollees)	13	15	15	16	17	18	19	20
FIRE								
. Total Fuel Treatment (acres)	700	400	300	300	300	300	300	300
. Fire-related Fuel Treatment (acres)	0	0	0	0	0	0	0	0
. Timber-related Fuel Treatment (acres)	695	400	300	295	295	295	295	295
. Other Fuel Treatment (acres)	5	0	0	5	5	5	5	5
. Expected Acres Burned by Wildfire								
. Intensity Class 1	6			6	6	6	6	6
. Intensity Class 2	18			18	18	18	18	18
. Intensity Class 3	16			16	16	16	16	16
. Intensity Class 4	3			3	3	3	3	3
. Intensity Class 5	1			1	1	1	1	1
. Intensity Class 6	0			0	0	0	0	0
TRANSPORTATION								
. Trail Construction (miles)	0			6.0	4.4	1.8	1.4	1.5
. Trail Reconstruction (miles)	2	4	3	2.0	2.0	3.0	4.0	4.0
. Trail Maintenance (miles)	198			258	302	320	334	352
. Road Construction (miles)	0			.2	.2	.2	.4	.6
. Road Reconstruction (miles)	1			3	3	0	0	0
. Road Maintenance (miles)	240			242	244	246	250	256
FACILITIES								
. Dams and Reservoirs								
. Forest Service (number)	11	0	0	11	11	11	11	11
. Other Federal (number)	0	0	0	0	0	0	0	0
. Other State/Local (number)	0	0	0	0	0	0	0	0
. Private (number)	4	0	0	4	4	4	4	4
. Administrative Sites								
. Forest Service Owned (number)	14	0	0	15	16	16	16	16
. Leased (number)	2	0	0	2	1	1	1	1
TOTAL BUDGET (MM$) 3/	3.8	3.76	3.97	5.3	5.4	5.0	5.6	6.2
TOTAL COST (MM$) 3/	3.9			5.1	5.3	5.3	5.8	6.4

1/ Privately operated or owned recreation sites on national forest land.

2/ Included within Programmed Sale Quantity.

3/ Difference between Budget and Cost is explained in Table 2.27b.

Alternative B. Current Level and Mix of Outputs (No Action)

a. Theme - This alternative would continue the current directions, policies and practices. Protecting the unique environmental values of the Lake Tahoe area would continue to be emphasized. Goods and services would be provided at the FY82 level. A balanced program of developed and dispersed recreation opportunities would continue. Land allocation and direction would continue as in the past, except that no new recreation construction would occur. Timber harvest level would not increase. The overall budget would be fixed at the 1982 level of $3.3 million. However, the mix of funds for programs could be changed for greater efficiency. (See Tables 2.5 and 2.6.)

This alternative would not emphasize resolving the issues because this plan would make few changes from the current situation.

b. Resource Program Direction

Recreation. The emphasis for dispersed recreation would continue at low standard management. No attempt would be made to satisfy future demand. The same would be true for developed recreation. Sites would generally be managed at the current standard while use rates increase from higher demand. Fewer Forest Service sites would be needed to maintain current outputs. The facilities kept open would be managed more nearly at 100% capacity.

Visual Quality. Current visual quality objectives would be continued. Disturbed sites would gradually recover through natural processes or through watershed restoration activities.

Wilderness. Current management would continue in Desolation Wilderness. Freel and Lincoln Creek further planning areas and the Mt. Rose roadless area would continue to be managed for a mix of motorized and nonmotorized dispersed recreation at a low intensity level.

Wildlife and Fisheries. Mule deer, waterfowl, Peregrine falcon, Lahontan cutthroat and rainbow trout are management indicator species which would be emphasized in direct habitat improvement projects and through the watershed restoration and vegetation management programs. Goshawk habitat capability would decline from the current level by 5% in the long term. Pileated woodpecker and spotted owl would be substantially improved mainly through ecological succession of vegetation types. Habitat capability for all other management indicator species would be maintained near the current level. Fish and wildlife programs would remain at about current level, including approximately two miles of stream habitat improvement per year and 70 acres of terrestrial habitat improvement per year in meadows, brushlands, and wetlands. Riparian areas would be protected and restored, mainly as part of the fisheries and wildlife habitat improvement programs and to a lesser extent through the watershed restoration program.

Forest Pest Management. Pest management would continue to emphasize existing developed sites. Opportunity for prevention would be less than preferred due to the lack of construction of new recreation sites,

management of existing sites at low standard, and reduced acres of vegetation management.

Range. Grazing would continue at the current level using extensive management practices.

Timber and Vegetation. Management would continue to emphasize health and diversity through sanitation salvage, single tree selection, and thinning. Equal amounts of sawtimber and firewood would be produced. To meet minimum management requirements, 40 acres of openings averaging 1-2 acres would be created yearly for diversity.

Water. Water Quality would be to maintained at current or slightly higher standards. Restoration of inventoried disturbed lands would progress at a rate of 22 acres per year. Water necessary for implementation of this alternative would be about 1,558 afa.

Air. No bicycle and pedestrian trails (proposed in the TRPA Regional Plan as the Forest Service share of reducing current traffic) would be constructed. Smoke would remain at the current level as a result of activity fuel treatment.

Cultural Resources. Cultural resources would be managed at the lowest level meeting legal requirements. Inventory, evaluation, and protection of cultural resources would be emphasized in support of other resource activities.

Research Natural Areas. No areas would be recommended.

Special Interest Areas. No areas would be recommended.

Fire. The fire organization would remain at the 1982 budget level and include approximately 33% prevention, 6% detection, 52% attack, and 9% fuels. The wildfire response strategy would be to control all fires at two acres or less, 90% of the time. Activity fuels would continue to receive 100% disposal.

Land Uses. No utility corridors would be designated. Individual rights-of-way would be considered.

Transportation and Facilities. Roads would be maintained at a serviceable, environmentally acceptable standard. They would be reconstructed at the rate of one mile per year. No new roads would be constructed. Recreation and administrative facilities would be in a custodial care mode.

c. The Environment to be Created - In the year 2030, the LTBMU would look much the same as it does now to the casual observer. There would be approximately the same level of recreation and facility resource management activity. However, on closer inspection, there would be a number of changes. The recreation sites would be in poorer condition because of low maintenance levels. Furthermore, since there are no new facilities to handle increasing demand, the existing sites will be used more heavily than now. Dispersed areas would be show the impacts of less care. Trail erosion, which is already a problem, would become more severe. The

forested areas would shift to older age classes and there would be less habitat for early successional stage species. Insect and disease attacks would be a problem for much of the forest because only a small portion is being treated.

The Forest Service would not be fully supporting achievement of all the environmental thresholds. Watershed restoration would be at a slower rate than necessary to achieve water quality standards by 2005. Expected contributions to reduction in vehicle miles traveled (VMT) as a means to improve air quality and traffic conditions would be fulfilled. However, there would be less increase in VMT due to the absence of recreation expansion on the national forest. The "fair share" of capacity in the basin negotiated with the TRPA for public outdoor recreation would not be utilized. The thresholds for soils, vegetation, wildlife, fisheries, noise, and scenic resources would generally be met, but more from an absence of new impacts than from active programs.

Table 2.5 Acreage Allocations by Management Prescriptions and Management Areas

Alternative B - Current

Management Prescription	Lower Truckee	Watson	Martis	Mt. Rose	Marlette	E. Shore Beaches	Genoa Peak	Round Hill	Heavenly	Tahoe Valley
1 Developed Recreation	85							485		300
2 Alpine Skiing		300		292					3335	
3 Unroaded Recreation				6838	4356	750	5704	180		
4 Roaded Recreation							4927			
5 Intensive Dispersed Recreat'n	759	30				1159		63		
6 Wilderness										
7 Administrative Site	1		1		2			2		7
8 Wetlands Management								100		480
9 Maintenance									3861	2653
10 Timber Stand Maintenance		2265	1343		491		985	334		7040
11 Reduced Timber Harvest		6067	2577							4839
12 Urban Lots		1		378			259	20	212	521
13 Research Natural Area										
14 Utility Corridor										
15 Full Timber Harvest										
16 Intensive Grazing										
Totals	845	8663	3921	7508	4849	1909	11875	1184	7408	15840

Management Prescription	Freel	Meiss	Echo	Fallen Leaf	Desolation	Emerald Bay	Meeks	McKinney	Blackwood	Ward
1 Developed Recreation			715	1730		85	85		40	40
2 Alpine Skiing								760		1290
3 Unroaded Recreation	16000	12332	775	1490			2817			
4 Roaded Recreation								2140		
5 Intensive Dispersed Recreat'n			220	635		832				
6 Wilderness					21300				30	
7 Administrative Site				30			5			1
8 Wetlands Management				660			345			250
9 Maintenance			90			1497		139	5961	
10 Timber Stand Maintenance	1135			2425		233		989	1460	4945
11 Reduced Timber Harvest										
12 Urban Lots						56	43	54	1	96
13 Research Natural Area										
14 Utility Corridor										
15 Full Timber Harvest										
16 Intensive Grazing										
Totals	17135	12332	1800	6970	21300	2703	3295	4082	7492	6622

Table 2.6a. Average Annual Outputs - Alternative B (Current)
Decade 1 is the period 1986-1995

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
RECREATION								
. Developed Public (M RVD)	434	1550	2160	347	347	347	347	347
. Developed Private (M RVD) 1/	959			1088	1179	1267	1282	1289
. Dispersed (M RVD) (includes WFUD)	913	1340	1790	1094	1165	1221	1272	1330
. Wilderness (M RVD) (includes WFUD)	106			106	106	106	106	106
. Open, usable OHV areas - Summer (acres) X 1000	1.3			0	0	0	0	0
. Open, usable OHV areas - Winter (acres) X 1000	74			74	74	74	74	74
. Roads Open to Public Vehicle Use - Summer (miles)	205			215	215	215	215	215
. Roads Closed to Public Vehicle Use - Summer (miles)	35			25	25	25	25	25
. 4X4 Roads Open to OHV Use - Summer (miles)	20			20	20	20	20	20
. Trails Open to OHV Use - Summer (miles)	26			26	26	26	26	26
. Trails Closed to OHV Use - Summer (miles)	182			228	265	265	265	265
. Snow Covered Roads Open to Winter OHV Use (miles)	210			210	210	210	210	210
. Snow Covered Roads Closed to Winter OHV Use (miles)	30			30	30	30	30	30
. Snow Covered Trails Open to Winter OHV Use (miles)	50			88	119	119	119	119
. Snow Covered Trails Closed to Winter OHV Use (miles)	148			166	172	172	172	172
. Visual Quality Index	10.8			10.8	10.8	10.8	10.8	10.8
WILDLIFE AND FISH								
. Threatened and Endangered Species								
. Bald Eagle (number of nesting pairs)	0			4	4	4	4	4
. Peregrine Falcon (nesting pairs)	0			1	1	1	1	1
. Wildlife -- Other Than T & E (habitat capability in animal numbers)								
. Deer	1300	1560		1530	1669	1669	1669	1669
. Resident fish other than T & E (M pounds)	88	105		92	96	96	96	96
. Spotted Owls (number of pairs)	0			0	0	0	0	0
. Goshawk (number of pairs)	12			15	15	15	15	15
. Total Wildlife and Fish User Days (MWFUD) (Not to be double counted with dispersed recreation)	50			51	53	54	56	57
. Direct Habitat Improvement (WFUD)								
. Deer				50	50	50	50	50
. All Other Wildlife Species (except T&E)				400	400	400	400	400
. Resident Fish (except T&E)				240	240	240	240	240
. Induced Habitat Improvement (WFUD)								
. Deer				30	150	50	50	50
. All Other Wildlife Species (except T&E)				50	80	80	80	80
. Resident Fish (except T&E)				150	250	250	250	250
. Acres of Direct Habitat Improvement								
. Deer (acres)				70	70	70	70	70
. All Other Wildlife Species (except T&E)(acres)				5	5	5	5	5
. Resident Fish (except T&E)(acres)				2	2	2	2	2
RANGE								
. Grazing (AUM)	1400	1000	1100	1400	1400	1400	1400	1400
TIMBER								
. Allowable Sale Quantity (MMBF)	0	8.5	10.7	0	0	0	0	0
(MMCF)	0	1.3	1.6	0	0	0	0	0
. Programmed Sale Quantity (MMBF)	4	8.5	10.7	4.0	4.0	4.0	4.0	4.0
(MMCF)	.6	1.3	1.6	.6	.6	.6	.6	.6
. Long Term Sustained Yield (MMBF)	NA			NA	NA	NA	NA	NA
(MMCF)	NA			NA	NA	NA	NA	NA
. Reforestation (acres)	0			48	45	40	40	40
. Timber Stand Improvement (acres)	0	317	320	50	50	48	45	40

Table 2.6b. Average Annual Outputs - Alternative B (Current)

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
WOOD PRODUCTS OTHER THAN SAWTIMBER								
. Firewood (cords) 2/	4000			4000	4000	4000	4000	4000
WATER								
. Quality (M acre feet at standards)	286	180	180	289	291	294	296	298
. Increased Quantity (M acre feet)	0			1.1	1.4	1.4	1.4	1.4
. Watershed Improvement (acres)	40	220	250	22	22	22	22	22
LANDS AND MINERALS								
. Mineral (operating plans)	0	0	0	0	0	0	0	0
. Land Acquisition (acres)	400	8000	600	300	200	20	20	20
HUMAN RESOURCES								
. PROGRAMS (enrollees)	13	15	15	16	17	18	19	20
FIRE								
. Total Fuel Treatment (acres)	700	400	300	410	410	400	400	400
. Fire-related Fuel Treatment (acres)	0	0	0	0	0	0	0	0
. Timber-related Fuel Treatment (acres)	695	400	300	408	408	398	398	398
. Other Fuel Treatment (acres)	5	0	0	2	2	2	2	2
. Expected Acres Burned by Wildfire								
. Intensity Class 1	6			6	6	6	6	6
. Intensity Class 2	18			18	18	18	18	18
. Intensity Class 3	16			16	16	16	16	16
. Intensity Class 4	3			3	3	3	3	3
. Intensity Class 5	1			1	1	1	1	1
. Intensity Class 6	0			0	0	0	0	0
TRANSPORTATION								
. Trail Construction (miles)	2	4	3	5.6	3.7	0	0	0
. Trail Reconstruction (miles)				2.0	2.0	2.0	2.0	2.0
. Trail Maintenance (miles)	198			254	291	291	291	291
. Road Construction (miles)	0			0	0	0	0	0
. Road Reconstruction (miles)	1			1	1	1	1	1
. Road Maintenance (miles)	240			240	240	240	240	240
FACILITIES								
. Dams and Reservoirs								
. Forest Service (number)	11	0	0	11	11	10	10	10
. Other Federal (number)	0	0	0	0	0	0	0	0
. Other State/Local (number)	0	0	0	0	0	0	0	0
. Private (number)	4	0	0	4	4	4	4	4
. Administrative Sites								
. Forest Service Owned (number)	14	0	0	14	15	15	15	15
. Leased (number)	2	0	0	2	2	2	2	2
TOTAL BUDGET (MM$) 3/	3.8	3.76	3.97	3.8	3.3	3.3	3.3	3.3
TOTAL COST (MM$) 3/	3.9			3.9	3.4	3.4	3.4	3.4

1/ Privately operated or owned recreation sites on national forest land.

2/ Included within Programmed Sale Quantity.

3/ Difference between budget and cost is explained in Table 2.27b.

Alternative C. Conservation Alternative

a. Theme. This alternative emphasizes protection of the natural environment, establishment of wilderness, and provision for a high level of dispersed recreation. (See Tables 2.7 and 2.8.)

The water quality (#1), wilderness (#4), and environmental thresholds (#3) would be the issues most emphasized for resolution in this alternative.

b. Resource Program Direction.

Recreation. Opportunities for dispersed recreation would be enlarged. Improvements to existing trailhead parking and construction of additional trailheads would occur in the first decade. New hiking trails would be high priority. Shoreline access to Lake Tahoe would continue to be emphasized through acquisition programs and cooperation with State and regional agencies. Access to Fallen Leaf Lake would ensure that the rustic, low-key nature of the environment in that area is preserved. There would be no new OHV staging areas, roads, or trails.

Moderate expansion of developed recreation would occur. This would be dispersed around the basin rather than concentrated in the South Lake Tahoe area. Expansion would receive low priority until current traffic and air quality problems are corrected. A 65% increase in ski area capacity would be allowed over the long term, provided ski area master plans demonstrate thresholds can be met.

Visual Quality. High priority would be given to mitigating visual impacts of forest management and ski area development to insure there is no adverse change in visual quality.

Wilderness and Roadless Areas. Current management would continue for Desolation Wilderness. All unroaded areas would be recommended for wilderness. This would include Freel, Lincoln Creek, and Dardanelles (Echo-Carson or Meiss) areas and also a portion of Mt. Rose roadless area that extends into the LTBMU from the Toiyabe National Forest. If it is determined that the release language of the California Wilderness Act of 1984 precludes consideration of the Meiss area for wilderness during this round of planning, it would be managed for unroaded recreation.

Wildlife and Fisheries. Mule deer, waterfowl, Peregrine falcon, Lahontan cutthroat, rainbow, and brook trout are management indicator species that would be emphasized by direct habitat improvement projects and through the watershed restoration and vegetation management programs. Wildlife management would favor species dependent on old growth timber and climax vegetation.

Riparian areas would be protected and restored as part of watershed restoration, wildlife, and fisheries programs.

Forest Pest Management. Emphasis would be on hazard trees and vegetation management in developed sites. The need and opportunity for pest management would be moderate due to recreation use at full standard and

modest increase in timber harvest. Moderate opportunities for prevention would occur as vegetation management is implemented.

Range. Livestock grazing would be prohibited in riparian areas. This would result in termination of most grazing when existing permits expire.

Timber and Vegetation. Management would be for health of vegetation for its scenic and watershed values. Emphasis would be on increasing old growth and late successional stage vegetation to enhance dependent species. Timber harvesting would be limited to sanitation salvage and thinning of stands highly susceptible to insect attack and disease or posing a substantial fire hazard. Harvesting would also be limited to land capability classes 3 to 7. Openings created by timber management practices would be no larger than two acres. Firewood would be supplied to the public at the current level.

Water. Improvement of water quality would be very high priority. All disturbed sites in the watershed restoration inventory would be restored within 20 years at a rate of about 110 acres per year. Stream environment zone protection and restoration would be emphasized. Existing facilities would be retrofitted with Best Management Practices. About 2,334 afa of water would be required to implement this alternative.

Air. More emphasis would be placed upon implementing measures that would be effective in reducing existing and projected traffic and air quality problems, including, but not limited to, bike trail construction. The TRPA traffic model would be used to review the impacts of all traffic generating projects. Ridesharing, transit system use, and other techniques to reduce parking and traffic problems at the Forest Service offices and at other similar locations would be used.

The emphasis for slash treatment would be on chipping, or lop and scatter techniques, or leaving it for wildlife cover in order to reduce the amount of smoke from burning.

Cultural Resources. Cultural resources would be managed at a high level. Not only would inventory and evaluation of all cultural resource be complete by 1995, but an active program of cultural site protection and interpretation would be carried out. The cultural resources overview of the LTBMU would be completed by 1995.

Fire. The fire organization budget level would be increased 20% above the 1982 level in order to strengthen fire suppression resources near urban areas. The current combination of fire suppression and prevention forces would remain which is approximately 33% prevention, 6% detection, 52% attack, and 9% fuels. Wildfire response strategy would be to control all fires within or near urbanized areas, to use containment strategy on forested lands outside of urbanized areas, and to use the confinement strategy in high elevation alpine areas. Activity fuel treatment would emphasize maintenance of existing visual quality and protection of environmentally sensitive land.

Research Natural Areas. Grass Lake Moss Bog would be recommended for inclusion in the RNA system.

Special Interest Areas. The Tallac Historic Site would be recommended as a Special Interest Area. Emerald Bay, Osgood Bog, Freel Peak Cushion Plant Community, and the Taylor Creek Wetlands would be subject to further study as possible SIAs.

Land Uses. Highest priority would be to purchase the remaining environmentally sensitive lots in the Lake Tahoe Basin. In order to preserve visual quality, no utility corridors would be designated, nor would major electrical transmission interties be approved.

Transportation and Facilities. Reconstruction of roads and construction of parking which encourages dispersed recreation activities would be emphasized. New hiking trails would be constructed. No new road construction would take place except those necessary to access new recreation sites.

c. The Environment To Be Created - In the year 2030, the LTBMU would appear much the same as it is now to the casual observer. Panoramic views would show little evidence of man-made impacts on the national forest lands. On closer inspection, a visitor would find that all unacceptable soil and visual disturbances had been treated. More areas would be accessed by hiking trails. Through timber management the forest would be healthier on accessible moderate and high capability land. There would be more old growth and mature stands of trees than exist in the 1980's but diversity would not have been improved through creation of young stands. Firewood would be available to the public. Instream flows would be maintained to support fish, wildlife, and riparian resources.

Environmental thresholds would be achieved in 20 years except for the recreation "fair share" and vegetation diversity. The water quality standards would be met within 20 years as a result of an intensive restoration program. Air quality impacts from traffic would be fully mitigated.

Table 2.7 Acreage Allocations by Management Prescriptions and Management Areas

Alternative C - Conservation

Management Prescription	Lower Truckee	Watson	Martis	Mt. Rose	Marlette	E. Shore Beaches	Genoa Peak	Round Hill	Heavenly	Tahoe Valley
1 Developed Recreation	85	200			288			485		300
2 Alpine Skiing		300		292					4200	
3 Unroaded Recreation			400	2600	4039	750	4531	180		
4 Roaded Recreation										
5 Intensive Dispersed Recreat'n	759	30				1159		397		
6 Wilderness				2625			6665			1000
7 Administrative Site	1		1		2			2		7
8 Wetlands Management								100		120
9 Maintenance				1613					2996	1653
10 Timber Stand Maintenance		2080	1060		520		420			7040
11 Reduced Timber Harvest		6052	2460							4839
12 Urban Lots		1		378			259	20	212	521
13 Research Natural Area										360
14 Utility Corridor										
15 Full Timber Harvest										
16 Intensive Grazing										
Totals	845	8663	3921	7508	4849	1909	11875	1184	7408	15840

Management Prescription	Freel	Meiss	Echo	Fallen Leaf	Desolation	Emerald Bay	Meeks	McKinney	Blackwood	Ward
1 Developed Recreation			715	1730		85	85		100	40
2 Alpine Skiing										2605
3 Unroaded Recreation	400		775	1490			2817			
4 Roaded Recreation								2140		
5 Intensive Dispersed Recreat'n			220	635		832			1750	600
6 Wilderness	15600	12332			21300				30	
7 Administrative Site				30			5			1
8 Wetlands Management				660			345			250
9 Maintenance			90			1497		899	4211	
10 Timber Stand Maintenance	1135			1350		233		989	850	1593
11 Reduced Timber Harvest				1075					550	1437
12 Urban Lots						56	43	54	1	96
13 Research Natural Area										
14 Utility Corridor										
15 Full Timber Harvest										
16 Intensive Grazing										
Totals	17135	12332	1800	6970	21300	2703	3295	4082	7492	6622

Table 2.8a. Average Annual Outputs - Alternative C (Conservation)

Decade 1 is the period 1986-1995

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
RECREATION								
. Developed Public (M RVD)	434	1550	2160	460	572	603	716	818
. Developed Private (M RVD) 1/	959			1088	1100	1179	1288	1398
. Dispersed (M RVD) (includes WFUD)	913	1340	1790	1017	1187	1293	1388	1510
. Wilderness (M RVD) (includes WFUD)	106			144	163	177	190	190
. Open, usable OHV areas - Summer (acres) X 1000	1.3			0	0	0	0	0
. Open, usable OHV areas - Winter (acres) X 1000	74			74	74	74	74	74
. Roads Open to Public Vehicle Use - Summer (miles)	205			205	206	210	214	220
. Roads Closed to Public Vehicle Use - Summer (miles)	35			35	35	35	35	35
. 4X4 Roads Open to OHV Use - Summer (miles)	20			20	20	20	20	20
. Trails Open to OHV Use - Summer (miles)	26			17	17	17	17	17
. Trails Closed to OHV Use - Summer (miles)	182			240	305	335	335	335
. Snow Covered Roads Open to Winter OHV Use (miles)	210			206	203	203	203	200
. Snow Covered Roads Closed to Winter OHV Use (miles)	30			34	38	42	46	53
. Snow Covered Trails Open to Winter OHV Use (miles)	50			67	88	91	91	91
. Snow Covered Trails Closed to Winter OHV Use (miles)	148			190	234	261	261	261
. Visual Quality Index	10.8			11.1	11.1	11.1	11.1	11.1
WILDLIFE AND FISH								
. Threatened and Endangered Species								
. Bald Eagle (number of nesting pairs)	0			4	4	4	4	4
. Peregrine Falcon (nesting pairs)	0			1	1	1	1	1
. Wildlife -- Other Than T & E (habitat capability in animal numbers)								
. Deer	1300	1560		1540	1735	1735	1735	1735
. Resident fish other than T & E (M pounds)	88	105		96	103	103	103	103
. Spotted Owls (number of pairs)	0			0	0	0	0	0
. Goshawk (number of pairs)	12			15	15	15	15	15
. Total Wildlife and Fish User Days (WFUD) (Not to be double counted with dispersed recreation)	50			51	53	54	56	58
. Direct Habitat Improvement (WFUD)								
. Deer				50	160	160	160	160
. All Other Wildlife Species (except T&E)				400	840	840	840	840
. Resident Fish (except T&E)				240	440	440	440	440
. Induced Habitat Improvement (WFUD)								
. Deer				50	30	30	30	30
. All Other Wildlife Species (except T&E)				80	50	50	50	50
. Resident Fish (except T&E)				380	170	170	170	170
. Acres of Direct Habitat Improvement								
. Deer(acres)				70	70	70	70	70
. All Other Wildlife Species (except T&E)(acres)				5	5	5	5	5
. Resident Fish (except T&E)(acres)				2	2	2	2	2
RANGE								
. Grazing (AUM)	1400	1000	1100	1400	0	0	0	0
TIMBER								
. Allowable Sale Quantity (MMBF)	0	8.5	10.7	0	0	0	0	0
(MMCF)	0	1.3	1.6	0	0	0	0	0
. Programmed Sale Quantity (MMBF)	4	8.5	10.7	4.4	4.6	4.9	5.2	5.5
(MMCF)	.6	1.3	1.6	.7	.7	.8	.8	.8
. Long Term Sustained Yield (MMBF)	NA			NA	NA	NA	NA	NA
(MMCF)	NA			NA	NA	NA	NA	NA
. Reforestation (acres)	0	0	0	40	40	40	40	40
. Timber Stand Improvement (acres)	0	317	320	40	40	40	40	40

Table 2.8b. Average Annual Outputs - Alternative C (Conservation)

Resourse Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
WOOD PRODUCTS OTHER THAN SAWTIMBER								
. Firewood (cords) 2/	4000			4000	4000	4000	4000	4000
WATER								
. Quality (M acre feet at standards)	286	180	180	295	318	319	319	319
. Increased Quantity (M acre feet)	0			1.4	1.7	1.9	1.9	1.9
. Watershed Improvement (acres)	40	220	250	110	110	0	0	0
LANDS AND MINERALS								
. Mineral (operating plans)	0	0	0	0	0	0	0	0
. Land Acquisition (acres)	400	8000	600	300	200	20	20	20
HUMAN RESOURCES								
. PROGRAMS (enrollees)	13	15	15	16	17	18	19	20
FIRE								
. Total Fuel Treatment (acres)	700	400	300	300	300	300	300	300
. Fire-related Fuel Treatment (acres)	0	0	0	0	0	0	0	0
. Timber-related Fuel Treatment (acres)	695	400	300	295	295	295	295	295
. Other Fuel Treatment (acres)	5	0	0	5	5	5	5	5
. Expected Acres Burned by Wildfire								
. Intensity Class 1	6			6	6	6	6	6
. Intensity Class 2	18			18	18	18	18	18
. Intensity Class 3	16			16	16	16	16	16
. Intensity Class 4	3			3	3	3	3	3
. Intensity Class 5	1			1	1	1	1	1
. Intensity Class 6	0			0	0	0	0	0
TRANSPORTATION								
. Trail Construction (miles)	2	4	3	5.6	5.9	2.6	1.3	0
. Trail Reconstruction (miles)				7.5	7.5	0	0	0
. Trail Maintenance (miles)	198			257	322	352	352	352
. Road Construction (miles)	0			0	.1	.4	.4	.4
. Road Reconstruction (miles)	1			3	3	0	0	0
. Road Maintenance (miles)	240			240	241	245	249	253
FACILITIES								
. Dams and Reservoirs								
. Forest Service (number)	11	0	0	11	11	11	11	11
. Other Federal (number)	0	0	0	0	0	0	0	0
. Other State/Local (number)	0	0	0	0	0	0	0	0
. Private (number)	4	0	0	4	4	4	4	4
. Administrative Sites								
. Forest Service Owned (number)	14	0	0	15	16	16	16	16
. Leased (number)	2	0	0	2	1	1	1	1
TOTAL BUDGET (MM$) 3/	3.8			5.1	5.3	4.8	5.3	5.8
TOTAL COST (MM$) 3/	3.9			5.1	5.2	5.3	5.6	6.2

1/ Privately operated or owned recreation sites on national forest land.

2/ Included within Programmed Sale Quantity.

3/ Difference between budget and cost is explained in Table 2.27b.

Alternative D. Constrained Economic Efficiency

a. Theme. This alternative seeks the most economically efficient allocation and schedule for meeting the minimum management and implementation requirements. It would produce the highest present net value that can be legally and feasibly achieved for priced marketable goods and services. However, it would not consider intangible values of the forest. (See Tables 2.9 and 2.10.)

Recreation (#2) and wilderness (#4) would be the issues most emphasized because of their contribution toward a maximum PNV.

b. Resource Program Direction

Recreation. Dispersed and developed recreation opportunities would be provided at the most economically efficient level. Standard service level management would occur, plus construction of trails and facilities to meet projected demand. Priority would be given to overnight facilities rather than day use. Ski area expansion would also be encouraged to meet demand.

Visual Quality. Visual quality would not be used to restrict activities. Also, since scenic values do not contribute directly to PNV, no funds would be spent on restoration of visually disturbed sites.

Wilderness and Roadless Areas. Current management would be continued in Desolation Wilderness. Freel, Lincoln Creek, and Mt. Rose roadless areas would be recommended for wilderness.

Wildlife and Fish. Bald eagle, Peregrine falcon and Lahontan cutthroat trout are management indicator species (MIS) that would be emphasized. Species dependent upon older age and more decadent forest stands such as spotted owls, pileated woodpeckers, and black bears would have substantially improved habitat as a result of limited vegetation management and the continuation of natural plant succession. Habitat capability for other MIS would be maintained at current levels. Both fisheries and wildlife programs would decline to less than 10% of the current program levels with no outputs resulting from direct habitat improvements in either program. Low level watershed restoration and vegetation management programs would provide some induced benefits albeit minimal for mule deer and resident trout. Riparian areas would be protected, but little restoration would occur being totally associated with low level watershed restoration program.

Forest Pest Management. The need and opportunity for pest management would be low due primarily to low number of acres treated through vegetation management. Emphasis would be in areas managed for developed recreation. Opportunity for prevention would be low.

Range. Grazing would be eliminated because the costs exceed the benefits.

Timber and Vegetation. No lands would be economically efficient to manage for timber. The only vegetation management would be to remove hazard trees for public health and safety and to treat 40 acres each year to maintain early successional wildlife habitat.

Water. Water quality would be slightly improved. Restoration of disturbed watersheds would be at a rate of 22 acres per year, which would not complete the entire program by 2005. Best Management Practices would be retrofitted to existing facilities although at a slow pace. Water yield is increased primarily as a result of ski area expansion. About 1,803 afa would be necessary to implement activities in this alternative.

Air. Mitigation would be provided for all new recreation improvements by offsetting the impacts of traffic caused by the activity. However, no reduction of existing traffic would occur through construction of bike and pedestrian trails as proposed in the TRPA Plan. Smoke would be substantially reduced since the timber program is small and slash would be treated in the most efficient manner, primarily lop and scatter.

Cultural Resources. Cultural resources would be managed at the lowest level meeting legal requirements. Inventory, evaluation and protection of cultural resources would be emphasized in support of other resource activities.

Research Natural Areas. No areas would be recommended.

Special Interest Areas. No areas would be recommended.

Fire. The fire organization budget would be decreased 40% below the 1982 level, and would be 12% prevention, 2% detection, 81% attack, and 5% fuels. Wildfire suppression forces would be emphasized. Wildfire response strategy would be to control all fires. Activity fuel treatment would meet minimum fire hazard reduction needs.

Land Uses. A utility corridor would be designated from Echo Summit to Daggett Pass within an area that is already affected by improvements and where there is primarily low to moderate hazard land. Requests for other special uses would be evaluated based on their economic contribution to society and monetary return to the treasury.

Transportation and Facilities. Reconstruction of roads to comply with water quality protection would be emphasized at a rate of one mile per year. No new road construction would occur except those associated with new recreation sites. Trails would be added to the transportation system. Recreation and administrative facilities would be maintained to the standard service level and made energy efficient as necessary.

c. The Environment To Be Created. In the year 2030, the LTBMU would still appear much as it does now. In the flatter, more accessible areas there would be more recreation development. Except where ski area expansion occurs, most of the remote areas would remain undeveloped. The trail network would be expanded to provide access to all attractive destinations on the forest. There would be little timber management so that stands would be older than at present. Diversity would be maintained. Overstocked stands would be subject to insect and disease attacks. Little firewood would be made available to the public from national forest land.

Not all of the environmental thresholds would be achieved in this alternative where the objective is strictly economic efficiency. The implementation of the program to improve water quality would not be completed in the 20 years required by the Water Quality Management Plan for Lake Tahoe. While the traffic and air quality impacts of new development would be mitigated, the Forest Service would not be contributing toward improvement of the existing condition. The older forest conditions would partially meet the vegetation diversity threshold. Thresholds for soils, wildlife, fisheries, noise, recreation fair share, and scenic resources would generally be achieved.

Table 2.9 Acreage Allocations by Management Prescriptions and Management Areas

Alternative D - Economic Efficiency

Management Prescription	Lower Truckee	Watson	Martis	Mt. Rose	Marlette	E. Shore Beaches	Genoa Peak	Round Hill	Heavenly	Tahoe Valley
1 Developed Recreation	85	360			288			485		520
2 Alpine Skiing		300		292					4036	
3 Unroaded Recreation				2600	4559	750	4951	180		
4 Roaded Recreation			3920							6728
5 Intensive Dispersed Recreat'n	759	30				1159		63		
6 Wilderness				2625			6665			
7 Administrative Site	1		1		2			2		7
8 Wetlands Management								100		486
9 Maintenance				1613				334	2976	2653
10 Timber Stand Maintenance										
11 Reduced Timber Harvest										
12 Urban Lots		1		378			259	20	212	521
13 Research Natural Area										
14 Utility Corridor									184	84
15 Full Timber Harvest		7972								4847
16 Intensive Grazing										
Totals	845	8663	3921	7508	4849	1909	11875	1184	7408	15840

Management Prescription	Freel	Meiss	Echo	Fallen Leaf	Desolation	Emerald Bay	Meeks	McKinney	Blackwood	Ward
1 Developed Recreation			715	1730		85	85		100	40
2 Alpine Skiing								760		2605
3 Unroaded Recreation	1535	12332	775	1490			2817			1406
4 Roaded Recreation								2140	1400	
5 Intensive Dispersed Recreat'n			220	635		832				
6 Wilderness	15600				21300				30	
7 Administrative Site				30			5			1
8 Wetlands Management				660			345			250
9 Maintenance			90			1497		139	5961	
10 Timber Stand Maintenance				1350		233				
11 Reduced Timber Harvest										
12 Urban Lots						56	43	54	1	96
13 Research Natural Area										
14 Utility Corridor										
15 Full Timber Harvest				1075				989		2224
16 Intensive Grazing										
Totals	17135	12332	1800	6970	21300	2703	3295	4082	7492	6622

Table 2.10a. Average Annual Outputs - Alternative D (Efficiency)
Decade 1 is the period 1986-1995

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
RECREATION								
. Developed Public (M RVD)	434	1550	2160	460	603	716	818	931
. Developed Private (M RVD) 1/	959			1088	1179	1288	1422	1588
. Dispersed (M RVD) (includes WFUD)	913	1340	1790	1056	1188	1298	1407	1526
. Wilderness (M RVD) (includes WFUD)	106			144	163	171	171	171
. Open, usable OHV areas - Summer (acres) X 1000	1.3			0	0	0	0	0
. Open, usable OHV areas - Winter (acres) X 1000	74			66	63	63	63	63
. Roads Open to Public Vehicle Use - Summer (miles)	205			175	176	180	184	188
. Roads Closed to Public Vehicle Use - Summer (miles)	35			65	65	65	65	65
. 4X4 Roads Open to OHV Use - Summer (miles)	20			20	22	22	25	25
. Trails Open to OHV Use - Summer (miles)	26			31	31	31	31	31
. Trails Closed to OHV Use - Summer (miles)	182			223	285	308	315	318
. Snow Covered Roads Open to Winter OHV Use (miles)	210			210	210	210	210	210
. Snow Covered Roads Closed to Winter OHV Use (miles)	30			30	31	35	39	43
. Snow Covered Trails Open to Winter OHV Use (miles)	50			78	99	99	99	102
. Snow Covered Trails Closed to Winter OHV Use (miles)	148			166	217	240	247	247
. Visual Quality Index	10.8			10.8	10.8	10.8	10.8	10.8
WILDLIFE AND FISH								
. Threatened and Endangered Species								
. Bald Eagle (number of nesting pairs)	0			4	4	4	4	4
. Perigrine Falcon (number of nesting pairs)	0			1	1	1	1	1
. Wildlife -- Other Than T & E (habitat capability in animal numbers)								
. Deer	1300	1560		1318	1333	1333	1333	1333
. Resident fish other than T & E (M pounds)	88	105		89	90	90	90	90
. Spotted Owls (number of pairs)	0			0	0	0	0	0
. Goshawk (number of pairs)	12			16	16	16	16	16
. Total Wildlife and Fish User Days (WFUD) (Not to be double counted with dispersed recreation)	50			50	50	50	50	50
. Direct Habitat Improvement (WFUD)								
. Deer				0	0	0	0	0
. All Other Wildlife Species (except T&E)				0	0	0	0	0
. Resident Fish (except T&E)				0	0	0	0	0
. Induced Habitat Improvement (WFUD)								
. Deer				20	30	30	30	30
. All Other Wildlife Species (except T&E)				30	50	50	50	50
. Resident Fish (except T&E)				140	250	250	250	250
. Acres of Direct Habitat Improvement								
. Deer(acres)				0	0	0	0	0
. All Other Wildlife Species (except T&E)(acres)				0	0	0	0	0
. Resident Fish (except T&E)(acres)				0	0	0	0	0
RANGE								
. Grazing (AUM)	1400	1000	1100	0	0	0	0	0
TIMBER								
. Allowable Sale Quantity (MMBF)	0	8.5	10.7	0	0	0	0	0
(MMCF)	0	1.3	1.6	0	0	0	0	0
. Programmed Sale Quantity (MMBF)	4			.8	.9	1.0	1.1	1.2
(MMCF)	.6			.1	.1	.2	.2	.2
. Long Term Sustained Yield (MMBF)	NA			NA	NA	NA	NA	NA
(MMCF)	NA			NA	NA	NA	NA	NA
. Reforestation (acres)	0	0	0	40	40	40	40	40
. Timber Stand Improvement (acres)	0	317	320	50	50	40	40	40

Table 2.10b. Average Annual Outputs - Alternative D (Efficiency)

Resource Elements	Base Year 1982	'80 RPA Goals 1990	'80 RPA Goals 2030	Decades 1	2	3	4	5
WOOD PRODUCTS OTHER THAN SAWTIMBER								
. Firewood (cords) 2/	4000			0	0	0	0	0
WATER								
. Quality (M acre feet at standards)	286	180	180	289	291	294	297	299
. Increased Quantity (M acre feet)	0			1.2	1.5	1.8	2.1	2.1
. Watershed Improvement (acres)	40	220	250	22	22	22	22	22
LANDS AND MINERALS								
. Mineral (operating plans)	0	0	0	0	0	0	0	0
. Land Acquisition (acres)	400	8000	600	300	200	20	20	20
HUMAN RESOURCES								
. PROGRAMS (enrollees)	13	15	15	16	17	18	19	20
FIRE								
. Total Fuel Treatment (acres)	700	400	300	40	40	40	40	40
. Fire-related Fuel Treatment (acres)	0	0	0	0	0	0	0	0
. Timber-related Fuel Treatment (acres)	695	400	300	38	38	38	38	38
. Other Fuel Treatment (acres)	5	0	0	2	2	2	2	2
. Expected Acres Burned by Wildfire								
. Intensity Class 1	6			19	19	19	19	19
. Intensity Class 2	18			35	35	35	35	35
. Intensity Class 3	16			17	17	17	17	17
. Intensity Class 4	3			4	4	4	4	4
. Intensity Class 5	1			1	1	1	1	1
. Intensity Class 6	0			0	0	0	0	0
TRANSPORTATION								
. Trail Construction (miles)	2	4	3	5.6	6.2	2.3	0.7	0.3
. Trail Reconstruction (miles)				2.0	2.0	2.0	2.0	2.0
. Trail Maintenance (miles)	198			254	316	339	346	349
. Road Construction (miles)	0			0	.1	.4	.4	.4
. Road Reconstruction (miles)	1			1	1	1	1	1
. Road Maintenance (miles)	240			240	241	245	249	253
FACILITIES								
. Dams and Reservoirs								
. Forest Service (number)	12	0	0	11	10	9	8	7
. Other Federal (number)	0	0	0	0	0	0	0	0
. Other State/Local (number)	0	0	0	0	0	0	0	0
. Private (number)	4	0	0	4	4	4	4	4
. Administrative Sites								
. Forest Service Owned (number)	14	0	0	14	15	15	15	15
. Leased (number)	2	0	0	2	1	1	1	1
TOTAL BUDGET (MM$) 3/	3.8	3.79	3.97	3.8	3.9	4.7	5.0	5.5
TOTAL COST (MM$) 3/	3.9			4.1	4.2	5.0	5.4	5.9

1/ Privately operated or owned recreation sites on national forest land.

2/ Included within Programmed Sale Quantity.

3/ Difference between budget and cost is explained in Table 2.27b.

Alternative E. Market Emphasis

a. Theme. This alternative emphasizes high levels of marketable goods (timber, grazing, and developed recreation) to help satisfy national demand. Nonmarket goods and services would be produced also where they do not conflict with production of the marketable resources and it would be economically efficient to do so. Production of marketable resources would only be limited by minimum management requirements. (See Tables 2.11 and 2.12.)

Recreation and skiing (#2) and forest management (#3) would be the issues most emphasized in this alternative.

b. Resource Program Direction

Recreation. New developed sites would be constructed to satisfy demand. Management of sites would be at the standard service level. Overnight facilities would be emphasized over day use. Ski area expansion would also be encouraged. New trails could be constructed where they were not in conflict with commodity production. The trend would be toward more motorized forms of dispersed recreation use because of road construction.

Visual Quality. The visual resource would not be emphasized and visual conditions would shift toward Partial Retention and Modification.

Wilderness. Current management would continue in Desolation Wilderness. No new wilderness would be recommended. Freel would be managed for timber and forage production and motorized dispersed recreation. Mt. Rose and Lincoln Creek would remain unroaded and would be managed for both motorized and nonmotorized recreation.

Wildlife and Fisheries. Threatened and endangered species, including the bald eagle, Peregrine falcon and Lahontan cutthroat trout, would be emphasized. Deer and other management indicator species (MIS) that are dependent upon early successional vegetation stages, would also be increased. Habitat capability of species associated with mature forest stands would decline in the short term. Habitat capability for all other MIS would either remain near current levels or increase slightly in the long term. Both fisheries and wildlife programs would decline to less than 10% of the 1982 level with no direct habitat improvements. Riparian areas would be protected, but little restoration would occur.

Forest Pest Management. The need and opportunity for pest management would be high due to increased recreation use and construction and high increases in acres treated through vegetation management and increased timber harvest volume. Emphasis would be in developed recreation sites and timber harvest areas. Opportunity for prevention would be high due to large increases in acres treated in vegetation management.

Range. Range production would be increased substantially over current levels. New allotments would be established in Rabe, Prey, Page, and Meeks Meadows. Greater use would be made of transitory range following timber harvesting in the Freel area.

Timber and Vegetation. There would be a substantial increase in timber production using most of the available and capable forest land. Harvest methods would favor clearcutting in blocks up to 20 acres in size. Firewood production would be doubled over current levels as a by-product of managing recreation sites and as cleanup of commercial timber sales.

Water. Water quality would be maintained through the application of Best Management Practices to new projects and activities. Restoration of disturbed watersheds would progress at a rate of 22 acres per year, not completing the program in the 20 years required by the Water Quality Management Plan. About 1,813 afa of water would be required to implement activities.

Air. The impacts of new recreation construction would be mitigated by offsetting traffic caused by the activity. However, the impacts of current traffic on air quality would not be mitigated through the construction of bike and foot trails. Smoke would increase substantially as a result of treating a much larger volume of activity fuels.

Cultural Resources. Cultural resources would be managed at the lowest level meeting legal requirements. Inventory, evaluation, and protection of cultural resources would be emphasized in support of other resource activities.

Research Natural Areas. No areas would be recommended.

Special Interest Areas. No areas would be recommended.

Fire. The fire organization budget would be increased 20% above the 1982 level to protect timber and recreation investments. It would include approximately 33% prevention, 6% detection, 52% attack, and 9% fuels. Wildfire response strategy would be control within or near urbanized areas and on forested land outside of urbanized areas. High elevation alpine areas would have a confinement strategy. Activity fuel treatment would emphasize protection of timber and recreation investments.

Land Use. A utility corridor would be designated from Echo Summit to Luther Pass. Permits for special land uses would favor uses such as public services that support urban development.

Transportation and Facilities. The road system would be increased by 20 miles to access timber plus additions for new recreation sites. Much of the increase would not begin until the third decade. Reconstruction would occur on below-standard roads at the rate of one mile per year. Recreation and administrative sites would be maintained to standard and made energy efficient in the most cost-efficient manner.

c. The Environment to be Created - In the year 2030 the LTBMU would be more developed for skiing and camping than it is now. Most new campgrounds would be in or near the existing band of development around the lake. Much of the backcountry area would be accessed by logging roads, increasing motorized forms of recreation. About 40,000 acres of land would be managed for timber production using even-aged techniques. Openings would be up to 20 acres in size and would significantly impact visual quality. On these

intensively managed lands there would be stands of various ages rather than the predominately medium sized trees that exist now. The forest would be healthier. Overstocked stands would be thinned, and dying trees would be salvaged rapidly.

Many of the environmental thresholds would not be achieved in this alternative. Water quality standards would not be met in 20 years because the restoration work would require longer to complete. Clearcutting with 20 acre openings would not be consistent with the vegetation pattern threshold that limits openings to eight acres in size. The scenic resources threshold would not be achieved in many areas being managed for intensive timber production. The thresholds for soils, vegetation diversity, wildlife, fisheries, noise, and recreation "fair share" would be met.

Table 2.11 Acreage Allocations by Management Prescriptions and Management Areas

Alternative E- Market

Management Prescription	Lower Truckee	Watson	Martis	Mt. Rose	Marlette	E. Shore Beaches	Genoa Peak	Round Hill	Heavenly	Tahoe Valley
1 Developed Recreation	85	360			288			485		520
2 Alpine Skiing		300		292					4200	
3 Unroaded Recreation				6838	1006	750	5704			
4 Roaded Recreation										
5 Intensive Dispersed Recreat'n	759	30				1159		63		
6 Wilderness										
7 Administrative Site	1		1		2			2		7
8 Wetlands Management										480
9 Maintenance									2811	1260
10 Timber Stand Maintenance		2487	1343		2553				185	4000
11 Reduced Timber Harvest										
12 Urban Lots		1		378			259	20	212	521
13 Research Natural Area										
14 Utility Corridor										100
15 Full Timber Harvest		5485	2577		1000		5912	514		8832
16 Intensive Grazing								100		120
Totals	845	8663	3921	7508	4849	1909	11875	1184	7408	15840

Management Prescription	Freel	Meiss	Echo	Fallen Leaf	Desolation	Emerald Bay	Meeks	McKinney	Blackwood	Ward
1 Developed Recreation			715	1730		85	85		40	40
2 Alpine Skiing								760		2605
3 Unroaded Recreation	7235	11732	775	1490						
4 Roaded Recreation										
5 Intensive Dispersed Recreat'n			220	635		832				
6 Wilderness					21300				30	
7 Administrative Site				30			5			1
8 Wetlands Management				542						
9 Maintenance			90			985		128	800	
10 Timber Stand Maintenance							982		3391	
11 Reduced Timber Harvest										
12 Urban Lots						56	43	54	1	96
13 Research Natural Area										
14 Utility Corridor	200									
15 Full Timber Harvest	9600			2443		745	1835	3140	3230	3630
16 Intensive Grazing	100	600		100			345			250
Totals	17135	12332	1800	6970	21300	2703	3295	4082	7492	6622

Table 2.12a. Average Annual Outputs - Alternative E (Market)

Decade 1 is the period 1986-1995

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
RECREATION								
. Developed Public (M RVD)	434	1550	2160	460	603	716	818	931
. Developed Private (M RVD) 1/	959			1088	1179	1288	1422	1588
. Dispersed (M RVD) (includes WFUD)	913	1340	1790	1083	1234	1353	1461	1586
. Wilderness (M RVD) (includes WFUD)	106			117	117	117	117	117
. Open, usable OHV areas - Summer (acres) X 1000	1.3			0	0	0	0	0
. Open, usable OHV areas - Winter (acres) X 1000	74			73	72	80	85	85
. Roads Open to Public Vehicle Use - Summer (miles)	205			205	206	218	232	258
. Roads Closed to Public Vehicle Use - Summer (miles)	35			35	35	35	35	35
. 4X4 Roads Open to OHV Use - Summer (miles)	20			20	15	12	8	5
. Trails Open to OHV Use - Summer (miles)	26			42	42	42	42	42
. Trails Closed to OHV Use - Summer (miles)	182			212	253	272	277	290
. Snow Covered Roads Open to Winter OHV Use (miles)	210			220	220	224	223	226
. Snow Covered Roads Closed to Winter OHV Use (miles)	30			20	21	29	44	67
. Snow Covered Trails Open to Winter OHV Use (miles)	50			104	145	152	152	162
. Snow Covered Trails Closed to Winter OHV Use (miles)	148			150	150	162	167	170
. Visual Quality Index	10.8			10.6	10.4	10.2	10.0	9.8
WILDLIFE AND FISH								
. Threatened and Endangered Species								
. Bald Eagle (number of nesting pairs)	0			4	4	4	4	4
. Peregrine Falcon (nesting pairs)	0			1	1	1	1	1
. Wildlife -- Other Than T & E (habitat capability in animal numbers)								
. Deer	1300	1560		1368	1423	1423	1423	1423
. Resident fish other than T & E (M pounds)	88	105		89	90	90	90	90
. Spotted Owls (number of pairs)	0			0	0	0	0	0
. Goshawk (number of pairs)	12			13	13	13	13	14
. Total Wildlife and Fish User Days (WFUD) (not to be double counted with dispersed recreation)	50			50	50	51	51	51
. Direct Habitat Improvement (WFUD)								
. Deer				0	0	0	0	0
. All Other Wildlife Species (except T&E)				0	0	0	0	0
. Resident Fish (except T&E)				0	0	0	0	0
. Induced Habitat Improvement (WFUD)								
. Deer				50	100	100	100	100
. All Other Wildlife Species (except T&E)				100	180	180	180	180
. Resident Fish (except T&E)				140	250	250	250	250
. Acres of Direct Habitat Improvement								
. Deer(acres)				0	0	0	0	0
. All Other Wildlife Species (except T&E)(acres)				0	0	0	0	0
. Resident Fish (except T&E)(acres)				0	0	0	0	0
RANGE								
. Grazing (AUM)	1400	1000	1100	3000	3000	3000	3000	3000
TIMBER								
. Allowable Sale Quantity (MMBF)	0	8.5	10.7	12.1	13.2	15.1	17.4	20.0
(MMCF)	0	1.3	1.6	1.9	2.0	2.3	2.7	3.1
. Programmed Sale Quantity (MMBF)	4			16.1	17.2	19.1	21.4	24.0
(MMCF)	.6			2.5	2.7	3.0	3.3	3.7
. Long Term Sustained Yield (MMBF)	2			24.8	24.8	24.8	24.8	24.8
(MMCF)	.31			3.8	3.8	3.8	3.8	3.8
. Reforestation (acres)	0	0	0	236.4	176.9	305.6	318.6	403.1
. Timber Stand Improvement (acres)	0	317	320	50	50	236.4	176.9	305.6

Table 2.12b. Average Annual Outputs - Alternative E (Market)

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
WOOD PRODUCTS OTHER THAN SAWTIMBER								
. Firewood (cords) 2/	4000			8000	8000	8000	8000	8000
WATER								
. Quality (M acre feet at standards)	286	180	180	290	294	298	301	303
. Increased Quantity (M acre feet)	0			2.9	3.8	5.4	6.3	7.6
. Watershed Improvement (acres)	40	220	250	22	22	22	22	22
LANDS AND MINERALS								
. Mineral (operating plans)	0	0	0	0	0	0	0	0
. Land Acquisition (acres)	400	8000	600	300	200	20	20	20
HUMAN RESOURCES								
. PROGRAMS (enrollees)	13	15	15	16	17	18	19	20
FIRE								
. Total Fuel Treatment (acres)	700	400	300	830	750	850	810	940
. Fire-related Fuel Treatment (acres)	0	0	0	0	0	0	0	0
. Timber-related Fuel Treatment (acres)	695	400	300	815	735	835	795	925
. Other Fuel Treatment (acres)	5	0	0	15	15	15	15	15
. Expected Acres Burned by Wildfire								
. Intensity Class 1	6			5	5	5	5	5
. Intensity Class 2	18			11	11	11	11	11
. Intensity Class 3	16			12	12	12	12	12
. Intensity Class 4	3			2	2	2	2	2
. Intensity Class 5	1			1	1	1	1	1
. Intensity Class 6	0			0	0	0	0	0
TRANSPORTATION								
. Trail Construction (miles)	2	4	3	5.6	4.1	1.9	0.5	1.3
. Trail Reconstruction (miles)				2.0	2.0	3.0	4.0	4.0
. Trail Maintenance (miles)	198			254	295	314	319	332
. Road Construction (miles)	0			0	.1	.8	.9	1.5
. Road Reconstruction (miles)	1			1	1	1	1	1
. Road Maintenance (miles)	240			240	241	249	258	273
FACILITIES								
. Dams and Reservoirs								
. Forest Service (number)	11	0	0	10	5	2	2	2
. Other Federal (number)	0	0	0	0	0	0	0	0
. Other State/Local (number)	0	0	0	0	0	0	0	0
. Private (number)	4	0	0	4	4	4	4	4
. Administrative Sites								
. Forest Service Owned (number)	14	0	0	15	16	16	16	16
. Leased (number)	2	0	0	1	1	1	1	1
TOTAL BUDGET (MM$) 3/	3.8	3.76	3.97	5.7	6.3	8.2	9.6	11.8
TOTAL COST (MM$) 3/	3.9			5.8	6.4	8.3	9.7	11.9

1/ Privately operated or owned recreation sites on national forest land.

2/ Included within Programmed Sale Quantity.

3/ Difference between budget and cost is explained in Table 2.27b.

Alternative F. Amenity Emphasis

a. Theme. This alternative would emphasize a high level of nonmarketable resources and environmental protection. High quality dispersed recreation (wilderness and nonwilderness types) would be favored. Developed recreation and alpine skiing would not be expanded. Fish and wildlife habitat, water quality, scenic quality, and air quality would be intensively managed to improve upon current conditions. Vegetation management would emphasize diversity and healthy conditions. (See Tables 2.13 and 2.14.)

The water quality (#1), wilderness (#4) and achievement of environmental thresholds (#3) would be the issues most emphasized for resolution in this alternative.

b. Resource Program Direction

Recreation. Dispersed recreation opportunities would be increased through construction of trails and trailheads where such facilities and the induced visitor use do not significantly detract from water quality and wildlife and fish habitat. OHV use would be strictly regulated to minimize environmental damage. Existing developed sites would be managed at standard service level to provide a quality experience. No new recreation sites or ski areas would be built in order to minimize visual and water quality impacts and traffic and air quality mitigation costs.

Visual Quality. The emphasis in visual resources would be to improve upon existing conditions through restoration of areas not meeting objectives.

Wilderness and Roadless Areas. Current management would continue for Desolation Wilderness. The Freel, Lincoln Creek and Mt. Rose roadless areas would be recommended for wilderness.

Wildlife and Fisheries. Mule deer, waterfowl, Peregrine falcon, Lahontan cutthroat, rainbow and brook trout are management indicator species (MIS) which would be emphasized in direct habitat improvement projects and through the watershed restoration and vegetation management programs. The lower extremes of deer herd plan goals would be achieved. Pileated woodpecker and spotted owl habitat would be substantially improved through ecological succession of vegetation. Goshawk habitat capability would decline from current levels by 3% over the long term. Habitat capability for all other MIS would be maintained near current level. The fisheries and wildlife program would be increased by 150 to 200%. Approximately four miles of stream habitat improvement per year and 100 acres of terrestrial habitat improvement per year would occur. Riparian areas would be protected and restored as part of the watershed restoration, wildlife and fisheries programs.

Forest Pest Management. The need and opportunity for pest management would be moderate due to recreation use at full standard and moderate increase in timber outputs. Emphasis would be in hazard tree and vegetation management in developed sites. Moderate opportunities for prevention would occur as vegetation management is implemented.

Range. Livestock grazing would be eliminated in order to minimize conflicts with dispersed recreation, water quality, and wildlife and fish habitat objectives. Some grazing of recreational livestock (horses) would be permitted where not in conflict with other objectives.

Timber and Vegetation. Forests would be managed for health and diversity of vegetation which would benefit scenic, watershed, and habitat values. The most common harvest method would be group and single tree selection. Openings would not exceed 5 acres and would average 2 or 3 acres. Firewood would be supplied to the public at current levels.

Water. Improvement of water quality would be a high priority. All sites requiring treatment to restore watershed conditions would be completed within 20 years at a rate of 110 acres per year. All existing facilities would be retrofitted with Best Management Practices to protect water quality. About 1,413 afa of water would be required to implement this alternative.

Air. There would be no new sources of traffic induced emissions from recreation development. Bicycle and pedestrian trails would be constructed by the Forest Service as a share of the TRPA program to reduce current traffic. The emphasis for slash treatment would be on chipping, lopping and scattering, or leaving it for wildlife cover in order to reduce the amount of smoke from the burning.

Cultural Resources. Cultural resources would be managed at a high level. Not only would inventory and evaluation of all cultural resources be complete by 1995, but an active program of cultural site protection and interpretation would be carried out. The cultural resources overview of the LTBMU would be completed by 1995.

Research Natural Areas. Grass Lake Moss Bog would be recommended for inclusion in the RNA system.

Special Interest Areas. The Tallac Historic site would be designated as a Special Interest Area. Emerald Bay, Osgood Bog, Freel Peak Cushion Plant Community, and Taylor Creek Wetlands would be subject to further study as possible SIAs.

Fire. The fire organization budget would remain at the current level. It would include approximately 33% prevention, 6% detection, 52% attack, and 9% fuels. Wildfire response strategy would be to control within or near urbanized areas, contain on forested lands outside of urbanized areas, and confine in high elevation alpine areas. Amenity values would emphasize complete disposal of activity fuels.

Land Uses. No utility corridors or windows would be designated, nor would major utility rights of ways be approved.

Transportation and Facilities. Transportation improvements would occur to encourage dispersed recreation activities. Additions to the trail system and supporting parking sites would be made. About three miles per year of road reconstruction would occur over 20 years. There would be no new road construction. Recreation and administrative sites would be maintained to

standard service levels and made energy efficient in the most cost-efficient manner.

c. The Environment To Be Created - In the year 2030, the LTBMU would appear much the same as it is now to the casual observer. Panoramic views would show little evidence of man-made impacts on national forest lands. On closer inspection, a visitor would find that all unacceptable soil and visual disturbances had been treated. More areas would be accessed by trails. Forest diversity would be greater. Trees would become older and larger compared to the significant amount of medium sized trees that exist in the 1980's, and there would be more openings with young trees. The forest would also be healthier and more vigorous because more optimal stocking would be achieved. Firewood would be available to the public. There would be a greater emphasis on maintaining instream flows to support fish, wildlife, and riparian resources.

All environmental thresholds would be achieved in 20 years except for the recreation fair share. The water quality standards would be met within 20 years as a result of an intensive restoration program. Air quality impacts from traffic would be fully mitigated. All other thresholds (soils, vegetation, wildlife, fisheries, noise, and scenic) would also be met.

Table 2.13 Acerage Allocations by Management Prescriptions and Management Areas

Alternative F - Amenity

	Management Prescription	Lower Truckee	Watson	Martis	Mt. Rose	Marlette	E. Shore Beaches	Genoa Peak	Round Hill	Heavenly	Tahoe Valley
1	Developed Recreation	85							485		300
2	Alpine Skiing				292					3335	
3	Unroaded Recreation				4213	4847	750		180		
4	Roaded Recreation							4531			
5	Intensive Dispersed Recreat'n	759	30				1159		63		
6	Wilderness				2625			6665			
7	Administrative Site	1		1		2			2		7
8	Wetlands Management								100		120
9	Maintenance									3861	2653
10	Timber Stand Maintenance		2935	1343				420	334		7124
11	Reduced Timber Harvest		5697	2577							4755
12	Urban Lots		1		378			259	20	212	521
13	Research Natural Area										360
14	Utility Corridor										
15	Full Timber Harvest										
16	Intensive Grazing										
	Totals	845	8663	3921	7508	4849	1909	11875	1184	7408	15840

	Management Prescription	Freel	Meiss	Echo	Fallen Leaf	Desolation	Emerald Bay	Meeks	McKinney	Blackwood	Ward
1	Developed Recreation			715	1730		85	85		40	10
2	Alpine Skiing										48
3	Unroaded Recreation	400	12332	775	1490			2817			1000
4	Roaded Recreation								2900		600
5	Intensive Dispersed Recreat'n			220	635		832				
6	Wilderness	15600				21300				30	
7	Administrative Site				30			5			1
8	Wetlands Management				660			345			250
9	Maintenance			90			1497		128	6021	
10	Timber Stand Maintenance	1135			2425		233		1000	850	2688
11	Reduced Timber Harvest									550	1929
12	Urban Lots						56	43	54	1	96
13	Research Natural Area										
14	Utility Corridor										
15	Full Timber Harvest										
16	Intensive Grazing										
	Totals	17135	12332	1800	6970	21300	2703	3295	4082	7492	6622

Table 2.14a. Average Annual Outputs - Alternative F (Amenity)

Decade 1 is the period 1986-1995

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
RECREATION								
. Developed Public (M RVD)	434	1550	2160	460	572	572	572	572
. Developed Private (M RVD) 1/	959			1048	1048	1048	1048	1048
. Dispersed (M RVD) (includes WFUD)	913	1340	1790	1056	1187	1298	1407	1526
. Wilderness (M RVD) (includes WFUD)	106			144	163	171	171	171
. Open, usable OHV areas - Summer (acres) X 1000	1.3			0	0	0	0	0
. Open, usable OHV areas - Winter (acres) X 1000	74			56	56	56	56	56
. Roads Open to Public Vehicle Use - Summer (miles)	205			105	105	105	105	105
. Roads Closed to Public Vehicle Use - Summer (miles)	35			135	135	135	135	135
. 4X4 Roads Open to OHV Use - Summer (miles)	20			20	18	15	15	15
. Trails Open to OHV Use - Summer (miles)	26			0	0	0	0	0
. Trails Closed to OHV Use - Summer (miles)	182			254	313	339	352	352
. Snow Covered Roads Open to Winter OHV Use (miles)	210			210	210	220	220	220
. Snow Covered Roads Closed to Winter OHV Use (miles)	30			30	30	20	20	20
. Snow Covered Trails Open to Winter OHV Use (miles)	50			67	88	89	91	91
. Snow Covered Trails Closed to Winter OHV Use (miles)	148			187	225	250	261	261
. Visual Quality Index	10.8			11.0	11.0	11.0	11.0	11.0
WILDLIFE AND FISH								
. Threatened and Endangered Species								
. Bald Eagle (number of nesting pairs)	0			4	4	4	4	4
. Perigrine Falcon (number of nesting pairs)	0			1	1	1	1	1
. Wildlife -- Other Than T & E (habitat capability in animal numbers)								
. Deer	1300	1560		1630	1800	1800	1800	1800
. Resident fish other than T & E (M pounds)	88	105		99	108	108	108	108
. Spotted Owls (number of pairs)	0			0	0	0	0	0
. Goshawk (number of pairs)	12			15	15	15	15	15
. Total Wildlife and Fish User Days (MWFUD) (Not to be double counted with dispersed recreation)	50			52	54	57	59	62
. Direct Habitat Improvement (WFUD)								
. Deer				110	360	360	360	360
. All Other Wildlife Species (except T&E)				490	940	940	940	940
. Resident Fish (except T&E)				490	880	880	880	880
. Induced Habitat Improvement (WFUD)								
. Deer				70	80	80	80	80
. All Other Wildlife Species (except T&E)				130	140	140	140	140
. Resident Fish (except T&E)				380	170	170	170	170
. Acres of Direct Habitat Improvement								
. Deer(acres)				100	100	100	100	100
. All Other Wildlife Species (Except T&E) (acres)				5	5	5	5	5
. Resident Fish (Except T&E)(acres)				4	4	4	4	4
RANGE								
. Grazing (AUM)	1400	1000	1100	0	0	0	0	0
TIMBER								
. Allowable Sale Quantity (MMBF)	0	8.5	10.7	0	0	0	0	0
(MMCF)	0	1.3	1.6	0	0	0	0	0
. Programmed Sale Quantity (MMBF)	4			4.4	4.6	4.9	5.2	5.5
(MMCF)	.6			.7	.7	.8	.8	.8
. Long Term Sustained Yield (MMBF)	NA			NA	NA	NA	NA	NA
(MMCF)	NA			NA	NA	NA	NA	NA
. Reforestation (acres)	0	0	0	100	100	100	100	100
. Timber Stand Improvement (acres)	0	317	320	50	50	100	100	100

Table 2.14b. Average Annual Outputs - Alternative F (Amenity)

Ressource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
WOOD PRODUCTS OTHER THAN SAWTIMBER								
. Firewood (cords) 2/	4000			4000	4000	4000	4000	4000
WATER								
. Quality (M acre feet at standards)	286	180	180	295	311	319	319	319
. Increased Quantity (M acre feet)	0			1.4	1.7	1.8	1.9	1.9
. Watershed Improvement (acres)	40	220	250	110	110	0	0	0
LANDS AND MINERALS								
. Mineral (operating plans)	0	0	0	0	0	0	0	0
. Land Acquisition (acres)	400	8000	600	300	200	20	20	20
HUMAN RESOURCES								
. PROGRAMS (enrollees)	13	15	15	16	17	18	19	20
FIRE								
. Total Fuel Treatment (acres)	700	400	300	410	410	410	410	410
. Fire-related Fuel Treatment (acres)	0	0	0	0	0	0	0	0
. Timber-related Fuel Treatment (acres)	695	400	300	405	405	405	405	405
. Other Fuel Treatment (acres)	5	0	0	5	5	5	5	5
. Expected Acres Burned by Wildfire								
. Intensity Class 1	6			6	6	6	6	6
. Intensity Class 2	18			18	18	18	18	18
. Intensity Class 3	16			16	16	16	16	16
. Intensity Class 4	3			3	3	3	3	3
. Intensity Class 5	1			1	1	1	1	1
. Intensity Class 6	0			0	0	0	0	0
TRANSPORTATION								
. Trail Construction (miles)	2	4	3	5.6	5.9	2.6	1.3	0
. Trail Reconstruction (miles)				7.5	7.5	0	0	0
. Trail Maintenance (miles)	198			254	313	339	352	352
. Road Construction (miles)	0			0	0	0	0	0
. Road Reconstruction (miles)	1			3	3	0	0	0
. Road Maintenance (miles)	240			240	240	240	240	240
FACILITIES								
. Dams and Reservoirs								
. Forest Service (number)	11	0	0	11	11	11	11	11
. Other Federal (number)	0	0	0	0	0	0	0	0
. Other State/Local (number)	0	0	0	0	0	0	0	0
. Private (number)	4	0	0	4	4	4	4	4
. Administrative Sites								
. Forest Service Owned (number)	14	0	0	14	14	14	14	14
. Leased (number)	2	0	0	2	2	2	2	2
TOTAL BUDGET (MM$) 3/	3.8	3.76	3.97	4.9	4.9	4.3	4.6	4.9
TOTAL COST (MM$) 3/	3.9			5.1	5.1	4.4	4.7	5.0

1/ Privately operated or owned recreation sites on national forest land.

2/ Included within Programmed Sale Quantity.

3/ Difference between budget and cost is explained in Table 2.27b.

Alternative G. Low Budget

a. Theme. This alternative would reduce the budget by 25% from the 1982 level. As a consequence, the level of goods and services would also be reduced. Reductions would occur in each resource area, although not necessarily uniformly. There would be more reliance upon cooperative assistance, such as in fire control, and volunteers in recreation operations. Environmental improvements would rely to a larger extent upon protection as opposed to making capital investments. (See Tables 2.15 and 2.16.)

All issues are resolved based upon the restraint of a reduced budget.

b. Resource Program Direction

Recreation. The emphasis in recreation would be to reduce costs either through lower standard management or closing of facilities. Lower cost dispersed recreation, such as driving for pleasure and wildlife use, would be emphasized. OHV use would continue without much enforcement of control measures. No new developed recreation facilities would be constructed except those provided through private investments, such as skiing.

Visual Quality. The emphasis for visual resources would be to maintain current conditions. Disturbed sites would gradually recover through natural processes or through watershed restoration activities.

Wilderness and Roadless Areas. Current management would continue in Desolation Wilderness, but less effort would be made to enforce rules and capacity limits and upon trail maintenance. Since wilderness management costs more than other dispersed recreation, Freel, Mt. Rose, and Lincoln Creek roadless areas would not be recommended for wilderness.

Wildlife and Fish. Mule deer, waterfowl, Peregrine falcon, Lahontan cutthroat and rainbow trout are MIS which would be emphasized through direct habitat improvement projects and to a lesser amount through the watershed restoration and vegetation management programs. Goshawk habitat capability would decline from current levels by 5% over the long term. Pileated woodpecker and spotted owl would benefit from ecological succession of vegetation. Habitat capability for all other MIS would be maintained. A moderate fisheries and wildlife program, equivalent to current program levels, would improve approximately two miles of stream habitat per year and 70 acres of terrestrial habitat per year in meadows, brushlands, and wetlands. Riparian areas would be protected and restored as part of the fisheries and wildlife habitat improvement and the watershed restoration programs.

Forest Pest Management. The need and opportunity for pest management would be low due to the reduced recreation use and reduced acres treated through vegetation management. The opportunity for prevention would be low.

Range. The grazing program would be eliminated upon termination of existing permits.

Timber and Vegetation. Timber harvesting would be reduced from the current level to a minimum necessary to maintain habitat diversity which is 40 acres of openings each year. Firewood would be at half of the current volume, with emphasis on removal of trees that present a safety hazard in recreation areas.

Water. Water quality would be slightly improved. Existing facilities would be retrofitted with Best Management Practices, but at a slow rate. The watershed restoration program would be implemented at a rate of 22 acres per year, not completing the program in 20 years. About 1,344 afa of water would be required to implement activities.

Air. New sources of traffic induced emissions from recreation development would be from private investment such as skiing. The Forest Service contribution toward reduction of current vehicle impacts on air quality would be through the closure of some existing sites. There would be significantly less smoke produced from the burning of timber activity fuels.

Cultural Resource. Cultural resources would be managed at the lowest level. Meeting legal requirement inventory, evaluation, and protection of cultural resources would be emphasized in support of other resource activities.

Research Natural Areas. No areas would be recommended.

Special Interest Areas. No areas would be recommended.

Fire. The fire organization budget would be decreased 40% from the 1982 level and would include approximately 12% prevention, 2% detection, 81% attack, and 5% fuels. Wildfire suppression forces would be emphasized. Wildfire response strategy would be to control fires. Activity fuel treatment would meet minimum fire hazard reduction needs.

Land Uses. No utility corridors would be designated. Windows would be recognized as Dagget Pass, Luther Pass, and Echo Summit when individual rights are considered.

Transportation and Facilities. The road system would be reduced by about 33 miles, or 14%. Remaining roads would be maintained at a custodial level. Reconstruction would occur at a rate of one mile per year. Recreation and administrative facilities would be maintained at custodial levels.

c. The Environment To Be Created. Casual observers in the year 2030 would see much the same environment as they do now with relatively undisturbed forested mountains. There would be fewer recreation sites, and these facilities would be more crowded and in a poorer state of repair than now. Dispersed recreation would not be as well cared for and there would be more incidents of use conflicts. Most of the forest would be 50 years older than now, with little habitat left for early successional stage species, except where wildfire has changed the forest. Since only a small area can be treated each year, insect and disease problems would have increased as more stands became overstocked. More firewood would be imported by

residents both to supply the increased population and to replace the reduced volume produced on LTBMU.

Environmental thresholds that would be met are soils, wildlife, fisheries, noise, and scenic. This would result more from a lack of activities than from active protection and management. The air quality threshold would be achieved through a reduction in the number of visitors instead of through mitigation. On the other hand, restoration of disturbed watersheds would require substantially more than 20 years to complete. Vegetation diversity would not be met because there would be few immature timber stands left. Not only would the public not receive a fair share of future development for outdoor recreation, but some of the existing capacity would be lost as well.

Table 2.15 Acreage Allocations by Management Prescriptions and Management Areas

Alternative G - Low Budget

Management Prescription	Lower Truckee	Watson	Martis	Mt. Rose	Marlette	E. Shore Beaches	Genoa Peak	Round Hill	Heavenly	Tahoe Valley
1 Developed Recreation	85							485		300
2 Alpine Skiing		300		292					3335	
3 Unroaded Recreation		3020		6838	4847	750	8275	180		
4 Roaded Recreation		1915	3320				3341			6768
5 Intensive Dispersed Recreat'n	759	30				1159		63		
6 Wilderness										
7 Administrative Site	1		1		2			2		7
8 Wetlands Management								100		480
9 Maintenance									3861	2653
10 Timber Stand Maintenance								334		2100
11 Reduced Timber Harvest		3397	600							3011
12 Urban Lots		1		378			259	20	212	521
13 Research Natural Area										
14 Utility Corridor										
15 Full Timber Harvest										
16 Intensive Grazing										
Totals	845	8663	3921	7508	4849	1909	11875	1184	7408	15840

Management Prescription	Freel	Meiss	Echo	Fallen Leaf	Desolation	Emerald Bay	Meeks	McKinney	Blackwood	Ward
1 Developed Recreation			715	1630		85	85		10	
2 Alpine Skiing								760		48
3 Unroaded Recreation		12332	775	1490			2817	2380		
4 Roaded Recreation	887									
5 Intensive Dispersed Recreat'n			220	635		832				
6 Wilderness					21300				30	
7 Administrative Site				30			5			1
8 Wetlands Management			90	660			345			250
9 Maintenance	16248					1730		888	5961	3527
10 Timber Stand Maintenance				1530					940	2000
11 Reduced Timber Harvest				995					550	700
12 Urban Lots						56	43	54	1	96
13 Research Natural Area										
14 Utility Corridor										
15 Full Timber Harvest										
16 Intensive Grazing										
Totals	17135	12332	1800	6970	21300	2703	3295	4082	7492	6622

Table 2.16a. Average Annual Outputs - Alternative G (Low Budget)

Decade 1 is the period 1986-1995

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
RECREATION								
. Developed Public (M RVD)	434	1550	2160	143	143	143	143	143
. Developed Private (M RVD) 1/	959			1088	1179	1237	1237	1237
. Dispersed (M RVD) (includes WFUD)	913	1340	1790	1028	1099	1155	1206	1264
. Wilderness (M RVD) (includes WFUD)	106			106	106	106	106	106
. Open, usable OHV areas - Summer (acres) X 1000	1.3			0	0	0	0	0
. Open, usable OHV areas - Winter (acres) X 1000	74			74	74	74	74	74
. Roads Open to Public Vehicle Use - Summer (miles)	205			106	106	106	106	106
. Roads Closed to Public Vehicle Use - Summer (miles)	35			101	101	101	101	101
. 4X4 Roads Open to OHV Use - Summer (miles)	20			20	22	24	26	30
. Trails Open to OHV Use - Summer (miles)	26			26	26	26	26	26
. Trails Closed to OHV Use - Summer (miles)	182			228	265	265	265	265
. Snow Covered Roads Open to Winter OHV Use (miles)	210			190	192	192	192	192
. Snow Covered Roads Closed to Winter OHV Use (miles)	30			17	15	15	15	15
. Snow Covered Trails Open to Winter OHV Use (miles)	50			88	119	119	119	119
. Snow Covered Trails Closed to Winter OHV Use (miles)	148			166	172	172	172	172
. Visual Quality Index	10.8			10.7	10.7	10.7	10.7	10.7
WILDLIFE AND FISH								
. Threatened and Endangered Species								
. Bald Eagle (number of nesting pairs)	0			4	4	4	4	4
. Perigrine Falcon (number of nesting pairs)	0			1	1	1	1	1
. Wildlife -- Other Than T & E (habitat capability in animal numbers)								
. Deer	1300	1560		1386	1457	1457	1457	1457
. Resident fish other than T & E (M pounds)	88	105		89	90	90	90	90
. Spotted Owls (number of pairs)	0			0	0	0	0	0
. Goshawk (number of pairs)	12			16	16	16	16	16
. Total Wildlife and Fish User Days (MWFUD) (Not to be double counted with dispersed recreation)	50			51	52	53	54	55
. Direct Habitat Improvement (WFUD)								
. Deer				20	70	70	70	70
. All Other Wildlife Species (except T&E)				320	430	430	430	430
. Resident Fish (except T&E)				120	220	220	220	220
. Induced Habitat Improvement (WFUD)								
. Deer				30	60	60	60	60
. All Other Wildlife Species (except T&E)				40	60	60	60	60
. Resident Fish (except T&E)				140	250	250	250	250
. Acres of Direct Habitat Improvement								
. Deer(acres)				15	15	15	15	15
. All Other Wildlife Species (except T&E)(acres)				5	5	5	5	5
. Resident Fish (except T&E)(acres)				1	1	1	1	1
RANGE								
. Grazing (AUM)	1400	1000	1100	0	0	0	0	0
TIMBER								
. Allowable Sale Quantity (MMBF)	0	8.5	10.7	0	0	0	0	0
(MMCF)	0	1.3	1.6	0	0	0	0	0
. Programmed Sale Quantity (MMBF)	4			1.9	2.0	2.1	2.2	2.3
(MMCF)	.6			.3	.3	.3	.3	.4
. Long Term Sustained Yield (MMBF)	NA			NA	NA	NA	NA	NA
(MMCF)	NA			NA	NA	NA	NA	NA
. Reforestation (acres)	0	0	0	40	40	40	40	40
. Timber Stand Improvement (acres)	0	317	320	50	50	40	40	40

Table 2.16b. Average Annual Outputs - Alternative G (Low Budget)

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
WOOD PRODUCTS OTHER THAN SAWTIMBER								
. Firewood (cords) 2/	4000			2000	2000	2000	2000	2000
WATER								
. Quality (M acre feet at standards)	286	180	180	288	291	293	296	298
. Increased Quantity (M acre feet)	0			1.1	1.1	1.3	1.3	1.3
. Watershed Improvement (acres)	40	220	250	22	22	22	22	22
LANDS AND MINERALS								
. Mineral (operating plans)	0	0	0	0	0	0	0	0
. Land Acquisition (acres)	400	8000	600	300	200	20	20	20
HUMAN RESOURCES								
. PROGRAMS (enrollees)	13	15	15	16	17	18	19	20
FIRE								
. Total Fuel Treatment (acres)	700	400	300	90	90	90	90	90
. Fire-related Fuel Treatment (acres)	0	0	0	0	0	0	0	0
. Timber-related Fuel Treatment (acres)	695	400	300	88	88	88	88	88
. Other Fuel Treatment (acres)	5	0	0	2	2	2	2	2
. Expected Acres Burned by Wildfire								
. Intensity Class 1	6			19	19	19	19	19
. Intensity Class 2	18			35	35	35	35	35
. Intensity Class 3	16			17	17	17	17	17
. Intensity Class 4	3			4	4	4	4	4
. Intensity Class 5	1			1	1	1	1	1
. Intensity Class 6	0			0	0	0	0	0
TRANSPORTATION								
. Trail Construction (miles)	2	4	3	5.6	3.7	0	0	0
. Trail Reconstruction (miles)				2.0	2.0	2.0	2.0	2.0
. Trail Maintenance (miles)	198			254	291	291	291	291
. Road Construction (miles)	0			0	0	0	0	0
Road Reconstruction (miles)	1			1	1	1	1	1
. Road Maintenance (miles)	240			207	207	207	207	207
FACILITIES								
. Dams and Reservoirs								
. Forest Service (number)	11	0	0	11	10	9	8	7
. Other Federal (number)	0	0	0	0	0	0	0	0
. Other State/Local (number)	0	0	0	0	0	0	0	0
. Private (number)	4	0	0	4	4	4	4	4
. Administrative Sites								
. Forest Service Owned (number)	14	0	0	12	12	12	12	12
. Leased (number)	2	0	0	2	2	2	2	2
TOTAL BUDGET (MM$) 3/	3.8	3.76	3.97	3.0	2.5	2.5	2.5	2.5
TOTAL COST (MM$) 3/	3.9			3.3	2.8	2.8	2.8	2.8

1/ Privately operated or owned recreation sites on national forest land.

2/ Included within Programmed Sale Quantity.

3/ Difference between budget and cost is explained in Table 2.27b.

Alternative H 1980 RPA

a. Theme. This alternative would achieve the 1980 RPA program targets assigned in the Regional Guide for the Pacific Southwest Region. The RPA program, which emphasizes moderately high levels of both commodity and amenity benefits, would be met in the most economically efficient way. Timber outputs would be met using systems that are protective of water and visual quality. (See Tables 2.17 and 2.18.)

Water quality (#1), recreation (#2), and forest management (#3) would the issues most emphasized in this alternative.

b. Resource Program Direction

Recreation. Dispersed and developed recreation would be increased to meet respective targets. Motorized recreation and overnight facilities would be emphasized. Management would be at the standard service level. Ski area expansion would also be encouraged to help meet targets.

Visual Quality. A slight decrease in the visual resource would occur since a larger acreage of partial retention is allowed.

Wilderness and Roadless Areas. Current management would be continued for Desolation Wilderness. Freel and Mt. Rose would be recommended for wilderness. Dispersed recreation emphasis would continue in Lincoln Creek.

Wildlife and Fish. Mule deer, rainbow trout, and brook trout are management indicator species (MIS) and RPA emphasis species which would be emphasized in both direct habitat improvement projects as well as indirectly in watershed restoration and vegetation management projects. Pileated woodpeckers, also a MIS and RPA emphasis species, would be emphasized as much as possible while still meeting RPA mule deer and timber management targets. RPA targets for mule deer would be achieved, and the physical and biological habitat improvement potential for resident trout would be implemented. Goshawk habitat capability would decline by approximately 17% from current levels. Habitat capability for all other MIS would be maintained or improved in the long term, mainly through ecological succession of vegetation types. A high fisheries program level and a moderate wildlife program level would be implemented, including three to eight miles of stream habitat improvement per year and 70 to 100 acres of terrestrial wildlife habitat improvement per year in meadows, brushlands and wetlands. This would be a doubling of the current fisheries program and an 8% increase from current wildlife program. Riparian areas would be protected and restored as part of watershed restoration, fisheries, and wildlife programs.

Forest Pest Management. The need and opportunity for pest management would be high due to increased recreation use and construction and large increases in acres treated through vegetation management and increased timber volume output. Emphasis would be in developed recreation sites and timber harvest areas. The larger timber program associated with this alternative would provide increased prevention opportunities.

Range. Grazing would increase by 46% above current level over the next 50 years. The emphasis would continue to be the current extensive management practice with some intensive management in new allotments associated with large meadows.

Timber and Vegetation. Timber management would emphasize sustained yield production and harvest on a regulated basis. Harvesting would primarily use group selection, creating openings up to five acres. Firewood production would double from the current level as a by-product of slash disposal, recreation site management, hazard tree removal and habitat improvement projects.

Water. Water quality would be improved. Inventoried disturbed areas would be restored at a rate of 55 acres per year over 40 years. Existing facilities would be retrofitted with Best Management Practices to protect water quality. About 1,952 afa of water would be required to implement activities.

Air. Mitigation of the effects of new recreation construction would offset traffic generated by the activity. Existing impacts of traffic would not be reduced through investments in bicycle and pedestrian trails. Smoke would increase because of the larger volume of activity fuels that would be treated.

Cultural Resources. Cultural resources would be managed at a moderate level. A complete inventory and evaluation of cultural resources on all national forest lands would be completed by 1995 and significant resources would be protected.

Research Natural Areas. No areas would be recommended.

Special Interest Areas. No areas would be recommended.

Fire. The fire organization budget would be increased 20% above the 1982 level, but would retain the current combination of fire suppression and prevention forces because of larger investment in forest resources and improvements. It would include approximately 33% prevention, 6% detection, 52% attack, and 9% fuels. Wildfire response strategy would be to control fires at two acres or less 90% of the time. Activity fuel treatment would emphasize fire hazard reduction.

Land Uses. No utility corridors would be designated. Windows would be recognized at Echo Summit, Daggett Pass, and Luther Pass when individual rights-of-way are considered.

Transportation and Facilities. Additions would be made to the transportation system to within new recreation sites. Four miles of new road would be constructed to access the timber resource. Most of the construction would occur during the fourth and fifth decades. Roads would be upgraded through reconstruction at a rate of two miles per year over thirty years. Recreation and administrative facilities would be maintained to standards, made energy efficient, and/or replaced in the most cost efficient manner.

c. The Environment To Be Created - In the year 2030, the LTBMU would be more developed for skiing and other outdoor recreation than it is now. However, construction would probably not keep up with demand. Opportunities for dispersed recreation would be significantly increased, particularly for motorized recreation. Diversity would be increased over present levels with more stands of older and larger trees and more early successional stages. The forest would be healthier where stands are managed to optimal density and diversity.

Not all of the environmental thresholds would be achieved by Forest Service policies in this alternative. The restoration of disturbed watershed would be enlarged but would not be completed in 20 years. Air quality impacts from traffic generated by new construction of recreation facilities would be fully mitigated, but no mitigation would be provided for existing traffic. Although there would be an increase in developed recreation, it would not be as great as the "fair share" negotiated in the TRPA Regional Plan. Visual quality would be reduced in some locations where timber management activities are visible. The thresholds for soils vegetation, wildlife, fisheries, and noise would be achieved.

Table 2.17 Acreage Allocations by Management Prescriptions and Management Areas

Alternative H - RPA

	Management Prescription	Lower Truckee	Watson	Martis	Mt. Rose	Marlette	E. Shore Beaches	Genoa Peak	Round Hill	Heavenly	Tahoe Valley
1	Developed Recreation	85							485		300
2	Alpine Skiing				292					4200	
3	Unroaded Recreation				4213	4559	750	5704	180		
4	Roaded Recreation							5001			
5	Intensive Dispersed Recreat'n	759	30				1159		63		
6	Wilderness				2625						
7	Administrative Site	1		1		2			2		7
8	Wetlands Management										480
9	Maintenance									2811	1260
10	Timber Stand Maintenance		590					911	334	185	900
11	Reduced Timber Harvest		8042	3920		288					12252
12	Urban Lots		1		378			259	20	212	521
13	Research Natural Area										
14	Utility Corridor										
15	Full Timber Harvest										
16	Intensive Grazing								100		120
	Totals	845	8663	3921	7508	4849	1909	11875	1184	7408	15840

	Management Prescription	Freel	Meiss	Echo	Fallen Leaf	Desolation	Emerald Bay	Meeks	McKinney	Blackwood	Ward
1	Developed Recreation			715	1730		85	85		40	40
2	Alpine Skiing								760		2605
3	Unroaded Recreation		12332	775	1490			1817			1200
4	Roaded Recreation								2140		
5	Intensive Dispersed Recreat'n			220	635		832				
6	Wilderness	15600				21300				30	
7	Administrative Site				30			5			1
8	Wetlands Management				660						250
9	Maintenance			90			1497		139	5961	
10	Timber Stand Maintenance				577		233			350	
11	Reduced Timber Harvest	1435			1848			1000	989	1110	2430
12	Urban Lots						56	43	54	1	96
13	Research Natural Area										
14	Utility Corridor										
15	Full Timber Harvest										
16	Intensive Grazing	100						345			
	Totals	17135	12332	1800	6970	21300	2703	3295	4082	7492	6622

Table 2.18a. Average Annual Outputs - Alternative H (RPA)

Decade 1 is the period 1986-1995

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
RECREATION								
. Developed Public (M RVD)	434	1550	2160	455	465	531	632	632
. Developed Private (M RVD) 1/	959			1087	1179	1288	1422	1527
. Dispersed (M RVD) (includes WFUD)	913	1340	1790	1056	1195	1314	1422	1541
. Wilderness (M RVD) (includes WFUD)	106			144	156	156	156	156
. Open, usable OHV areas - Summer (acres) X 1000	1.3			0	0	0	0	0
. Open, usable OHV areas - Winter (acres) X 1000	74			64	61	61	61	61
. Roads Open to Public Vehicle Use - Summer (miles)	205			205	205	205	211	215
. Roads Closed to Public Vehicle Use - Summer (miles)	35			35	35	35	35	35
. 4X4 Roads Open to OHV Use - Summer (miles)	20			20	20	20	25	25
. Trails Open to OHV Use - Summer (miles)	26			31	31	31	31	31
. Trails Closed to OHV Use - Summer (miles)	182			221	275	295	302	315
. Snow Covered Roads Open to Winter OHV Use (miles)	210			210	210	210	212	214
. Snow Covered Roads Closed to Winter OHV Use (miles)	30			30	30	30	34	36
. Snow Covered Trails Open to Winter OHV Use (miles)	50			68	104	108	108	121
. Snow Covered Trails Closed to Winter OHV Use (miles)	148			186	202	218	225	225
. Visual Quality Index	10.8			10.7	10.7	10.7	10.7	10.7
WILDLIFE AND FISH								
. Threatened and Endangered Species								
. Bald Eagle (number of nesting pairs)	0			4	4	4	4	4
. Peregrine Falcon (number of nesting pairs)	0			1	1	1	1	1
. Wildlife -- Other Than T & E (habitat capability in animal numbers)								
. Deer	1300	1560		1572	1759	1759	1759	1759
. Resident fish other than T & E (M pounds)	88.0	105.0		93.6	98.2	98.2	98.2	98.2
. Spotted Owls (number of pairs)	0			0	0	0	0	0
. Goshawk (number of pairs)	12			14	14	14	14	15
. Total Wildlife and Fish User Days (MWFUD) (not to be double counted with dispersed recreation)	50			52	54	57	59	61
. Direct Habitat Improvement (WFUD)								
. Deer				110	160	160	160	160
. All Other Wildlife Species (except T&E)				490	840	840	840	840
. Resident Fish (except T&E)				680	750	750	750	750
. Induced Habitat Improvement (WFUD)								
. Deer				70	120	120	120	120
. All Other Wildlife Species (except T&E)				120	220	220	220	220
. Resident Fish (except T&E)				190	300	300	300	300
. Acres of Direct Habitat Improvement								
. Deer(acres)				100	70	70	70	70
. All Other Wildlife Species (except T&E)(acres)				5	5	5	5	5
. Resident Fish (except T&E)(acres)				8	3	3	3	3
RANGE								
. Grazing (AUM)	1400	1000	1100	2300	2300	2300	2300	2300
TIMBER								
. Allowable Sale Quantity (MMBF)	0	8.5	10.7	5.8	6.3	6.7	6.7	6.7
(MMCF)	0	1.3	1.6	.9	1.0	1.0	1.0	1.0
. Programmed Sale Quantity (MMBF)	4			9.8	10.3	10.7	10.7	10.7
(MMCF)	.6			1.5	1.6	1.7	1.7	1.7
. Long Term Sustained Yield (MMBF)	2			10.7	10.7	10.7	10.7	10.7
(MMCF)	.31			1.6	1.6	1.6	1.6	1.6
. Reforestation (acres)	0	0	0	170	160	121	109	142
. Timber Stand Improvement (acres)	0	317	320	50	50	170	160	121

Table 2.18b. Average Annual Outputs - Alternative H (RPA)

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
WOOD PRODUCTS OTHER THAN SAWTIMBER								
. Firewood (cords) 2/	4000			8000	8000	8000	8000	8000
WATER								
. Quality (M acre feet at standards)	286	180	180	292	300	308	316	320
. Increased Quantity (M acre feet)	0			2.1	2.8	3.0	3.0	3.1
. Watershed Improvement (acres)	40	220	250	55	55	55	55	0
LANDS AND MINERALS								
. Mineral (operating plans)	0	0	0	0	0	0	0	0
. Land Acquisition (acres)	400	8000	600	300	300	20	20	20
HUMAN RESOURCES								
. PROGRAMS (enrollees)	13	15	15	16	17	18	19	20
FIRE								
. Total Fuel Treatment (acres)	700	400	300	420	500	460	450	480
. Fire-related Fuel Treatment (acres)	0	0	0	0	0	0	0	0
. Timber-related Fuel Treatment (acres)	695	400	300	413	493	453	443	473
. Other Fuel Treatment (acres)	5	0	0	7	7	7	7	7
. Expected Acres Burned by Wildfire								
. Intensity Class 1	6			5	5	5	5	5
. Intensity Class 2	18			11	11	11	11	11
. Intensity Class 3	16			12	12	12	12	12
. Intensity Class 4	3			2	2	2	2	2
. Intensity Class 5	1			1	1	1	1	1
. Intensity Class 6	0			0	0	0	0	0
TRANSPORTATION								
. Trail Construction (miles)	2	4	3	5.6	5.2	2.0	0.7	1.3
. Trail Reconstruction (miles)				2.0	2.0	3.0	4.0	4.0
. Trail Maintenance (miles)	198			254	306	326	333	346
. Road Construction (miles)	0			0	0	0	.4	.2
. Road Reconstruction (miles)	1			2	2	2	0	0
. Road Maintenance (miles)	240			240	240	240	244	246
FACILITIES								
. Dams and Reservoirs								
. Forest Service (number)	11	0	0	11	11	11	11	11
. Other Federal (number)	0	0	0	0	0	0	0	0
. Other State/Local (number)	0	0	0	0	0	0	0	0
. Private (number)	4	0	0	4	4	4	4	4
. Administrative Sites								
. Forest Service Owned (number)	14	0	0	15	16	16	16	16
. Leased (number)	2	0	0	2	1	1	1	1
TOTAL BUDGET (MM$) 3/	3.8	3.76	3.97	5.6	5.6	6.2	6.0	6.3
TOTAL COST (MM$) 3/	3.9			5.7	5.7	6.3	7.1	6.4

1/ Privately operated or owned recreation sites on national forest land.

2/ Included within Programmed Sale Quantity.

3/ Difference between budget and cost is explained in Table 2.27b.

Alternative I. Wilderness Emphasis With Capital Investment Emphasis to Mitigate for Lands Out of Production

a. Theme. This alternative would allow all roadless areas be added to the wilderness preservation system while intensifying management on nonwilderness lands to maintain or even increase production of marketable goods. (See Tables 2.19 and 2.20.)

Recreation (#2), forest management (#3), and wilderness (#4) are issues that would be most emphasized in this alternative.

b. Resource Program Direction

Recreation. Developed recreation, including skiing, would be expanded to meet demand. Dispersed recreation opportunities would also expand as determined by demand, especially in wilderness. OHV use would be discouraged. Existing developed sites would be managed at the standard service level. (Because no suitable ski and developed recreation sites occur in further planning areas, recreation development and additional wilderness are fully compatible on the LTBMU.)

Visual Quality. Visual resources would be preserved in wilderness. Outside of wilderness, scenic quality would be lowered slightly since more partial retention would be allowed in areas managed for timber production.

Wilderness and Roadless Areas. Current management would continue for Desolation Wilderness. The Freel, Mount Rose and Lincoln Creek areas would be recommended for wilderness.

Wildlife and Fisheries. Mule deer, waterfowl, Peregrine falcon, Lahontan cutthroat and rainbow trout are management indicator species (MIS) which would benefit from direct habitat improvement projects and through the watershed restoration and vegetation management programs. Goshawk habitat capability would decline from current levels by 9% in the long term. Pileated woodpecker and spotted owl would be substantially enhanced through ecological succession of vegetation types. Habitat capability for all other MIS would be maintained. Fisheries and wildlife programs would occur at a level equivalent to the current program, including improvement to approximately two miles of stream habitat per year and 70 acres of terrestrial habitat per year in meadows, brushlands and wetlands. Riparian areas would be protected and restored, mainly as part of the fisheries and wildlife habitat improvement programs and, to a lesser extent, through the watershed restoration program.

Forest Pest Management. The need and opportunity for pest management would be moderate due to increasing recreation use and construction and moderate increases in timber outputs. Emphasis would be in hazard tree and vegetation management in developed sites. Opportunities for prevention would occur as new developed sites are constructed and vegetation management is implemented.

Range. Grazing would equal or exceed current levels through extensive management.

Timber and Vegetation. Timber production would be intensive outside of wilderness. The main harvest method would be group and individual tree selection, especially on accessed low and moderate hazard land. Firewood would be supplied to the public at the current level.

Water. Water quality would be maintained on all new projects and activities. Restoration of disturbed watersheds would occur at a rate of 22 acres per year but would not be completed in 20 years. About 1,953 afa of water would be necessary to implement activities.

Air. Traffic impacts of new developments would be mitigated. Measures intended to reduce existing traffic and air quality problems would not be provided. Smoke would be reduced slightly from present levels by leaving more timber activity slash for natural decomposition.

Cultural Resources. Cultural resources would be managed at a moderate level. A complete inventory and evaluation of cultural resources on all national forest lands would be completed by 1995 and significant resources would be protected.

Research Natural and Special Interest Areas. None would be recommended.

Fire. The fire organization budget would be decreased 20% from the 1982 level and would include approximately 33% prevention, 6% detection, 52% attack, and 9% fuels. Wildfire response strategy would be control within or near urbanized areas, containment on forested lands outside of urbanized areas, and confinement in high elevation alpine areas. Activity fuel treatment would emphasize fire hazard reduction while providing adequate slash for wildlife and watershed protection cover.

Land Uses. No utility corridor would be designated. Windows for utilities would be recognized at Echo Summit and Daggett Pass when individual rights of way are considered.

Transportation and Facilities. There would be no new road construction except those within new recreation sites. Reconstruction of existing roads to planned standard would occur at the rate of one mile per year. Additions to the trail system would be provided. Recreation and administrative facilities would be maintained to the standard service level and made energy efficient.

c. The Environment To Be Created - In the year 2030, the LTBMU would appear about the same as it does today. There would be an increase in recreation and ski development. Timber would be intensively managed on low and moderate hazard land. Meeting the current timber output targets would not require harvesting on high hazard lands. Vegetation diversity would increase on land under timber management, but vegetation in wilderness areas would tend toward old growth conditions.

Some of the environmental thresholds would not be achieved by this alternative. Watershed restoration would not progress as rapidly as desired in the TRPA and State of California Water Quality Plans. The thresholds for soils, vegetation diversity, wildlife, fisheries, noise, recreation fair share, and scenic resources would be met.

Table 2.19 Acreage Allocations by Management Prescriptions and Management Areas

Alternative I - Wilderness

	Management Prescription	Lower Truckee	Watson	Martis	Mt. Rose	Marlette	E. Shore Beaches	Genoa Peak	Round Hill	Heavenly	Tahoe Valley
1	Developed Recreation	85	360			288			485		520
2	Alpine Skiing		300		292					4200	
3	Unroaded Recreation				4213	4559	750		180		
4	Roaded Recreation							4066			
5	Intensive Dispersed Recreat'n	759	30				1159		63		
6	Wilderness				2625			6665			
7	Administrative Site	1		1		2			2		7
8	Wetlands Management								100		480
9	Maintenance									2811	2463
10	Timber Stand Maintenance		2187	1343				885	334	185	6676
11	Reduced Timber Harvest		5785	2577							5173
12	Urban Lots		1		378			259	20	212	521
13	Research Natural Area										
14	Utility Corridor										
15	Full Timber Harvest										
16	Intensive Grazing										
	Total	845	8663	3921	7508	4849	1909	11875	1184	7408	15840

	Management Prescription	Freel	Meiss	Echo	Fallen Leaf	Desolation	Emerald Bay	Meeks	McKinney	Blackwood	Ward
1	Developed Recreation			715	1730		85	85		100	40
2	Alpine Skiing								760		2605
3	Unroaded Recreation		12332	775	1490			2817			1200
4	Roaded Recreation								2140		
5	Intensive Dispersed Recreat'n			220	635		832				
6	Wilderness	15600				21300				30	
7	Administrative Site				30			5			1
8	Wetlands Management				660			345			250
9	Maintenance			90			1497		139	5961	
10	Timber Stand Maintenance	1535			1430		233		989	850	636
11	Reduced Timber Harvest				995					550	1794
12	Urban Lots						56	43	54	1	96
13	Research Natural Area										
14	Utility Corridor										
15	Full Timber Harvest										
16	Intensive Grazing										
	Totals	17135	12332	1800	6970	21300	2703	3295	4082	7492	6622

Table 2.20a. Average Annual Outputs - Alternative I (Wilderness)

Decade 1 is the period 1986-1995

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
RECREATION								
. Developed Public (M RVD)	434	1550	2160	460	603	716	818	931
. Developed Private (M RVD) 1/	959			1088	1179	1288	1422	1588
. Dispersed (M RVD) (includes WFUD)	913	1340	1790	1056	1188	1298	1407	1526
. Wilderness (M RVD) (includes WFUD)	106			144	163	171	171	171
. Open, usable OHV areas - Summer (acres) X 1000	1.3			0	0	0	0	0
. Open, usable OHV areas - Winter (acres) X 1000	74			56	56	56	56	56
. Roads Open to Public Vehicle Use - Summer (miles)	205			175	176	180	184	188
. Roads Closed to Public Vehicle Use - Summer (miles)	35			65	65	65	65	65
. 4X4 Roads Open to OHV Use - Summer (miles)	20			20	18	16	15	15
. Trails Open to OHV Use - Summer (miles)	26			17	17	17	17	17
. Trails Closed to OHV Use - Summer (miles)	182			240	305	335	335	335
. Snow Covered Roads Open to Winter OHV Use (miles)	210			190	190	190	190	190
. Snow Covered Roads Closed to Winter OHV Use (miles)	30			50	51	55	59	63
. Snow Covered Trails Open to Winter OHV Use (miles)	50			67	88	91	91	91
. Snow Covered Trails Closed to Winter OHV Use (miles)	148			190	234	261	261	261
. Visual Quality Index	10.8			10.9	10.9	10.9	10.9	10.9
WILDLIFE AND FISH								
. Threatened and Endangered Species								
. Bald Eagle (number of nesting pairs)	0			4	4	4	4	4
. Peregrine Falcon (number of nesting pairs)	0			1	1	1	1	1
. Wildlife -- Other than T & E (habitat capability in animal numbers)								
. Deer	1300	1560		1514	1689	1689	1689	1689
. Resident fish other than T & E (M pounds)	88	105		92	96	96	96	96
. Spotted Owls (number of pairs)	0			0	0	0	0	0
. Goshawk (number of pairs)	12			14	14	14	14	15
. Total Wildlife and Fish User Days (MWFUD) (Not to be double counted with dispersed recreation)	50			51	52	54	55	57
. Direct Habitat Improvement (WFUD)								
. Deer				50	160	160	160	160
. All Other Wildlife Species (except T&E)				400	840	840	840	840
. Resident Fish (except T&E)				240	440	440	440	440
. Induced Habitat Improvement (WFUD)								
. Deer				40	60	60	60	60
. All Other Wildlife Species (except T&E)				70	110	110	110	110
. Resident Fish (except T&E)				140	250	250	250	250
. Acres of Direct Habitat Improvement								
. Deer(acres)				70	70	70	70	70
. All Other Wildlife Species (except T&E)(acres)				5	5	5	5	5
. Resident Fish (except T&E)(acres)				2	2	2	2	2
RANGE								
. Grazing (AUM)	1400	1000	1100	1400	1400	1400	1400	1400
TIMBER								
. Allowable Sale Quantity (MMBF)	0	8.5	10.7	0	0	0	0	0
(MMCF)	0	1.3	1.6	0	0	0	0	0
. Programmed Sale Quantity (MMBF)	4			5.9	5.3	5.3	5.3	5.3
(MMCF)	.6			.8	.8	.8	.8	.8
. Long Term Sustained Yield (MMBF)	NA			NA	NA	NA	NA	NA
(MMCF)	NA			NA	NA	NA	NA	NA
. Reforestation (acres)	0	0	0	91	93	89	70	60
. Timber Stand Improvement (acres)	0	317	320	50	50	90	93	89

Table 2.20b. Average Annual Outputs - Alternative I (Wilderness)

Resource Elements	Base Year 1982	1980 RPA Goals 1990	2030	Decades 1	2	3	4	5
WOOD PRODUCTS OTHER THAN SAWTIMBER								
. Firewood (cords) 2/	4000			4000	4000	4000	4000	4000
WATER								
. Quality (M acre feet at standards)	286	180	180	289	292	294	297	299
. Increased Quantity (M acre feet)	0			1.5	1.9	2.2	2.5	2.5
. Watershed Improvement (acres)	40	220	250	22	22	22	22	22
LANDS AND MINERALS								
. Mineral (operating plans)	0	0	0	0	0	0	0	0
. Land Acquisition (acres)	400	8000	600	300	200	20	20	20
HUMAN RESOURCES								
. PROGRAMS (enrollees)	13	15	15	16	17	18	19	20
FIRE								
. Total Fuel Treatment (acres)	700	400	300	290	300	290	270	260
. Fire-related Fuel Treatment (acres)	0	0	0	0	0	0	0	0
. Timber-related Fuel Treatment (acres)	695	400	300	286	296	286	266	256
. Other Fuel Treatment (acres)	5	0	0	4	4	4	4	4
. Expected Acres Burned by Wildfire								
. Intensity Class 1	6			10	10	10	10	10
. Intensity Class 2	18			24	24	24	24	24
. Intensity Class 3	16			17	17	17	17	17
. Intensity Class 4	3			3	3	3	3	3
. Intensity Class 5	1			0	0	0	0	0
. Intensity Class 6	0			0	0	0	0	0
TRANSPORTATION								
. Trail Construction (miles)	2	4	3	5.9	6.5	3.0	0	0
. Trail Reconstruction (miles)				4.0	3.0	2.0	1.0	0
. Trail Maintenance (miles)	198			257	322	352	352	352
. Road Construction (miles)	0			0	.1	.4	.4	.4
. Road Reconstruction (miles)	1			1	1	1	1	1
. Road Maintenance (miles)	240			240	241	245	249	253
FACILITIES								
. Dams and Reservoirs								
. Forest Service (number)	11	0	0	11	11	10	10	10
. Other Federal (number)	0	0	0	0	0	0	0	0
. Other State/Local (number)	0	0	0	0	0	0	0	0
. Private (number)	4	0	0	4	4	4	4	4
. Administrative Sites								
. Forest Service Owned (number)	14	0	0	13	14	14	14	14
. Leased (number)	2	0	0	1	1	1	1	1
TOTAL BUDGET (MM$) 3/	3.8	3.76	3.97	4.3	4.4	5.1	5.4	5.8
TOTAL COST (MM$) 3/	3.9			4.5	4.6	5.3	5.6	6.0

1/ Privately operated or owned recreation sites on national forest lands.

2/ Included within Programmed Sale Quantity.

3/ Difference between budget and cost is explained in Table 2.27b.

5. Comparison of Alternatives

Major differences between alternatives are displayed in this section. This is accomplished through a narrative comparison of elements of programs and through comparison tables.

a. Narrative. The following briefly compares the alternative approaches for resource elements.

Developed Recreation - Alternatives A, D, E, and I each offer opportunities for adding developed recreation to meet demand. Alternate A requires construction in the first decade to assure that the public receives a "fair share" of Lake Tahoe recreation opportunities. Existing sites would be maintained and operated to standard. Alternative C offers opportunity for developed recreation but defers action for at least the first decade to insure that water, air and traffic problems are resolved. Alternative H provides only slightly less than the above. Alternatives B and F maintain existing sites, but in Alternative B they are operated at a low standard. No expansion would occur in Alternatives B, F, and G. In G, operation would be at a low standard and some sites would be closed to reduce expenditures.

Downhill Skiing - All alternatives continue skiing at Heavenly Valley and, except for Alternative F, would offer opportunity to expand skiing in order to meet demand or assigned RPA targets. Alternative C would defer the expansion through at least the first decade to allow action on resolution of basinwide water, air and traffic problems. Alternative A would not meet skiing demand in the 4th and 5th decades because of cumulative watershed impacts.

Dispersed Recreation - All alternatives provide dispersed recreation in response to demand with the exception of B and G where budget may limit ability to develop opportunities. Alternatives C and F place greatest emphasis upon dispersed recreation.

Wilderness - Alternative C recommends Freel and Lincoln Creek further planning areas, Mt. Rose roadless area, and the Congressionally released Meiss area for wilderness designation. Alternatives D, F, and I recommend Freel, Lincoln Creek, and Mt. Rose for wilderness. Alternative H recommends Freel and Mt. Rose for wilderness. Alternative A recommends only the Mt. Rose roadless area for wilderness designation. Alternatives B, E, and G would not include wilderness recommendations.

Cultural Resources - Alternatives A, C, and F recommend a high level of management, with emphasis on inventorying, evaluating, protecting and interpreting cultural sites, and completion of the cultural resources overview by 1995. Alternatives H and I provide for a moderate level of management, with a complete inventory by 1995, and protective measures for significant sites. Alternatives B, D, E and G recommend the lowest legal level of treatment for cultural resources, with an active program in support of other resources.

Research Natural Areas - Grass Lake Moss Bog (360 acres) is recommended to the RNA system in Alternatives A, C, and F. No areas are recommended for RNA status in the other alternatives.

Special Interest Areas - The Tallac Historic Site would be designated as a Special Interest Area. Emerald Bay, Osgood Bog, Freel Peak Cushion Plant Community, and Taylor Creek Wetlands would be studied as possible SIA in Alternatives A, C, and F. No areas are recommended in the other alternatives.

Visual Resource - Over 90% of LTBMU would appear undisturbed or natural in Alternatives A, B, C, F, G, H, and I even after 50 years. Of the above, Alternative F has 94% of the land area appearing natural, because no new recreation or ski areas are developed and the timber program is limited to small openings on relatively flat land. Alternative E, which would allow 20 acre clearcuts to manage timber, some of it on steep land, would have the greatest effect upon visual quality. Only 53% of the land area would remain natural appearing after 50 years. Alternatives D also utilizes 20 acre clearcuts for timber management, but to a lesser extent than E and thus would have a moderate reduction in visual quality. Alternatives D and E would not meet the environmental thresholds for visual quality because of the large openings created by clearcutting timber.

Fish and Wildlife - All alternatives provide an opportunity to improve habitat capability for Lahontan cutthroat trout. Alternative C, F, and H would produce the highest fisheries outputs by improving habitat capability of all streams to their potential. Alternatives A, B, and I would produce moderate levels of fisheries outputs by improving habitat capability of approximately 60 to 80% of streams to their potential. Alternative G would produce low to moderate levels of fisheries outputs by improving habitat capability of approximately half of the streams. Alternatives D and E would produce low levels of fisheries outputs and maintain current fish habitat capability of streams with no improvement to their potential.

All alternatives would improve habitat capability and/or nesting situations for bald eagle and Peregrine falcon.

Alternative C and F would produce the highest levels of wildlife outputs and include a high level wildlife habitat improvement program, approximately 150% greater than current program levels. The lower extremes of the deer herd plan goals would be achieved. Habitat capability for all other MIS except goshawk would be maintained or improved from current conditions. Goshawk habitat capability would decline by 3% from current conditions.

Alternatives A, B, and I would produce moderate levels of wildlife outputs through a moderate level wildlife habitat improvement program equivalent to the current program; increase mule deer habitat capability from 2 to 6% and deer numbers from 15 to 32% over current levels; and maintain or improve capability for all other MIS except goshawks. Goshawk habitat capability would decline 3 to 9%.

Alternative H would produce moderate to high levels of wildlife outputs through a moderate level wildlife habitat improvement program slightly (8%)

higher than the current program; meet 1990 RPA deer targets by increasing deer habitat capability 3 to 14% and deer numbers 20 to 35% over current levels; reduce habitat capability in both short and long term for goshawks and in short term only for both spotted owls and pileated woodpeckers; and maintain or improve current habitat capability for all other MIS in the short and long term.

Alternative D would produce the lowest levels of wildlife outputs through a minimum level wildlife habitat improvement program (0 to 10% of the current levels). Deer numbers and habitat capability would remain at or near current levels. Habitat capability for all other MIS would be maintained at current levels or improved substantially, especially for spotted owls and pileated woodpeckers.

Alternative E would produce low to moderate levels of wildlife outputs a wildlife habitat improvement program less than 10% of the current program. Deer numbers and habitat capability would increase 5 to 9% and 21 to 54% respectively as an induced benefit of an intensive timber management program. Habitat capability for goshawks and black bear would decline from current levels in both the short and long term. Habitat capability for spotted owls and pileated woodpeckers would decline from current conditions in the short term and improve from current conditions in the long term. Habitat capability for all remaining MIS would be maintained at current levels or improved.

Alternative G would produce low to moderate levels of wildlife outputs with a wildlife habitat improvement program about half of current. Deer numbers and capability would increase slightly as compared to current levels. Habitat capability for all other MIS would be maintained or improved, especially for spotted owls and pileated woodpeckers.

Range - Alternatives E and H would more than double the AUM over the 1982 level by establishing new allotments and taking advantage of transitory range from the enlarged timber program. The 1982 program level is maintained in Alternative A, B, and I. Alternative C would phase out grazing in ten years. Alternatives D, F, and G do not include a range program.

Timber - Alternative E produces the largest timber harvest with an increase over current volume harvested by fourfold. Harvesting would be required from high hazard land. Alternative H doubles the harvest level and also requires harvesting from some high hazard land. Alternatives A, B, D, and G harvest 40 acres mostly in small openings of 1 or 2 acres to satisfy the minimum management requirement (MMR) for diversity. Alternative F exceeds the MMR level for creation of small openings in order to provide additional diversity. Alternatives D and E utilize clearcuts up to 20 acres in size for management efficiency. Alternative C relies on individual tree selection cutting, and as result, adds little to the diversity of the forest. Only Alternatives E and H include an allowable sale quantity, land suitable for regulated harvest, and a long term sustained yield capacity.

Water - Restoration of disturbed watersheds would occur in all alternatives. Alternatives A, C, and F have a large enough program to

accomplish the restoration work that is inventoried within 20 years. More time is required for all other alternatives.

Watershed protection, including the protection of riparian areas, is a minimum management requirement in all alternatives. Greater potential for damaging watersheds occurs in Alternative E and H because of timber harvest on high hazard lands. Clearing of runs for skiing also increases the potential for damage, except in Alternative F which does not expand skiing. Alternatives B and G would have limited expansion of skiing and therefore the potential for damage. Alternative C, though allowing ski expansion in later decades, would do so only after substantial progress has been made to mitigate existing water, air and traffic problems.

Water yield is increased by 2% in Alternative E. All other alternatives result in about a 1% increase.

Alternatives A and C require the most water rights to meet the expected level of consumption. Alternative G requires the least because recreation development, erosion control and snowmaking are at a low level.

Minerals - Locatable and leasable mineral exploration and extraction would be encouraged the greatest in Alternatives E and H partly because the a more extensive road system. Alternative C would result in the greatest number of acres of existing or proposed withdrawals from mineral entry and leasing. The number of acres of mineral withdrawal would correspond to the acres recommended for wilderness, Research Natural Areas, existing developed recreation areas, wetlands, and administrative sites. Alternatives D, F, and H would follow closely behind C in withdrawals. Alternatives E and G would have the least amount of restriction upon mineral activity from withdrawals.

Lands - The land acquisition program would not vary between alternatives. This is because the program to acquire environmentally sensitive land under the Santini/Burton Act is Congressionally controlled and is not altered by any alternative. With both California and Nevada acquiring land, public acquisition programs should be complete within ten years.

Landline surveys would be accomplished as part of the timber management program and to verify the location of community boundaries. Alternatives E and H would complete the survey in 20 years while other alternatives would require longer.

Special use applications would be treated similarly in all alternatives. Utility corridors would be designated in Alternatives D and E. No corridors would be designated, but windows would be recognized in Alternatives B, G, H, and I. No corridors or windows would be designated in Alternative A , but individual rights-of-way would be considered. Major utility right-of-ways would be prohibited in Alternatives C and F.

Facilities - New road construction is not a major requirement in any alternative. Alternative E would require the most with 20 miles constructed, mostly in later decades to provide access for timber management. Alternative H would also require road building, but to a lesser extent than E. Where recreation and skiing development occurs, some

additional short segments of road would be added to the system. In Alternative G, 14% of the road system (34 miles) would be closed to reduce road maintenance costs. The rate of road reconstruction would vary by the size of the watershed restoration program. Alternatives A, C, and F would reconstruct three miles each year. Alternative H would reconstruct two miles per year to bring roads to established standard. Alternatives B, D, E, G and I reconstruct one mile each year.

Trails would be built in all alternatives to provide access for dispersed recreation. Alternatives C, F, and I build the most new miles of trail (154 miles). Alternative C, because of its emphasis upon dispersed recreation, would construct the trails in the first decades. The Tahoe Rim Trail comprises two-thirds of the trail mileage. In the low budget Alternative G, only the Rim Trail would be constructed since work is done mainly by volunteers.

Protection - Annual acres burned by wildfire would be greatest in Alternatives D and G and at near current levels in Alternatives A, B, C, E, H, F, and I. The fire management program emphasis would remain at the current mix of prevention and suppression resources in Alternatives A, B, C, E, H, F, and I. The fire management program would emphasize suppression resources in Alternative D and G. Fire suppression strategy of control would be used in Alternatives B, D, G and H. Fire suppression strategies of control and confine would be utilized in Alternative E. Fire suppression strategies of control, contain, and confine would be utilized in Alternatives A, C, F, and I. Fuel treatment and prescribed fire workload would be near current levels in Alternatives A, B, C, F, H, and I, below current levels in Alternatives D and G, and above current levels in Alternative E. The greatest impact on resources with no dollar values (air quality, visual impacts, water quality standards, other agency impacts, and public concern and safety) would occur in Alternatives D and G with the least effect in Alternatives A, B, C, E, H, F, and I.

Social - Social benefits vary greatly by alternative and cannot be measured as best or worst except in relationship to different social groups. Generally, those benefiting from the production of marketable goods and services would favor Alternatives A, D, E, H, and I since they provide the highest level of developed recreation and skiing. Environmentalists would benefit the most from Alternatives C and F which are the most protective of water quality, and change the natural appearance of the basin the least.

Economic - Alternative D is the most efficient and has the highest present net value. Alternative G has the lowest present net value. Highest return to the treasury (including payments to local governments) is from E, while G has the lowest. Cash flow is negative in all alternatives with G having the least and F the greatest in the first decade.

Employment does not vary substantially between alternatives. Those with the most skiing and other developed recreation create the most jobs.

Over a 50-year period, Alternative E requires the largest annual budget ($5.7 million increasing to $11.8 million) and Alternative G the lowest ($3.0 million). Alternatives A, C, F and H initially have high annual budgets ($5.3, $5.1, $4.9 and $5.6 million per year respectively for the

first decade) but do not increase substantially over 50 years and may decrease as the watershed restoration program is completed.

The only significant speculative and currently unquantified economic value is the purchase of environmentally sensitive land. That value is in the protection offered to the irretrievable clarity of water in Lake Tahoe.

b. Acres by Prescription. Table 2.21 compares alternatives by the acreage assigned to each of 16 prescriptions. These management prescriptions were previously described in Section E.3 of this chapter. This comparison is a summary of information located in the detailed description of each alternative. Further information is found in Chapter 4 where consequences are discussed.

Table 2.22 compares alternatives by acreage assigned to wilderness.

c. Outputs and Other Key Comparisons. Table 2.23 compares average annual outputs for each alternative. The predictions are summarized for the first and fifth decades.

Table 2.24 provides other key comparisons between alternatives including features of the physical and biological environment and significant environmental consequences.

d. Timber Land Classification (Suitability). Table 2.25 compares alternatives by acres of land classification for timber management. Only those alternatives which have an established quantity objective for regulated timber volume have land areas defined as suitable for timber production.

e. Treatment of Issues. Table 2.26 compares the alternatives in relationship to each of the five major planning issues and also in relationship to several other key planning questions.

Table 2.21 Acreage Allocations by Prescriptions and Alternatives

	Management Prescription	A Selected	B Current	C Conservat'n	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
1	Developed Recreation	4493	3565	4113	4493	4433	3535	3395	3565	4493
2	ALpine Skiing	8157	5977	7397	7993	8157	3675	4735	7857	8157
3	Unroaded Recreation	47969	51242	17982	33395	35530	28804	43704	33020	28316
4	Roaded Recreation	7067	7067	2140	14188	0	8031	16231	7141	6206
5	Intensive Dispersed Recreat'n	6048	3698	6382	3698	3698	3698	3698	3698	3698
6	Wilderness	23955	21330	59552	46220	21330	46220	21330	39555	46220
7	Administrative Site	49	49	49	49	49	49	49	49	49
8	Wetlands Management	1475	1835	1475	1835	1022	1475	1925	1390	1835
9	Maintenance	12014	14201	12959	15263	6074	14250	34868	11758	12961
10	Timber Stand Maintenance	19011	23645	17270	1583	14941	20487	6904	4080	17283
11	Reduced Timber Harvest	15494	13483	16413	0	0	15508	9253	33314	16874
12	Urban Lots	1641	1641	1641	1641	1641	1641	1641	1641	1641
13	Research Natural Area	360	0	360	0	0	360	0	0	0
14	Utility Corridor	0	0	0	268	300	0	0	0	0
15	Full Timber Harvest	0	0	0	17107	48943	0	0	0	0
16	Intensive Grazing	0	0	0	0	1615	0	0	665	0
	Total	147733	147733	147733	147733	147733	147733	147733	147733	147733

Table 2.22 **Wilderness Acreage Allocations by Benchmark and Alternative**

Roadless Area Name (Number)	Net Acres	MLV Minimum Level	FLW Maximum Efficiency	MMR Min. Mgt. Requirem't	CUR Current Level	MKV Market Values	TBR Maximum Timber	H20 Maximum Water	RGN Maximum Range	NON No Added Wilderness
						Benchmark				
Freel (05271)	15,600		15,600	15,600		15,600			9,587	
Lincoln Creek (05983)	6,665		6,665	6,665		6,665			6,665	
Total	22,265	0	22,265	22,265	0	22,265	0	0	16,243	0

Roadless Area Name (Number)	Net Acres	A Selected	B Current	C Conserv.	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
						Alternative				
Freel (05271)	15,600			15,600	15,600		15,600		15,600	15,600
Lincoln Creek (05983)	6,665			6,665	6,665		6,665			6,665
Mt. Rose	2,625	2,625		2,625	2,625		2,625		2,625	2,625
Dardanelles (05982)	14,500			14,500						
Total	39,390	18,225	0	39,390	24,890	0	24,890	0	18,225	24,890

Table 2.23a. **Comparison of Average Annual Output by Alternative for 1st and 5th Decades**

Resource Elements	Base Year 1982	'80 RPA Goals 1990	'80 RPA Goals 2030	A Selected 1st	A Selected 5th	B Current 1st	B Current 5th	C Conservation 1st	C Conservation 5th	D Efficiency 1st	D Efficiency 5th	E Market 1st	E Market 5th	F Amenity 1st	F Amenity 5th	G Low Budget 1st	G Low Budget 5th	H RPA 1st	H RPA 5th	I Wilderness 1st	I Wilderness 5th
RECREATION																					
.Developed Public Use (M RVD)	434	1550	2160	460	927	347	347	460	818	460	931	460	931	460	572	143	143	455	632	460	931
.Developed Private Use (M RVD)	959			1088	1420	1088	1289	1088	1398	1088	1588	1088	1588	1048	1048	1088	1237	1087	1527	1088	1588
.Dispersed (M RVD)	913	1340	1790	1073	1573	1094	1330	1017	1510	1056	1526	1083	1586	1056	1526	1028	1264	1056	1541	1056	1526
.Wilderness Use (M RVD)	106			127	127	106	106	144	190	144	171	117	117	144	171	106	106	144	156	144	171
.Open, Usable OHV Summer (M acres)	1.3			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
.Open, Usable OHV Winter (M acres)	74			83	80	74	74	74	74	66	63	73	85	56	56	74	74	64	61	56	56
.Roads and Trails Open Summer(miles)	231			236	258	241	241	234	255	206	219	247	300	105	105	132	132	236	246	192	205
.Roads and Trails Open Winter OHV (miles)	260			294	353	298	329	273	291	288	312	324	388	277	311	278	311	278	335	257	281
.Roads and Trails Closed Summer OHV (miles)	217			274	372	253	290	275	370	288	383	247	325	389	487	329	366	256	350	305	400
.Roads and Trails Closed Winter OHV (miles)	178			216	269	196	202	224	314	196	290	170	237	217	281	183	187	216	261	240	324
.Visual Quality Index	10.8			10.9	10.9	10.8	10.8	11.1	11.1	10.8	10.8	10.6	9.8	11.0	11.0	10.7	10.7	10.7	10.7	10.9	10.9
WATERSHED IMPROVEMENT (acres)	40	220	250	110	0	22	22	110	0	22	22	22	22	110	0	22	22	55	0	22	22
LANDS AND MINERALS																					
.Minerals (Operat'g Plans)	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
.Land Acquisition (acres)	400	8000	600	300	20	300	20	300	20	300	20	300	20	300	20	300	20	300	20	300	20

Table 2.23b. **Comparison of Average Annual Outputs by Alternative for 1st and 5th Decades**

Resource Elements	Base Year 1982	'80 RPA Goals 1990	'80 RPA Goals 2030	A Selected 1st	A Selected 5th	B Current 1st	B Current 5th	C Conservat'n 1st	C Conservat'n 5th	D Efficiency 1st	D Efficiency 5th	E Market 1st	E Market 5th	F Amenity 1st	F Amenity 5th	G Low Budget 1st	G Low Budget 5th	H RPA 1st	H RPA 5th	I Wilderness 1st	I Wilderness 5th
HUMAN RESOURCES																					
.Program Enrollees	13	15	15	16	20	16	20	16	20	16	20	16	20	16	20	16	20	16	20	16	20
WILDLIFE AND FISH																					
.T and E Species:																					
Bald Eagle Nesting Pair	0			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Peregrine Falcon Nesting Pair	0			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
.Wildlife Other than T and E Species:																					
Deer (number)	1300	1560		1540	1735	1530	1669	1540	1735	1318	1333	1368	1423	1630	1800	1386	1457	1572	1759	1514	1689
Spotted Owls Pairs	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goshawk Pairs	12			15	15	15	15	15	15	16	16	13	14	15	15	16	16	14	15	14	15
.Resident Fish 1/ (M pounds)	88	105		96	103	92	96	96	103	89	90	89	90	99	108	89	90	94	98	92	96
.Total Wildlife & Fish User Days(MWFUD)	50			51	57	51	57	51	58	50	50	50	51	52	62	51	55	52	61	51	57
.Direct Habitat Improvement:																					
Deer (WFUD's)				50	160	50	50	50	160	0	0	0	0	110	360	20	70	110	160	50	160
Deer (acres)				70	70	70	70	70	70	0	0	0	0	100	100	15	15	100	70	70	70
All Other Species Except T&E (WFUD)				400	840	400	400	400	840	0	0	0	0	490	940	320	430	490	840	400	840
All Other Species Except T&E (acres)				5	5	5	5	5	5	0	0	0	0	5	5	5	5	5	5	5	5
Resident Fish Except T&E (WFUD)				240	440	240	240	240	440	0	0	0	0	490	880	120	220	680	750	240	440
Resident Fish Except T&E (acres)				2	2	2	2	2	2	0	0	0	0	4	4	1	1	8	3	2	2

1/ Pounds of gamefish in lakes and streams with national forest shoreline, including Fallen Leaf and Cascade lakes but not Lake Tahoe.

Table 2.23c. **Comparison of Average Annual Output by Alternative for 1st and 5th Decades**

Resource Elements	Base Year 1982	'80 RPA Goals 1990	'80 RPA Goals 2030	A Selected 1st	A Selected 5th	B Current 1st	B Current 5th	C Conservation 1st	C Conservation 5th	D Efficiency 1st	D Efficiency 5th	E Market 1st	E Market 5th	F Amenity 1st	F Amenity 5th	G Low Budget 1st	G Low Budget 5th	H RPA 1st	H RPA 5th	I Wilderness 1st	I Wilderness 5th
.Induced Habitat Improvement:																					
Deer (WFUD's)				25	65	30	50	50	30	20	30	50	100	70	80	30	60	70	120	40	60
All Other Species Except T&E (FUD)				65	115	50	80	80	50	30	50	100	180	130	140	40	60	120	220	70	110
Resident Fish Except T&E (FUD)				200	300	150	250	380	170	140	250	140	250	380	170	140	250	190	300	140	250
RANGE																					
.Grazing (AUM)	1400	1000	1100	1400	1400	1400	1400	1400	0	0	0	3000	3000	0	0	0	0	2300	2300	1400	1400
TIMBER																					
. Allowable Sale																					
Quantity (MMBF)	0	8.5	10.7	0	0	0	0	0	0	0	0	12.1	20.0	0	0	0	0	5.8	6.7	0	0
(MMCF)	0	1.3	1.6	0	0	0	0	0	0	0	0	1.9	3.1	0	0	0	0	.9	1.0	0	0
. Programmed Sale																					
Quantity (MMBF)	4	8.5	10.7	4.4	5.5	4.0	4.0	4.4	5.5	.8	1.2	16.1	24.0	4.4	5.5	1.9	2.3	9.8	10.7	5.0	5.3
(MMCF)	.6	1.3	1.6	.7	.8	.6	.6	.7	.8	.1	.2	2.5	3.7	.7	.8	.3	.4	1.5	1.7	.8	.8
.Long Term Sustained																					
Yield (MMBF)	2			NA	NA	NA	NA	NA	NA	NA	NA	24.8	24.8	NA	NA	NA	NA	10.7	10.7	NA	NA
(MMCF)	.3			NA	NA	NA	NA	NA	NA	NA	NA	3.8	3.8	NA	NA	NA	NA	1.6	1.6	NA	NA
.Reforestation (acres)	0	0	0	40	40	48	40	40	40	40	40	236	403	100	100	40	40	·170	142	91	60
.Timber Improve (acres)	0	317	320	40	40	50	40	40	40	50	40	50	306	50	100	50	40	50	121	50	89
WOOD PRODUCTS OTHER THAN SAWTIMBER																					
.Firewood (cords)	4000			4000	4000	4000	4000	4000	4000	0	0	8000	8000	4000	4000	2000	2000	8000	8000	4000	4000

Table 2.23d. **Comparison of Average Annual Output by Alternative for 1st and 5th Decades**

Resource Elements	Base Year 1982	'80 RPA Goals 1990	'80 RPA Goals 2030	A Selected 1st	A Selected 5th	B Current 1st	B Current 5th	C Conservation 1st	C Conservation 5th	D Efficiency 1st	D Efficiency 5th	E Market 1st	E Market 5th	F Amenity 1st	F Amenity 5th	G Low Budget 1st	G Low Budget 5th	H RPA 1st	H RPA 5th	I Wilderness 1st	I Wilderness 5th
FIRE																					
.Fuel Treatment (acres)																					
Fire Related	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Timber Related	695	400	300	295	295	408	398	295	295	38	38	815	925	405	405	88	88	413	473	286	256
Other	5	0	0	5	5	2	2	5	5	2	2	15	15	5	5	2	2	7	7	4	4
TRANSPORTATION																					
.Trail Constr. (miles)				6.0	1.5	5.6	0	5.6	0	5.6	0.3	5.6	1.3	5.6	0	5.6	0	5.6	1.3	5.9	0
.Trail Reconst. (miles)	2.0	4.0	3.0	2.0	4.0	2.0	2.0	7.5	0	2.0	2.0	2.0	4.0	7.5	0	2.0	2.0	2.0	4.0	4.0	0
.Trail Maint. (miles)	198			258	352	254	291	257	352	254	349	254	332	254	352	254	291	254	346	257	352
.Road Construction(miles)	0			.2	.6	0	0	0	.4	0	.4	0	1.5	0	0	0	0	0	.2	0	.4
.Road Reconstruct(miles)	1			3.0	0	1.0	1.0	3.0	0	1.0	1.0	1.0	1.0	3.0	0	1.0	1.0	2.0	0	1.0	1.0
.Road Maint. (miles)	240			242	256	240	240	240	253	240	253	240	273	240	240	207	207	240	246	240	253
FACILITIES																					
.Dams and Reservoirs:																					
Forest Service (#)	11	0	0	11	11	11	10	11	11	11	7	10	2	11	11	11	7	11	11	11	10
Other Federal (#)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other State/Local(#)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Private (#)	4	0	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
.Administrative Sites																					
Forest Owned (#)	14	0	0	15	16	14	15	15	16	14	15	15	16	14	14	12	12	15	16	13	14
Forest Leased (#)	2	0	0	2	1	2	2	2	1	2	1	1	1	2	2	2	2	2	1	1	1
TOTAL BUDGET ($MM)	3.8	3.8	4.0	5.3	6.2	3.8	3.3	5.1	5.8	3.8	5.5	5.7	11.8	4.9	4.9	3.0	2.5	5.6	6.3	4.3	5.8
TOTAL COST (MM$)	3.9			5.1	6.4	3.9	3.4	5.1	6.2	4.1	5.9	5.8	11.9	5.1	5.0	3.3	2.8	5.7	6.4	4.5	6.0

Table 2.24a. **Environmental Consequences and Other Key Comparisons by Alternatives**

Resource Element	Unit of Measure Decade	A Selected 1st	A Selected 5th	B Current 1st	B Current 5th	C Conservation 1st	C Conservation 5th	D Efficiency 1st	D Efficiency 5th	E Market 1st	E Market 5th	F Amenity 1st	F Amenity 5th	G Low Budget 1st	G Low Budget 5th	H RPA 1st	H RPA 5th	I Wilderness 1st	I Wilderness 5th
RECREATION		Expand dispersed and developed recreation to meet demand.		Continue existing dispersed and developed recreation.		Emphasize dispersed. Defer developed recreation until environm't improved.		Expand dispersed & developed recrea. to meet demand where cost effective.		Expand dispersed & developed recrea. to meet demand w/ emphasis on motorized access		Emphasize dispersed recreation to meet demand. Continue existing developed.		Reduce F.S. management. Continue existing ski & other privately operated resorts.		Expand dispersed & developed recreation to meet RPA targets		Expand dispersed rec. Emphasize non-motored activities. Expand developed to meet demand	
RECREATION OPPORTUNITIES																			
Primitive	M acres	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Semi-primitive nonmotored	M acres	54	56	56	58	56	58	57	59	54	42	57	62	54	54	57	59	57	61
Semi-primitive motorized	M acres	15	12	14	12	14	11	14	10	16	8	15	12	16	15	14	9	14	9
Roaded Natural	M acres	57	56	56	55	56	55	55	52	56	71	55	54	56	56	55	54	55	51
Rural	M acres	13	18	13	15	13	18	13	18	13	18	12	12	13	13	13	16	13	18
Primitive	MM RVD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Semi-primitive nonmotored	MM RVD	.2	.2	.2	.2	.2	.2	.2	.3	.2	.2	.2	.3	.2	.2	.2	.2	.2	.3
Semi-primitive motorized	MM RVD	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
Roaded Natural	MM RVD	.4	.6	.4	.6	.4	.6	.4	.6	.4	.7	.4	.5	.4	.5	.4	.6	.4	.6
Rural	MM RVD	2.1	3.2	2.0	2.2	2.1	3.2	2.1	3.3	2.1	3.3	2.1	2.4	1.8	2.0	2.1	3.0	2.1	3.3
Primitive	M PAOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Semi-Primitive nonmotored	M PAOT	1.8	1.9	1.8	1.9	1.8	1.9	1.9	2.0	1.8	1.4	1.9	2.0	1.8	1.8	1.9	2.0	1.9	2.0
Semi-primitive motorized	M PAOT	.4	.3	.4	.3	.4	.3	.3	.3	.4	.2	.4	.3	.4	.3	.3	.3	.3	.3
Roaded Natural	M PAOT	2.8	2.7	2.8	2.8	2.8	2.7	2.7	2.6	2.8	3.6	2.7	2.7	2.8	2.8	2.7	2.7	2.8	2.5
Rural	M PAOT	4.2	5.8	4.2	4.8	4.2	5.8	4.4	5.8	4.4	5.8	4.0	4.0	4.3	4.3	4.2	5.3	4.2	5.8
VISUAL CONDITIONS		91% natural appearing. Small decline from ski area development		92% natural appearing. Slight decline from ski area development		91% natural appearing.		78% natural appearing. Moderate decline from timber & ski area development		53% natural appearing. Decline on over 40,000 acres from timber harvest.		94% natural appearing. No decline from present.		Same as Alt. B		Same as Alt. D		Same as Alt. A	

Table 2.24b. Environmental Consequences and Other Key Comparisons by Alternatives

Resource Element	Unit of Measure Decade	A Selected 1st	A Selected 5th	B Current 1st	B Current 5th	C Conservation 1st	C Conservation 5th	D Efficiency 1st	D Efficiency 5th	E Market 1st	E Market 5th	F Amenity 1st	F Amenity 5th	G Low Budget 1st	G Low Budget 5th	H RPA 1st	H RPA 5th	I Wilderness 1st	I Wilderness 5th
VISUAL QUALITY OBJECTIVES																			
Preservation	M acres	24	24	21	21	61	61	46	46	21	21	46	46	21	21	40	40	46	46
Retention	M acres	93	93	101	101	56	56	71	71	61	61	77	77	106	106	60	60	70	70
Partial Retention	M acres	31	31	25	25	31	31	16	16	17	17	25	25	20	20	48	48	31	31
Modification	M acres	0	0	0	0	0	0	15	15	48	48	0	0	0	0	0	0	0	0
Maximum Modification	M acres	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unacceptable Modific'n	M acres	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CULTURAL RESOURCES		Moderate increase in potential disturbance Emphasis on evaluation of sites.		Moderate increase in potential disturbance No increase in level of evaluation.		Moderate increase in potential disturbance Emphasis on evaluation of sites.		Same as Alt. B		Large increase in potential disturbance No increase in level of evaluation.		Same as Alt. A		Slight increase in potential disturbance No increase in level of evaluation.		Large increase in potential disturbance Increased evaluation of sites.		Moderate increase in potential disturbance Increased evaluation of sites.	
WILDERNESS	acres	23,955		21,330		60,720		46,220		21,330		46,220		21,330		39,555		46,220	
RESEARCH NATURAL AREAS	number	1		0		1		0		0		1		0		0		0	
	acres	360		0		360		0		0		360		0		0		0	
LANDS																			
Provisions for Major Utility Corridor:		No Windows or corridor Individual ROW considered.		No corridors.		No windows, corridor, or ROW.		Corridor provided.		Corridor provided.		No windows, corridors, or ROW.		Windows, but no corridors.		Windows, but no corridors.		Windows, but no corridors.	
MINERAL WITHDRAWAL	acres	27282		31816		54371		42443		23668		42001		22811		41651		33419	

Table 2.24c. Environmental Consequences and Other Key Comparisons by Alternatives

Resource Elements	Unit of Measure Decade	A Selected 1st	A Selected 5th	B Current 1st	B Current 5th	C Conservation 1st	C Conservation 5th	D Efficiency 1st	D Efficiency 5th	E Market 1st	E Market 5th	F Amenity 1st	F Amenity 5th	G Low Budget 1st	G Low Budget 5th	H RPA 1st	H RPA 5th	I Wilderness 1st	I Wilderness 5th
AIR QUALITY		Enhanced by mitigation required w/ recreation developm't, investments to reduce traffic, & reduced slash burn.		Reduced as recreation increases at existing sites.		Enhanced through investment in bike & pedestrian trails, rideshare, & reduced slash burn.		Enhanced by mitigation required w/ recreation developm't, & through large reduction slash burn.		Enhanced in summer and winter thru mitigation required w/ recreation development Reduced slash burn.		Enhanced through investments made to reduce traffic.		Enhanced primarily through reduced slash burning.		Same as Alt. E		Enhanced through mitigation required w/ recreation developm't, & through reduced slash burning.	
Effects of Auto Emissions Upon Air Quality:																			
Total NO_x per year	M. tons	42	65	40	49	40	65	42	72	42	72	40	44	36	44	42	67	42	72
Total CO per year	M. tons	776	1219	740	912	740	1219	776	1347	776	1347	746	824	668	831	775	1251	775	1347
Particulates per year	M. tons	135	212	129	159	129	212	135	235	135	235	113	143	116	144	135	210	135	235
Effects of Slash Burning Upon Air Quality:																			
Particulates per year	M. tons	70	70	90	90	68	68	12	12	190	190	12	12	25	25	100	100	70	70
NOISE		Increased primarily from recreation activities.		Little change.		Little change in 1st decade. Increased thereafter.		Same as Alt. A		Largest increase, especially from timber harvest.		Little change. Greatest effort to control.		Little change. Least effort to control.		Increased from recreation & timber harvest.		Same as Alt. A	
FIRE MANAGEMENT		Current program level; Current suppression & prevention mix.		Same as Alt. A		20% program increase. Current suppression & prevention mix.		40% program decrease; Suppression emphasis.		Same as Alt. C		Same as Alt. A		Same as Alt. D		Same as Alt. C		20% program decrease; Current suppression & prevention mix.	

Table 2.24d. Environmental Consequences and Other Key Comparisons by Alternatives

Resource Element	Unit of Measure Decade	A Selected 1st 5th	B Current 1st 5th	C Conservation 1st 5th	D Efficiency 1st 5th	E Market 1st 5th	F Amenity 1st 5th	G Low Budget 1st 5th	H RPA 1st 5th	I Wilderness 1st 5th
WILDFIRE		No change from current 44 ac. burned /yr.	Same as Alt. A	Average annual burn reduced 13 ac/yr to 31	Av/yr burn increased 32 ac/yr to 76 acres.	Same as Alt. C	Same as Alt. A	Same as Alt. D	Same as Alt. C	Av/yr burn increased 10 ac/yr to 54 acres.
VEGETATION DIVERSITY		Enhanced. 40 ac/yr of forest conversion to early seral stage. Balance not met.	Early stage forest continue to be lacking. Forest health improved on high capability land.	Fails to meet MMR for early seral stages.	Enhanced. 40 ac/yr of forest conversion to early stage on high capability land. Wildfire plays greater role.	Greatest enhancement through forest conversion to early stage on high, moderate & low capability land.	Enhanced. 100 ac/y of forest conversion to early stage mostly on high capability land, but balance not met.	Same as Alt D	All forest stages improved on high and moderate capability land.	Same as Alt. D
SILVICULTURAL PRACTICES										
Clearcutting	average annual acres (first decade only)	0	0	0	40	236	0	0	0	0
Group Selection		40	48	0	0	0	100	40	170	91
Selection (Individual Tree)		260	350	360	0	323	40	20	180	40
Intermediate Cutting Thinning & Salvage		100	125	200	0	1526	150	75	300	150
RIPARIAN AREAS AND STREAM ENVIRONMENT ZONE		Enhanced. 1550 acres of wildlife fish and watershed improvm'ts	Enhanced. 980 acres of wildlife fish and watershed improvm'ts	Enhanced. 1590 acres of wildlife fish and watershed improvm'ts	Enhanced. 670 ac of watershed improvem'ts	Same as Alt. D	Enhanced. 1590 acres of wildlife fish and watershed improvm'ts	Same as Alt. B	Enhanced. 1575 acres of wildlife fish and watershed improvem'ts	Same as Alt. B

Table 2.24e. Environmental Consequences and Other Key Comparisons by Alternatives

Resource Element	Unit of Measure Decade	A Selected 1st	A Selected 5th	B Current 1st	B Current 5th	C Conservation 1st	C Conservation 5th	D Efficiency 1st	D Efficiency 5th	E Market 1st	E Market 5th	F Amenity 1st	F Amenity 5th	G Low Budget 1st	G Low Budget 5th	H RPA 1st	H RPA 5th	I Wilderness 1st	I Wilderness 5th
SENSITIVE PLANTS		Potentially more impact from recreation, esp. upon TahoeYellow Cress.		Slight increase in potential impact.		Same as Alt. B		Same as Alt. A		Potential increased impact from roads and recreation in remote locations.		Same as Alt. B		Potential impact decreased by reduced recreation.		Same as Alt. A		Same as Alt. A	
WILDLIFE		Wildlife management indicator species would be effected over time as indicated below through a combination of: (1) natural successional progression of vegetation; and (2) amount of silvicultural treatment for vegetation diversity.																	
Habitat capability for Management Indicator Species:																			
Goshawk	%	97	97	99	95	99	95	100	100	92	83	99	97	100	100	97	89	99	91
Spotted Owl	change	100	345	93	333	93	333	100	362	52	126	100	343	100	359	85	307	95	324
Pileated Woodpecker	from	100	236	95	277	95	277	96	296	66	133	100	286	100	294	91	258	96	269
Mallard	1982	100	106	100	106	100	106	100	100	100	100	100	106	100	106	100	106	100	106
Blue Grouse	"	101	136	100	136	100	136	100	136	103	136	101	136	100	136	100	130	100	136
Willow flycatcher	"	99	99	100	104	100	104	99	99	100	130	99	100	100	100	101	108	101	105
Black Bear	"	99	119	99	122	99	122	100	123	86	83	99	122	99	123	98	118	99	120
Mule Deer																			
Cover	"	98	97	99	97	99	97	98	99	86	90	96	95	97	97	96	95	97	96
Forage	"	102	102	102	104	102	104	100	100	121	154	105	119	100	100	103	109	102	106
Numbers	"	117	132	115	128	115	128	101	103	105	100	125	138	107	112	119	135	116	130
Relation to RPA	% of target	98	110	96	107	96	107	84	85	88	91	104	115	89	93	99	113	97	108
WATER																			
Increased Quantity	M afa	1.5	2.5	1.1	1.4	1.4	1.9	1.2	2.1	2.9	7.6	1.4	1.9	1.1	1.3	2.1	3.1	1.5	2.5
Water Use (consumptive)	afa	2017		1558		2334		1803		1813		1413		1344		1952		1953	

Table 2.25. **Timber Land Classification by Alternatives**
(Acres)

	Alternatives								
	A Selected	B Current	C Conservat'n	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
1. Nonforest land (includes water)	21,076	21,076	21,076	21,076	21,076	21,076	21,076	21,076	21,076
2. Forest land	126,657	126,657	126,657	126,657	26,657	126,657	126,657	126,657	126,657
3. Forest land withdrawn from timber production (designated wilderness).	21,330	21,330	21,330	21,330	21,330	21,330	21,330	21,330	21,330
4. Forest land not capable of producing crops of industrial wood.	29,787	29,787	29,787	29,787	29,787	29,787	29,787	29,787	29,787
5. Forest land physically unsuitable: irreversible damage likely to occur, or not restockable within 5 years.	0	0	0	0	0	0	0	0	0
6. Forest land - inadequate information. 1/	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033	9,033
7. Tentatively suitable forest land. (Item 2 less items 3, 4, 5, and 6)	66,507	66,507	66,507	66,507	66,507	66,507	66,507	66,507	66,507
8. Forest land not appropriate for timber production. 2/	66,507	66,507	66,507	66,507	23,118	66,507	66,507	46,996	66,507
9. Unsuitable forest land. (Item 3, 4, 5, 6, and 8)	126,657	126,657	126,657	126,657	83,268	126,657	126,657	107,146	126,657
10. Total suitable forest land. (Item 2 less item 9)	0	0	0	0	43,389	0	0	19,511	0
11. Total national forest land. (Items 1 and 2)	147,733	147,733	147,733	147,733	147,733	147,733	147,733	147,733	147,733

1/ Lands for which current information is inadequate to project responses to timber management. Usually applies to low site and newly aquired lands

2/ Lands identified as not appropriate for timber production due to: (a) assignment to other resource uses to meet forest plan objectives; (b) management requirements; and (c) not being cost efficient in meeting forest plan objectives over the planning horizon.

Table 2.26a. Comparison of the Treatment of Issues and Planning Questions

Planning Issue	Indicator of Resolution	Alternative A Selected	B Current	C Conservation	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
1. WATER QUALITY										
How does national forest management affect water quality in the Lake Tahoe Basin and what are our opportunities to improve water quality?	Acres of impervious land coverage in the 5th decade.	1156	950	1139	1183	1213	1045	853	1143	1184
		None of the alternatives exceeded the allowed impervious coverage of 4807 acres as determined by the Bailey Land Capability System.								
	Maximum acres of other land disturbance (maximum does not always occur in the same decade).	2682	2535	2650	2802	3855	2429	2358	2876	2882
		None of the alternatives exceeded the allowed disturbance level of 12,140 acres at one time as determined by forestwide standards established for disturbance. However, in the selected alternative, ski area construction could not meet demand in the 4th and 5th decades because disturbance exceeded allowances in a watershed association.								
	Avg. annual increase in vehicle miles of travel producing nitrogen deposition upon Lake Tahoe. Thousand miles, 1st - 5th decades.	63	56	0	56	56	0	56	56	56
		146	127	146	146	146	0	127	127	146
		221	125	189	221	221	0	137	153	221
		221	20	256	255	255	0	0	224	224
		90	10	301	301	301	0	0	147	301
	Watershed restoration through treatm't of disturbed areas.	110 ac/yr for 20 yrs	22 ac/yr for 50+ yrs.	110 ac/yr for 20 yrs.	22 ac/yr for 50+ yrs.	22 ac/yr for 50+ yrs.	110 ac/yr for 20 yrs.	22 ac/yr for 50+ yrs.	55 ac/yr for 40 yrs	22 ac/yr for 50+ yrs.
	Watershed damage potential resulting from management action on high hazard land.	Moderate potential	Low potential	Low potential	Moderate potential	Highest potential	Low potential	Lowest potential	High potential	Moderate potential

Table 2.26b. Comparison of the Treatment of Issues and Planning Questions

Planning Issue	Indicator of Resolution	Alternative A Selected	B Current	C Conservation	D Efficiency	E Market	F Amenity	G Low Budgt	H RPA	I Wilderness
2. RECREATION										
What kind and amount of outdoor recreation opportunities should be provided on national forest land, recognizing the carrying capacity of the Lake Tahoe Basin?	Thousand RVD of public and private sector. Develop recreation except skiing in 1st & 5th decade.	1136 1603	1023 1023	1023 1603	1136 1607	1136 1607	1136 1248	819 779	1130 1308	1136 1607
	Thousand RVD of downhill skiing in 1st & %th decade.	412 744	412 613	412 613	412 912	412 912	372 372	412 601	412 851	412 912
	Number of ski areas.	5	3	5	5	5	1	3	5	4
	Thousand RVD's of dispersed recreation in 1st & %th decade.	1200 1700	1200 1436	1200 1700	1200 1697	1150 1703	1200 1697	1134 1370	1200 1697	1200 1697
	Relationship to estimate of recreation demand.	Meets demand for 30 years	Does not meet demand	Meets demand for dispersed rec., but not developed rec.	Meets demand	Meets demand	Meets demand for dispersed rec., but not developed rec.	Does not meet demand	Meets RPA targets, but not demand	Meets demand
	Relationship to the "fair share" of the Lake Tahoe Basin negotiated with the TRPA.	Used	Not used	Partially used	Used	Used	Partially used	Not used	Partially used	Used

Table 2.26c. Comparison of the Treatment of Issues and Planning Questions

Planning Issue	Indicator of Resolution	Alternative A Selected	B Current	C Conservation	D Efficiency	E Market	F Amenity	G Low Budgt	H RPA	I Wilderness
3. FOREST MANAGEMENT/THRESHOLDS										
What portion of the public "fair share" of the basin's carrying capacity should be allocated to forest management other than recreation use; and what is the appropriate blend of resource outputs to be contributed toward meeting national demand?	Regulated Timber (MMBF/year, 1st and 5th decade).	0 0	0 0	0 0	0 0	12.0 20.0	0 0	0 0	5.8 6.7	0 0
	Unregulated Timber (MMBF/year, 1st and 5th decade).	4.4 5.5	4.0 4.0	4.0 4.0	0.8 1.2	4.0 4.0	4.4 5.5	1.9 2.3	4.0 4.0	5.0 5.3
	Livestock grazing (M AUM's).	1.4	1.4	0	0	3.0	0	0	2.3	1.5
	Water Yield (M afa, 1st and 5th decades).	318.2 319.2	317.9 318.1	318.1 318.6	317.9 318.9	319.7 324.3	318.1 318.6	317.8 318.1	318.9 319.9	318.2 319.2
	Fish program level	Moderate	Moderate	High	Minimum	Minimum	High	Low	High	Moderate
	Wildlife Program	Moderate	Moderate	Moderate	Minimum	Minimum	High	Low	Moderate	Moderate
	Management Indicator Species Emphasized or Favored.									
	.mule deer	X	X	X		X	X		X	X
	.mallard-waterfowl	X	X	X			X	X	X	X
	.peregrine falcon	X	X	X	X	X	X	X	X	X
	.bald eagle	X	X		X	X	X	X	X	X
	.pileated woodpecker				X			X		
	.spotted owl				X			X		
	.black bear				X			X		
	.Lahontan cutthroat	X	X	X	X	X	X	X	X	X
	.rainbow trout	X	X	X			X		X	X
	.brook trout						X		X	

Table 2.26d. Comparison of the Treatment of Issues and Planning Questions

Planning Issue	Indicator of Resolution	Alternative A Selected	B Current	C Conservation	D Efficiency	E Market	F Amenity	G Low Budgt	H RPA	I Wilderness
4. FURTHER PLANNING AREAS How should the roadless and undeveloped areas in the "further planning" category be managed.	Freel Roadless Area (15,600 Acres).	Unroaded recreation	Unroaded recreation	Wilderness recommen-dation	Wilderness recommen-dation	1/3 High timber mgt 2/3 unroad	Wilderness recommen-dation.	Minimum mainten-ance.	Wildernes recommen-dation.	Wilderness recommen-dation.
	Lincoln Creek Roadless Area (6,665 Acres).	Unroaded recreation	Unroaded recreation	Wilderness recommen-dation	Wilderness recommen-dation	Unroaded recreation	Wilderness recommen-dation.	Minimum mainte-nance.	Unroaded recreation	Wilderness recommen-dation.
5. MANAGEMENT OF ENVIRON-MENTALLY SENSITIVE LAND How should environmentally sensitive lots, acquired through the Santini/Burton Act, be managed?	Acres of land to be acquired.	The amount of land acquired is not expected to vary by alternative. Land acquisition at Lake Tahoe has been independent of other programs for the national forest system.								
	Plan for management of land acquired outside of urban area.	Management would be in accord with the prescription assigned to lands surrounding the acquired parcel. Since the potential acquisitions are widely scattered and of various sizes, a summary of the probable results is not practical.								
		The program of acquisition of isolated parcels within urbanized areas differs from national land adjustment programs due to the objectives to protect environmentally sensitive areas.								
	Plan for management of land acquired within urban areas.	These lands are usually parcels ranging in size from less than 1/4 acre to several acres or more. Short term management would be the same in each alternative. That is, the lands are assigned to an Urban Lot Management Area, to be managed by the Urban Prescription. Emphasis is upon watershed protection and the development of criteria for transfer of the land to state and local governments for long term management where this is determined appropriate.								

f. Economic Effects. The following tables summarize the economic effects of alternatives.

Table 2.27 includes returns to the treasury, county receipts, operating costs, and budget, income and employment, and undiscounted costs and benefits. Total benefits from national forest land at Lake Tahoe increase over the plan period primarily in relation to the amount of recreation expansion that occurs. Benefits increase as much as 60% over 50 years. Where recreation expansion is limited (as a result of budget or policy limitations), the value of benefits may increase as little as 14%. Most of the benefits (approximately 98%) are non-cash benefits; that is, they do not result in money returned to the Treasury. Again, this is primarily the result of the benefits derived from recreation use. Cash returns to the Treasury increase in all alternatives. The amount of the increase is related to recreation use and timber volume harvested.

Capital investment costs are primarily for watershed restoration and recreation construction and, therefore, the amount in each alternative is related to the size of the restoration program and to the emphasis on developed recreation. Investments in road construction occur only in Alternatives E and H. This is for the purpose of accessing unroaded areas for timber management and occurs beyond the 10 to 15 years of this plan. (See the cost section of Appendix B for details on capital investments.) Receipts to the counties (25% of the return to the Treasury) are directly related to recreation expansion, primarily developed recreation and skiing, and to the amount of timber harvested. In some alternatives these receipts double from current levels by the end of the planning period.

Employment opportunities are primarily from operators of ski areas and related support businesses. Other resources contribute only a small amount to the available jobs. Therefore, changes in local employment are very small in all alternatives except where there is expansion of skiing.

Table 2.28 includes the marginal cost of MMR and MIR constraints. The alternatives were developed from the most economically efficient, unconstrained benchmark (FLW) with additional objectives added only as necessary to meet the theme of the alternative. The first set of objectives added were the minimum management requirements (MMR) which are necessary to meet the NFMA regulations. These included protection of bald eagle and goshawk nest sites, protection of riparian areas, maintenance of soil and water productivity, and minimum diversity of seral stages. All of these except for the diversity MMR restrict timber practices. Since timber harvest in the Tahoe Basin is not efficient, MMR had no effect on PNV. On the other hand, since the diversity MMR requires a small amount of timber harvest to create 40 acres of additional early successional stage habitat per year, it causes a $4 million reduction of PNV. Other effects of this MMR include timber production ranging from .8 to 1.2 MMBF and wildlife habitat improvement which induces from 50 to 80 WFUD per year. A small portion of the increase in water yield, from 1.2 to 2.1 thousand acre feet per year, is also attributable to this MMR. For a discussion of the opportunity costs of the MMR on Alternative E, see the Summary Listing of Reasons for Changes in Present Net Value below.

The MMR benchmark is further constrained by the minimum implementation requirements (MIR) to create the most efficient, implementable alternative. For the LTBMU, the only significant potential MIR was the protection of visual quality along California scenic highways. Because of the small level of timber management in the MMR benchmark, this requirement also had no opportunity cost and was not modeled. Therefore the MMR benchmark was developed into an alternative considered in detail: Alternative D (CEE).

Table 2.29 compares the effects on present net value (PNV) by specific areas of costs and benefits. (See Appendix D for more information on PNV and net public benefits.) Additional insight into PNV can be gained by studying Table 2.30. The alternatives are listed in order of decreasing PNV, after subtracting out the fixed costs and background benefits produced under the Minimum Level benchmark. The major conclusions that can be drawn from these tables is that the alternatives with the highest PNV have the most developed and dispersed recreation and lowest levels of timber harvest. Reductions in developed recreation are the most significant factors affecting PNV. Alternatives B (Current) and G (Low Budget) are at the bottom in this ranking because budget limits prevent taking advantage of potential developed recreation opportunities. Larger timber yields decrease the PNV in the same manner as smaller recreation outputs. This results in Alternative E (Market) and Alternative H (1980 RPA) appearing below Alternatives A (Selected), Alternatives C (Conservation), and Alternative I (Wilderness) which have only modest levels of timber harvest. Direct comparison between individual benefit and cost categories may be misleading because outputs have common costs of production that cannot be reliably separated and distributed to individual resources.

A high level watershed restoration program is the least efficient in terms of the priced benefits. Maintaining water quality and providing commodity outputs require a tradeoff in PNV and cash flow, whereas providing wilderness somewhat enhances PNV, with only a marginal sacrifice in cash flow. Costs in the categories that include grazing, firewood, fish and wildlife habitat improvement, and fire management are often negative. This is primarily a reflection of the net reduction in total fire costs from the Minimum Level benchmark.

In addition to national interest in government efficiency as reflected by PNV and cash flow, national interest is also served by the preservation of Lake Tahoe itself. These interests work against each other in that protecting the lake increases federal costs through capital investments for watershed restoration and the mitigation of environmental impacts. This is true for all alternatives.

Table 2.27a. **Summary Comparison of Economic Effects In Millions of 1982 Dollars per Year**

	A Selected	B Current	C Conservat'n	D Efficiency	E Market	F Amenity	G Low Budgt	H RPA	I Wilderness
1. **Total Benefits** (Base Year 1982 = 39.1)									
Decade 1	47.3	43.4	47.0	47.2	47.6	46.9	41.4	47.6	47.3
2	51.4	45.0	50.0	51.2	51.5	49.6	42.9	50.2	51.4
3	54.9	46.3	53.0	54.8	55.2	50.7	43.9	53.2	54.9
4	58.3	46.8	57.0	58.4	58.8	51.7	44.2	56.8	58.5
5	60.9	47.2	60.0	62.6	63.0	52.8	44.6	59.1	62.7
2. **Returns to the U.S Treasury** (Base Year 1982 = 0.9)									
Decade 1	1.0	0.9	0.9	0.9	1.2	0.9	0.8	1.1	1.0
2	1.1	1.0	1.0	1.0	1.4	1.0	0.9	1.1	1.1
3	1.2	1.0	1.1	1.1	1.5	1.0	0.9	1.2	1.2
4	1.2	1.0	1.2	1.2	1.6	1.0	0.9	1.3	1.3
5	1.3	1.1	1.2	1.3	1.8	1.0	0.9	1.4	1.4
3. **Non-Cash Benefits** (Base Year 1982 = 38.6)									
Decade 1	46.7	42.9	47.0	46.7	46.8	46.4	41.0	46.9	46.7
2	50.7	44.4	49.0	50.6	50.5	49.0	42.4	49.5	50.7
3	54.1	45.7	52.0	54.1	54.1	50.1	43.4	52.4	54.1
4	57.5	46.2	54.0	57.6	57.6	51.1	43.7	55.9	57.6
5	60.0	46.5	56.0	61.7	61.6	52.2	44.1	58.1	61.7
4. **Total Costs** (Base Year 1982 = 3.9)									
Decade 1	5.1	3.9	5.1	4.1	5.8	5.1	3.3	5.7	4.5
2	5.3	3.4	5.2	4.2	6.4	5.1	2.8	5.7	4.6
3	5.3	3.4	5.3	5.0	8.3	4.4	2.8	6.3	5.3
4	5.8	3.4	5.6	5.4	9.7	4.7	2.8	7.1	5.6
5	6.4	3.4	6.2	5.9	11.9	5.0	2.8	6.4	6.0

1. Total benefits include cash returns to the U.S. Treasury and noncash benefits. They are the estimated total amount that consumers would be willing to pay for forest outputs, whether or not this amount is actually collected.
2. Returns to the U.S. Treasury are the estimated payments by consumers of forest outputs collected by the Fed. Government.
3. Noncash benefits are the difference between the total estimated amount that consumers would be willing to pay for forest outputs and actual collections by the Federal Government. At present it is national policy to provide most forest outputs either at no charge to consumers or at a charge less than the total willingness to pay value.
4. Total costs include the Federal and non-Federal costs needed to produce Forest outputs. Decade 1 costs include $.5 MM for administration of Land Acquisition Program.

Table 2.27b. **Summary Comparison of Economic Effects In Millions of 1982 Dollars per Year**

	A Selected	B Current	C Conservat'n	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
5. Non-Federal Cost (Base Year1982=Negligible)									
Decade 1	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
2	"	"	"	"	"	"	"	"	"
3	"	"	"	"	"	"	"	"	"
4	"	"	"	"	"	"	"	"	"
5	"	"	"	"	"	"	"	"	"
6. Federal Cost (Base Year 1982 = 3.9)									
Decade 1	5.5	3.9	5.3	4.1	5.8	5.1	3.3	5.7	4.5
2	5.5	3.4	5.5	4.2	6.4	5.1	2.8	5.7	4.6
3	5.2	3.4	4.9	5.0	8.3	4.4	2.8	6.3	5.3
4	5.8	3.4	5.4	5.4	9.7	4.7	2.8	7.1	5.6
5	6.4	3.4	5.9	5.9	11.9	5.0	2.8	6.4	6.0
7. Total Budget (Base Year 1982 = 3.8)									
Decade 1	5.3	3.8	5.1	3.8	5.7	4.9	3.0	5.6	4.3
2	5.4	3.3	5.3	3.9	6.3	4.9	2.5	5.6	4.4
3	5.0	3.3	4.8	4.7	8.2	4.3	2.5	6.2	5.1
4	5.6	3.3	5.3	5.0	9.6	4.6	2.5	6.0	5.4
5	6.2	3.3	5.8	5.5	11.8	4.9	2.5	6.3	5.8
8. Operation & Maintenance Costs (Base Year 1982 = 3.3)									
Decade 1	3.4	2.9	3.4	3.1	4.6	3.4	1.9	4.0	3.4
2	3.9	2.8	3.8	3.6	5.5	3.8	1.9	4.3	3.9
3	4.5	2.8	4.2	4.0	6.6	4.0	1.9	4.7	4.3
4	5.0	2.8	4.6	4.5	7.8	4.2	1.9	5.3	4.7
5	5.4	2.7	5.0	4.8	9.2	4.4	1.9	5.6	4.9

5. Non-Federal costs include all costs paid by non-Federal cooperators such as State Fish and Game habitat improvements. Average annual cash contributions during the planning preiod are not expected to be exceed $100,000. Non cash contributions including volunteer work may exceed $200,000.
6. Federal costs are those borne by the Fed. Government and includes costs paid from general tax receipts, costs paid from funds set aside from receipts (such as KV) and costs paid by accepting in kind payments in lieu of cash (such as purchaser road credits). Federal cost also equals total cost less non-Federal cooperator cost. Decade 1 includes $.5 MM for administration of the land aquisition program.
7. Total budget is equal to Federal cost less the cost of fighting forest fires (FFF). Decade 1 includes $.5MM for administration of land aquisition program.
8. Operation and maintenance costs include the cost of administration, management, and protection of existing resources and capital assets. Operation and maintenance cost equals total cost less capital investments.

Table 2.27c. **Summary Comparison of Economic Effects In Millions of 1982 Dollars per Year**

	A Selected	B Current	C Conservation	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
9. **Capital Investment Cost** (Base Year 1982 = 0.1)									
Decade 1	2.1	1.0	1.9	1.0	1.2	1.7	1.1	1.7	1.1
2	1.6	0.6	1.7	0.6	0.9	1.3	0.6	1.4	0.7
3	0.7	0.6	0.7	1.0	1.7	0.4	0.6	1.6	1.0
4	0.8	0.6	0.8	0.9	1.9	0.5	0.6	1.8	0.9
5	1.0	0.7	0.9	1.1	2.7	0.6	0.6	0.8	1.1
10. **Recreation Construction** (Base Year 1982 = 0)									
Decade 1	0.4	0	0.2	0	0	0	0	0.2	0
2	0.3	0	0.4	0.1	0.1	0	0	0.3	0.1
3	0.3	0	0.3	0.4	0.4	0	0	0.3	0.4
4	0.3	0	0.3	0.3	0.3	0	0	0.4	0.3
5	0.4	0	0.3	0.4	0.4	0	0	0	0.4
11. **Watershed Restoration** (Base Year 1982 = 0)									
Decade 1	1.0	0.4	1.0	0.4	0.4	1.0	0.4	0.7	0.4
2	1.0	0.4	1.0	0.4	0.4	1.0	0.4	0.7	0.4
3	0	0.4	0	0.4	0.4	0	0.4	0.7	0.4
4	0	0.4	0	0.4	0.4	0	0.4	0.7	0.4
5	0	0.4	0	0.4	0.4	0	0.4	0	0.4
12. **Other Capital Investment** (Base Year 1982 = 0.1)									
Decade 1	0.7	0.6	0.7	0.6	0.8	0.7	0.6	0.8	0.7
2	0.3	0.2	0.3	0.1	0.4	0.3	0.1	0.4	0.2
3	0.4	0.2	0.4	0.2	0.9	0.4	0.2	0.6	0.2
4	0.5	0.2	0.5	0.2	1.2	0.5	0.2	0.7	0.2
5	0.6	0.3	0.6	0.3	1.9	0.6	0.2	0.8	0.3

9. Capital investment costs are the costs of creating or enhancing capital assets. Costs of treatments or activities that generate outputs or benefits over more than one period are capital investment costs. Decade 1 includes $.5 MM for administration of Land Aquisition Program.
10. Recreation construction includes only the initial investment costs for development of recreation facilities, landscaping, installation of Best Management Practices, and payment of traffic/air quality mitigation fees.
11. Watershed restoration is the cost of restoring disturbed lands to a near natural condition.
12. Other capital investment are those other than recreation construction and watershed restoration. Decade 1 includes $.5MM for administration of Land Acquisition Program.

Table 2.27d. Summary Comparison of Economic Effects In Millions of 1982 Dollars per Year

	A Selected	B Current	C Conservat'n	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
13. **25% Receipt Shares** (Base Year 1982 = 0.2)									
Decade 1	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.2
2	0.3	0.2	0.2	0.2	0.4	0.2	0.2	0.3	0.3
3	0.3	0.2	0.3	0.3	0.4	0.2	0.2	0.3	0.3
4	0.3	0.2	0.3	0.3	0.4	0.2	0.2	0.3	0.3
5	0.3	0.3	0.3	0.3	0.4	0.3	0.2	0.4	0.4
14. **County Yield Tax Revenues** (Base Year 1982 = .01)									
Decade 1	.02	.01	.01	.01	.07	.02	.01	.03	.02
2	.02	.02	.02	.01	.11	.02	.01	.05	.02
3	.03	.02	.02	.01	.15	.03	.01	.07	.02
4	.04	.02	.03	.01	.21	.04	.01	.08	.02
5	.05	.03	.04	.02	.28	.05	.02	.09	.02
15. **Income**, first decade (millions of 1982 dollars)	31.4	30.8	30.8	31.2	31.3	28.9	29.9	31.3	29.8
16. **Employment**, first decade (thousands of persons years)	2.3	2.2	2.2	2.3	2.3	2.1	2.2	2.3	2.3
17. **Discounted Benefits** (millions of 1982 dollars)	754.7	554.6	742.5	761.9	764.6	666.9	494.0	731.7	765.0
18. **Discounted Costs** (millions of 1982 dollars)	104.6	55.2	104.1	78.6	159.3	98.4	38.7	115.9	85.7
19. **Present Net Value** (millions of 1982 dollars)	650.1	499.4	638.4	683.4	605.3	568.5	455.3	615.8	679.3
20. **Benefit/Cost Ratio**	7.2	10.0	7.1	9.7	4.8	6.8	12.8	6.3	8.9

13. Twenty-five percent of returns to the U.S. Treasury are distributed back to the counties. The LTBMU's contribution is included in the distributions from the Tahoe, Eldorado, and Toiyabe National Forests.
14. Under California law, a yield tax currently equal to 2.9 percent of timber harvest value is levied on timber operators.
15. Total personal income including wages, salaries, proprietor's income, and rents was estimated for the forest's zone of influence. See Appendix B for a description of the multiplier method used to make estimates.
16. Employment generated by the forest in the zone of influences was estimated with a multiplier method. See Appendix B.
17. Discounted benefits over the planning period.
18. Discounted costs over the planning period. Includes cost of administering Land Acquisition Program.
19. Discounted benefits less total discounted costs.
20. Discounted benefits divided by total discounted costs.

Table 2.28. **Present Net Value Comparison - Part 1 = Marginal Cost of Constraints**
in Millions of 1982 Dollars 1/

Benchmark or Alternative	Present Net Value6/	Change in PNV 2/	Dis-counted Costs	Change in Dis-counted Costs2/	Dis-counted Benefit	Change in Dis-counted Benefit	Discounted Benefits by Resource: Devel. Rec.	Disp. Rec.	Timber	Water Yield	Other 3/	Discounted Costs by Category: Devel. Rec.	Disp. Rec.	Timber	Water-shed Rest-	Roads	Other 4/
FLW - PNV without MMR	691.7	--	67.5	--	759.2	--	548.5	209.1	0	1.6	0	51.5	15.4	0	9.3		-8.8
Diversity Constraint		-4.0		+6.7		+2.7						See text for discussion of effects of individual constraints on resource benefit and cost categories.					
MMR-PNV W/MMR (same as Alt. D - CEE run)	687.7	-4.0	74.2	+6.7	761.9	+2.7	548.5	209.1	1.9	2.4	0	51.5	15.4	6.4	9.3	.3	-8.7
MLV-Minimum Level 5/	551.8	--	38.7	--	590.5	--	0	118.0	0	472.5	0	0	0.9	0	0		37.8

1/ Direct comparison between individual benefit and cost categories may be misleading because, under multiple use management, many resource outputs have common costs that cannot be reliably separated and attributed to individual resources.

2/ All changes are measured incrementally from the FLW benchmark (PNV without MMR).

3/ Other discounted benefits include grazing and public firewood.

4/ Other discounted costs include grazing, public firewood, fish and wildlife habitat projects, and fire management.

5/ The minimum level benchmark shows the naturally occurring background benefits and fixed costs associated with maintaining the national forest in federal ownership. In order to display incremental tradeoffs, background benefits and fixed costs have been subtracted from the other benchmarks and alternatives.

6/ Does not include cost of administering land acquisition program.

Table 2.29. **Present Net Value Comparison of Alternatives - Part 2**
in Millions of 1982 Dollars 1/

Alternative (ID)	Present Net Value	Change in PNV 2/	Dis-counted Costs	Change in Dis-counted Costs 2/	Dis-counted Benefit	Change in Dis-counted Benefit	Discounted Benefits by Resource: Devel. Rec.	Disp. Rec.	Timber	Water Yield	Other 3/	Discounted Costs by Category: Devel. Rec.	Disp. Rec.	Timber	Water-shed Rest-	Roads	Other 4/
D. **Econ. Efficiency CEE**	683.3	--	78.6	--	761.9	--	548.5	209.1	1.9	2.4	0	51.5	15.4	6.4	9.3	.3	-4.3
I. **Wilderness PNV (WLI)**	679.3	-4.0	85.7	+7.1	765.0	+3.1	548.5	209.6	2.1	3.0	1.8	51.5	15.4	9.3	9.3	.3	-0.1
A. **Selected (SEL)**	650.1	-33.2	104.6	+26.0	754.7	-7.2	537.7	207.2	4.9	3.0	1.9	51.4	14.1	16.9	20.0	.4	1.8
C. **Conservation**	638.4	-44.9	104.1	+25.5	742.5	-19.4	523.0	209.7	4.9	3.0	1.9	50.0	14.1	16.9	20.0	.3	2.8
H. **RPA**	615.8	-67.5	115.9	+37.3	731.7	-30.2	505.3	209.6	10.1	4.0	2.7	40.1	15.0	34.4	19.7	.5	6.2
E. **Market (MKT)**	605.3	-78.0	159.3	+80.7	764.6	+2.7	548.5	206.9	-1.2	6.9	3.5	51.5	14.1	76.6	9.3	.9	6.9
F. **Amenity (AMN)**	568.5	-114.8	98.4	+19.8	666.9	-95.0	448.4	209.7	4.9	2.5	1.4	37.5	15.4	17.1	25.3	.3	2.8
B. **Current Level (CUR)**	499.4	-183.9	55.2	-23.4	554.6	-207.3	390.6	157.0	3.3	2.0	1.7	23.2	10.6	10.0	9.3	.3	1.8
G. **Low Budget (LBU)**	455.3	-228.0	38.7	-39.9	494.0	-267.9	351.5	138.0	2.1	1.8	0.6	14.9	9.6	6.9	9.3	.3	-2.3
Minimum 5/ Level (MLV)	551.8	--	38.7	--	590.5	--	0	118.0	0	472.5	0	0	0.9	0	0	0	37.8

1/ Direct comparison between individual benefit and cost categories may be misleading because under multiple use management, many resource outputs have common costs that cannot be reliably seperated and attributed to individual resources.

2/ All changes are measured from Alternative D. Constrained Economic Efficiency (CEE).

3/ Other discounted benefits include grazing and public firewood.

4/ Other discounted costs include grazing, public firewood, fish and wildlife habitat projects,fire management and the land aquisition program.

5/ The minimum level benchmark shows the naturally occurring background benefits and fixed costs associated with maintaining the National Forest in federal ownership. In order to display incremental tradeoffs, background benefits and fixed costs have been subtracted from the alternatives.

Table 2.30. **Indicators of Responsiveness to Major Issues and National Concerns**

	Alternatives								
	D Efficiency	I Wilderness	A Selected	C Conservat'n	H RPA	E Market	F Amenity	B Current	G Low Budget
Present Net Value ($MM)	683.3	679.3	650.1	638.4	615.8	605.3	568.5	499.4	455.3
Change in PNV ($MM)	----	-4.0	-33.2	-44.9	-67.5	-78.0	-114.8	-183.9	-228.0
Net Cash Flow ($MM)	-3.2	-3.5	-4.5	-4.4	-4.6	-4.6	-4.2	-3.0	-2.5
Noncash Benefits ($MM 1st decade)	46.7	46.7	46.7	47.0	46.9	46.8	46.4	42.9	41.0
Water Quality									
Annual Restoration (acres)	22	22	110	110	55	22	110	22	22
Total Disturbance (acres) 1/	3985	4066	3838	3789	3919	5068	3474	3485	3211
Av. Annual VMT Mitigation 2/	196	190	148	148	141	196	0	68	64
Recreation Demand Satisfied (% 5th decade)									
Developed Rec. 3/	100.0	100.0	100.0	65.0	82.0	100.0	78.0	64.0	49.0
Skiing	100.0	100.0	82.0	65.0	89.0	100.0	41.0	67.0	66.0
Dispersed 4/	100.0	100.0	100.0	100.0	100.0	100.0	100.0	84.0	81.0
Resources (5th decade)									
Timber Harvest (MMBF)	1.2	5.3	5.5	4.4	10.9	23.4	5.5	3.9	2.3
Grazing Use (AUM)	0	1400	1400	0	2300	3000	0	1400	0
Early Stage Habitat Created (acres per year)	40	60-90	100	0	100-170	80-400	100	40	40
Wilderness (acres)	46,220	46,220	23,955	59,552	39,555	21,330	46,220	21,330	21,330
Unroaded Recreation (acres)	27,825	25,225	33,625	12,600	29,955	35,985	25,313	52,850	32,338
Local Income ($MM 1st decade)	31.2	29.8	31.4	30.8	31.3	31.3	28.9	30.8	29.9
Jobs (number 1st decade)	2,300	2,300	2,300	2,100	2,300	2,300	2,100	2,200	2,200

1/ Total disturbance includes impervious coverage and other land disturbance in 5th decade.

2/ Vehicle miles traveled to be mitigated at the rate of 150% to protect air and water quality.

3/ Developed recreation includes resorts (other than skiing), recreation residences and other privately operated facilities along with public sites operated by the Forest Service.

4/ Includes wilderness recreation use.

Table 2.31 (Annual Cash Flow and Noncash Benefits) indicates that even though receipts change between alternatives, the Federal cost has the largest effect on cash flow. This differs from the PNV ranking which is primarily influenced by the value of the non-cash benefits. Generally the ranking of alternatives is the same between the first and the fifth decade except for Alternatives F and E. Alternative F deviates from this pattern because it includes a relatively expensive watershed restoration program in the early decades. It is the completion of this work that accounts for the improvement in cash flow and its ranking in the fifth period. The high logging cost associated with Alternative E gives it the most negative cash flow by the fifth period. The cash flow for Alternatives G and B are the least negative because budget constraints limit the Federal cost permitted in these alternatives. These budget constraints also limit the opportunities for increasing PNV. The substantial cost associated with Alternative E in the fifth decade is a result of high logging and mitigation costs associated with timber harvesting on environmentally sensitive land.

Table 2.31. Annual Cash Flow and Noncash Benefits in the First and Fifth Decade by Alternative 1/ (Million Dollars)

	1st Decade				5th Decade			
Alternatives	Net Cash Flow	Total Federal Cost	Returns to the Treasury	Noncash Benefits to users	Net Cash Flow	Total Federal Cost	Returns to the Treasury	Noncash Benefits to users
G.	-2.5	3.3	.8	41.0	-1.9	2.8	.9	44.1
B.	-3.0	3.9	.9	42.9	-2.3	3.4	1.1	46.5
D.	-3.2	4.1	.9	46.7	-4.6	5.9	1.3	61.7
I.	-3.5	4.5	1.0	46.7	-4.6	6.0	1.4	61.7
F.	-4.2	5.1	.9	46.4	-4.0	5.0	1.0	52.2
C.	-4.4	5.3	.9	47.0	-4.7	5.9	1.2	56.0
A.	-4.5	5.5	1.0	46.7	-5.1	6.4	1.3	60.0
E.	-4.6	5.8	1.2	46.8	-10.1	11.9	1.8	61.6
H.	-4.6	5.7	1.1	46.9	-5.0	6.4	1.4	58.1

1/ Costs are limited to agency or taxpayer expenditures. Payments to counties and expenditures by cooperators are excluded.

Summary Listing of Reasons for Changes in Present Net Value Compared to the Constrained Economic Efficiency Alternative Social Effects are Also Addressed

Alternative D - Constrained Economic Efficiency

PNV=$683.3 million; Cash flow= -$3.2 million

This alternative develops recreation opportunities as needed to meet demand, which is to the benefit of most local and regional social groups. Timber is only harvested at the minimum level required by the MMR. Both further planning areas are recommended for wilderness.

The low emphasis placed upon watershed restoration in this alternative would not agree with the values of environmental groups, nor with the national interest placed upon the environment at Lake Tahoe. On the other hand, the national interest is served by the low negative cash flow and the high PNV.

Alternative I - Wilderness Emphasis with Investments

PNV=$679.3 million; Change in PNV= -$4.0 million; Cash flow= -$3.5 million

The costs and benefits of this alternative are very similar to CEE. The small reduction in PNV is due to the added cost of meeting planned timber targets, which are slightly greater than required to meet the MMR's. Maintaining current grazing and firewood outputs also reduces PNV slightly. The fire management program is more efficient than the current, but is slightly less so than the one selected in CEE.

Most groups benefit the same under this alternative as under CEE. Recreation is expanded, diversity is increased, and additional wilderness is recommended. The environmental group and national interest in protection of the lake would not benefit as much from this alternative because the watershed restoration backlog would not be fully treated.

Alternative A - Selected

PNV=$650.1 million; Change in PNV= -$33.2 million; Cash flow= -$4.5 million

Ski area development is reduced from CEE in this alternative to better maintain air and water quality by limiting disturbance and traffic. This change accounts for 23% of the reduction in PNV. This alternative selects the current fire organization to protect amenity values (water, air and scenic quality and wildlife habitat) and to reduce risk of a major wildfire. The cost of this fire program accounts for 13% of the reduction in PNV from CEE. Likewise, having a moderate level of watershed restoration causes 33% of the reduction in PNV. Continuing the current grazing and firewood programs, accounts for a slight reduction in PNV.

All social groups benefit from this alternative, because recreation capacity is expanded while environmental values are also emphasized. National interest in the protection of Lake Tahoe is well served by this alternative, but the

negative cash flow is enlarged due to the cost of the watershed restoration program and obtaining other nonpriced benefits.

Alternative C - Conservation

PNV=$638.4 million; Change in PNV= -$44.9 million; Cash flow= -$4.4 million

Developed recreation expansion including ski area development is delayed until the second decade to reduce risk to environmental threshold attainment. This alternative selects increased expenditures on the fire organization to protect amenity values (water, air and scenic quality and wildlife habitat) and to reduce risk of a major wildfire. Continuing the current grazing and firewood programs accounts for a slight reduction in PNV.

The recreation-dependent business community is not served as well by this alternative as in some others which allow development of revenue-generating activities in the first period. The goals of other social groups may be well served by this conservative approach, however. All social groups benefit from this alternative because, while environmental values are emphasized, recreation capacity is expanded beginning in the second decade . National interest in the protection of Lake Tahoe is well served by this alternative, but the negative cash flow is enlarged due to the cost of the watershed restoration program and obtaining other nonpriced benefits.

Alternative H - 1980 RPA

PNV=$615.8 million; Change in PNV= -$67.5 million; Cash flow= -$4.6 million

This alternative was formulated to display the consequences of meeting the 1980 RPA goals. New openings would be limited to eight acres or less in size to meet the environmental thresholds for vegetation and water quality. This alternative results in additional timber harvest on moderate and high hazard land. The associated increase in logging cost causes a further reduction in PNV of $2.7 million.

Alternative E - Market Emphasis

PNV=$605.3 million; Change in PNV= -$78.0 million; Cash flow= -$4.6 million

Virtually all of the reduction in PNV in this alternative is due to the extra cost of meeting the high timber targets. In fact, the discounted logging costs in this alternative slightly exceed the discounted timber value. This may make it difficult to find willing purchasers of the timber. The forest has had little recent experience with sales of this type, therefore the cost estimates are considered only best approximations. Grazing and firewood, being market goods, are doubled in this alternative. The remainder of the reduction in PNV is due to the increased grazing and firewood programs, the additional fire management costs, and the nonwilderness use of the two further planning areas.

The recreation-dependent business group and recreation visitors would benefit from the full build out of new facilities, but the quality of the recreation benefits would be degraded by the visual impact of the large timber program. All other groups would not benefit from this alternative. National interest in

the environment at the lake, high PNV, and high cash flow would not be well served by this alternative.

A sensitivity test was done to determine whether the theme of this alternative could be met without clearcutting. The analysis indicated that it would be feasible from a production capability standpoint. However, it would have the same financial uncertainties as Alternative E regarding logging costs. The opportunity cost of prohibiting clearcutting in this alternative was $6.3 million.

An additional analysis was done to determine the opportunity costs of the MMR on this alternative because of the high timber target. Without any MMR, the PNV could have been increased by $3.3 million. Two thirds of this difference was caused by the MMR relating to wildlife (bald eagles, goshawks) and diversity. The remainder was the result of the dispersion timber policy.

Alternative F - Amenity Emphasis

PNV=$568 million; Change in PNV= -$114.8 million; Cash flow= -$4.2 million

To prevent new land disturbance and traffic impacts required to maintain scenic values and water and air quality, no new recreation or ski development was allowed in this alternative. This accounts for 70% of the reduction in PNV. Likewise, the watershed restoration backlog is treated within 20 years to meet water quality standards in the minimum time. The added cost causes 14% of the reduction in PNV. To improve diversity and wildlife habitat, this alternative creates 100 acres of early successional stage habitat per year compared to 40 acres in CEE. This is accomplished through additional regeneration harvest, causing 6% of the reduction in PNV. The current fire organization was selected because it best protects amenity values. The higher costs of this program cause another 5% of the drop in PNV. The public firewood program is a valuable tool for maintaining the health of the forest, for achieving wildlife and fuels objectives, and for providing part of the local demand for firewood. To achieve these benefits causes another 1% of the reduction in PNV.

All social groups benefit from the protection of the amenity values of the Tahoe Basin, but the recreation-dependent business group and the recreation visitor group would not benefit from the limitation on development.

Alternative B - Current Level - No Action

PNV=$499.4 million; Change in PNV= -183.9 million; Cash flow= -$3.0 million

This alternative does not increase outputs over the 1982 level and therefore does not take advantage of opportunities to increase PNV. Virtually all of the reduction in PNV is attributable to the theme of not increasing recreation opportunities. The remainder is caused by continuing the current fire organization, the current grazing and firewood programs, and by not recommending additional wilderness.

The environmental group would benefit from the absence of new construction and the low level of timber harvest. However, the small effort to restore damaged watersheds would not coincide with their values. The business and recreation visitor groups would not benefit from the restriction on meeting new demand.

Alternative G - Low Budget

PNV=$455.3 million; Change in PNV= -$228 million; Cash flow= -$2.5 million

The theme of this alternative is to reduce costs. However, this approach also reduces benefits, especially recreation which is the most efficient activity on the LTBMU. As in Alternative B (Current), virtually all of the reduction in PNV is the result of reducing the recreation program even below current levels. This reduction is partially offset by additional ski area development through private investment.

While the impacts of this alternative are similar to current, the Low Budget theme means even less environmental benefits can be achieved through Forest Service action. Not only would there be no new construction to meet recreation demand, but some existing sites would be closed. The business and visitor groups would not benefit from such closures.

(End Chapter 2)

CONTENTS

CHAPTER 3. THE AFFECTED ENVIRONMENT

A. Introduction and General Description of the LTBMU 3-1
B. The Economic Environment 3-2
C. The Social Environment 3-3
D. The Resource Environment 3-8
1. Air Quality and Noise 3-8
2. Adjacent Ownerships 3-11
3. Diversity 3-12
4. Facilities 3-15
a. Roads 3-16
b. Trails 3-17
c. Dams and Diversions 3-19
d. Administrative Facilities 3-20
5. Fire and Fuels 3-21
6. Fish (including threatened, endangered, and sensitive species) 3-22
7. Forest Pests/Integrated Pest Management 3-26
8. Geology and Groundwater 3-28
9. Historical and Cultural Resources 3-32
10. Lands 3-35
a. Landownership Adjustment
b. Landline Surveys
c. Non-Recreational Special Uses and Utility Corridors
d. Withdrawals
e. Rights-of-Way Acquisition
11. Minerals (including energy minerals) 3-38
12. Prime Agricultural Lands, Wetlands, and Floodplains 3-40
13. Range 3-41
14. Recreation 3-42
a. Developed Recreation
b. Dispersed Recreation
c. Winter Sports
d. Off-Highway Vehicle Use
e. Recreation Opportunity Spectrum Classes
15. Research Natural Areas 3-48
16. Riparian Areas and Stream Environment Zones 3-48
17. Sensitive Plants 3-49
18. Soils 3-50
19. Special Interest Areas 3-51
20. Timber and Vegetation 3-54
21. Visual Resources 3-57
22. Water 3-58
23. Wilderness (and Roadless Areas)..... 3-66
24. Wildlife (including threatened, endangered, and sensitive species) 3-66

CHAPTER 3. THE AFFECTED ENVIRONMENT

A. Introduction and General Description of the LTBMU

This chapter is intended to acquaint the reader with the resources and characteristics of the Lake Tahoe Basin Management Unit (LTBMU), focusing on the areas with unresolved issues, concerns, and opportunities. This information should help the reader understand the basis of the alternatives (Chapter 2) and how they differ in their consequences (Chapter 4).

The chapter begins with a general description of the LTBMU, followed by discussions of the interrelationships of national forest goods and services with the economic and social environments of the basin and of the extended zone of influence. Following this is a discussion of each individual resource or program in alphabetical order, which describes current direction, policies, and management opportunities. Each of these sections begin with a description of the resource, its location or extent, and any issues and conflicts or constraints associated with it. Then the supply and demand situation is discussed for the market and nonmarket resources.

To reduce the size of this EIS, the descriptions must be summarized from the in-depth analysis done by the ID Team. However, a more complete discussion of each resource can be found in Planning Records. Other documents that are quite comprehensive and are frequently cited in this chapter are: Lake Tahoe Environmental Assessment, Western Federal Regional Council, 1979; EIS for the Establishment of Environmental Threshold Carrying Capacities, TRPA, 1982; EIS for Adoption of a Regional Plan for the Lake Tahoe Basin, TRPA, 1987; and numerous other technical documents prepared for and by the TRPA in support of planning efforts in the Lake Tahoe basin.

Lake Tahoe lies astride the California-Nevada border in the crest of the Sierra Nevada at an elevation of 6,229 feet. It occupies a depression between a major division of the Sierra Nevada which resulted from geological faulting. The lake itself was formed by volcanic action - a natural dam formed by a great pile of andesitic mudflow breccia across the north outlet. The lake is an irregular oval, some 22 miles long by about 12 miles wide. It covers about 122,600 acres in the basin of 324,600 acres, comprising the Upper Truckee River watershed. The granitic basin was extensively glaciated during the Pleistocene epoch. The topography of the basin is moderate to steep. Only one-seventh of the land has a slope of less than ten percent.

The lake is the largest and deepest (1,645 feet) in the Sierra Nevada and one of the largest alpine lakes in the world. The lake's uniqueness, however, is not in its size, but in the remarkable color, clarity, and purity of its water.

B. The Economic Environment

The Tahoe Basin itself is the primary zone of influence considered in this discussion. Employment in the basin is tourist-oriented, and the casinos are the biggest employers. Activities on national forest land generate around 2,000 jobs or about 5% of average annual employment. One hundred worker-years of that are by Forest Service employees, and most of the rest result from ski area operations and associated support businesses. Timber production on national forest land currently generates only a few worker-years in the basin. Under the forest plan, most new jobs would be ski-related, strengthening the winter economy when total employment is at its lowest.

On neighboring national forest timber receipts are typically the biggest contributor to the U. S. Treasury and in receipts to the counties. In the LTBMU, however, recreation fees and special uses fees for resorts and ski areas generate the most revenues. It is estimated that collections in the basin amount to about $1,000,000 a year, with $250,000 divided among six counties for roads and schools in proportion to their area of national forest land. This is an almost negligible contribution to their annual school and road budgets which total more than $180,000,000.

In Fiscal Year 82, the LTBMU budget (not including land acquisition funds) was approximately $3.3 million. Recreation, fire management, range, wildlife, and timber management programs have been fairly constant, while watershed restoration and land acquisition has seen general increases. For the latter two programs, however, there have been some rather abrupt annual changes, both up and down.

Present Net Value (PNV) is the difference between the discounted value of all priced outputs and all Forest Service management and investment costs over the analysis period. Forage, timber, water, and recreation visitor days are the primary outputs from national forest land in the basin which affect the PNV. Fixed costs and certain program costs do not contribute benefit values to the PNV, even though their costs are subtracted from it. Administration of the land acquisition program, the watershed program, and the fixed cost of general administration contribute the greatest net cost. Land acquisition has been a major program in the basin for the last 20 years. The cost of administering this program has become a significant part of the LTBMU budget in the last few years, primarily because of the large number of small parcels being acquired under the Santini/Burton Act. The size of this program should begin to decline after the year 2000. The watershed program has increased steadily in size over the last ten years and will remain a major program for at least another twenty years. Recreation visitor days are the largest contributor to PNV. Recreation use has shown an upward trend and is expected to continue to increase for the next 50 years. General administration cost has experienced a slow but steady increase since the LTBMU was formed and is expected to remain at the current level in the future.

C. The Social Environment

The significant social variables that may be affected by the forest plan have been identified. Because of the rapid population growth in the area the most important variables are the attitudes, beliefs, and values; lifestyles; and public service capacities.

A limit to the number of people that can be accommodated in the basin (a carrying capacity) is generally recognized. Some argue that this level has already been reached while others believe continued growth is essential to the economy. In the revised Regional Plan for the basin prepared by the TRPA, a share of the capacity has been established for outdoor recreation. It is viewed as both a target to be achieved and a limit on development similar to growth limits that have been established for residential, tourist and commercial improvements. Table 3.1a summarizes the existing population and dwelling units around the basin and predicts growth over the next 20 years.

Table 3.1a. Population and Dwelling Units Projections
(source = TRPA)

	POPULATION			DWELLING UNITS		
	Total	Resident	Visitor	Housing	Hotel/ Motel	Campground
City SLT	35,215	18,925	16,290	10,133	4,857	112
El Dorado Co.	13,603	7,139	6,464	4,199	48	1,246
Placer Co.	20,418	8,631	11,786	7,059	1,000	123
Douglas Co.	11,156	5,084	6,073	3,147	1,759	184
Carson City	0	0	0	0	0	0
Washoe Co.	11,698	5,861	5,837	3,996	683	0
Total 1985	92,090	45,640	46,450	28,534	8,347	1,665
Predicted						
1995	111,761	51,241	60,520	31,934	9,093	3,194
2005	122,470	58,263	64,206	36,134	9,293	3,194

Washoe, Alpine, El Dorado, Douglas, and Placer Counties and Carson City Rural Area are most affected by activities of the LTBMU. These areas have experienced rapid population growth but still maintain a relatively rural living environment except for the immediate area circling the lake. Table 3.1b provides projections of population growth. Employment is cyclic, and there is some dependency on the LTBMU for revenue and jobs - both for skiing opportunities and providing the natural scenic backdrop to commercial recreation activities.

The Tahoe Basin is a recreation resource of world significance. Except for recreation visitors, the zone of influence we will be most concerned with will be the basin itself.

Table 3.1b. Population Projections by Counties 1/

	1970	1980	1990	2000
Washoe County	121,068	193,632	293,519	351,049
El Dorado County	43,833	85,812	128,295	169,685
Alpine County	480	1,097	1,653	2,224
Placer County	77,632	117,247	167,568	226,263
Douglas County	6,882	19,421	38,872	51,488
California	19,971,069	23,667,902	27,990,000	31,414,000
Nevada	488,738	800,493	1,221,919	1,532,932

1/ The 1970 and 1980 figures are from the U.S. Census. The 1990 and 2000 projections are from the State of California Department of Finance; and Bureau of Business and Economic Research, University of Nevada at Reno.

Six social groups that may be affected by the forest plan have been identified. Two of the groups represent basin residents: those who favor more growth to support the local economy (Recreation-Dependent Business Community) and those who want to maintain the social and environmental conditions that attracted them to the basin (Lifestyle-Oriented Residents). These groups place different demands and values on resource use. The groups' profiles were developed through a variety of resources: the analysis of the management situation, forest land use, scoping process, user group trends, newspaper articles, government studies, personal interviews, and census data. These groups are not mutually exclusive. They are useful for analysis since each social group would be affected differently by each of the alternatives.

In general, the following characteristics apply to the six groups that are felt to be most affected by LTBMU planning alternatives:

Recreation Visitors - Visitors to Lake Tahoe come from all over the world. The greatest number of visitors, however, come from Northern California and Nevada. While many from the more distant areas are attracted by the casinos, other attractions on private land, and skiing opportunities the forested areas provide an important visual enhancement to the recreational experience. Many of the skiing opportunities are located on national forest land. Many visitors are family oriented, using the high quality recreation experience (both developed and dispersed) for a wide variety of uses such as camping, hiking, and skiing.

Environmental Groups - Lake Tahoe has been a focus of attention both at a local and national level as an area of scenic beauty and extreme environmental sensitivity. Environmental groups have been active in seeking limitations on recreational and urban development in order to protect the environmental values of the basin.

Old Tahoe Enclaves - These families have been visiting the same summer homes and resorts at Lake Tahoe for years. Two of the largest groups are located at Fallen Leaf and Echo lakes. These people wish to retain the traditional rural charm of the Lake Tahoe area and oppose encroachment on their summer retreats by tourists.

Owners of Undeveloped Lots - Many of the 16,000 owners of undeveloped lots at Lake Tahoe are unable to develop them because they cannot get the required permits and approval. Many of these people have invested money in these properties and are anxious to develop them. Some people live considerable distances from Lake Tahoe and own property only for investment purposes, but others live within the basin and are anxious to upgrade their home environment.

Lake Tahoe Lifestyle Oriented Residents - This group was attracted to the basin because of its natural beauty and low density outdoor style of living. They are anxious to preserve these qualities.

Recreation-Dependent Business Community - This group owns businesses or provide services related to LTBMU recreation opportunities. They would benefit from economic growth such as new recreation developments to attract visitors. See Table 3.2 for a summary comparison of the relationships of these social groups.

Social Variables

Impacts of the LTBMU plan alternatives on social groups are analyzed by their effects on various facets of these social groups. Indicators used to measure social effects include:

Lifestyles. This variable includes the way people live, such as patterns of work and leisure; customs and traditions; and relationships with family and friends. Forest outputs such as land use permits for ski areas generate only a small portion of the jobs and income in the LTBMU area of influence. The local economy, however, is growing from a variety of new employers, and the proportionate share of Forest Service outputs is decreasing.

Aesthetic amenities which affect recreation lifestyles (such as open space, scenery, quietness, and recreation opportunities on national forest lands) are affected by Forest Service decisions.

Attitudes, Beliefs and Values. This variable refers to the sentiment and preferences people have for the Lake Tahoe area and the management and use of particular areas and resources. It may include the social group's sense of freedom or self-sufficiency and their feeling of certainty or uncertainty about the future. The former includes changes in perceived control by outsider interest and perceived capability of local governments to meet their needs. Feelings about the future may be affected by rates of change caused by Forest Service management and the predictability of consequences of the change.

Table 3.2. Summary Comparison of Relationships of Social Groups to LTBMU Resources

Resources	Group 1 Recreation Dependent Business Community	Group 2 Lifestyle Oriented Residents	Group 3 Old Tahoe Enclaves	Group 4 Recreation Visitors	Group 5 Environmental Groups	Group 6 Owners of Undeveloped Lots
1. Developed Recreation	Profits from expansion to meet demand.	Expansion impacts lifestyles negatively.	Expansion impacts traditional lifestyle negatively; especially near enclaves.	Expansion to meet demand benefits this group as long as quality of experience is maintained.	Expansion increases risk of degrading environmental values.	Thwarted by land coverage being allocated to outdoor recreation instead of homes.
2. Wilderness Allocations	Little conflict between roadless areas in further planning catagory and suitable recreation sites escept for ski potential in Granite Chief.	Benefits from wilderness designations to protect environmental values.	Benefits from wilderness designations, as long as managemend does not significantly increase use of areas - i.e., major trailheads in the enclaves.	Similar to Group 1.	Purthers aims of wilderness designations as means to protect environmental values.	Effects vary
3. Public Firewood	Benefits from current or increased supply if not adjacent to residential areas.	Impaired by cutting near residential areas.	Impaired by cuttion in or near the enclaves.	Impaired by cutting near recreation sites that would degrade quality of experience.	Conflicts with values protecting sensitive land.	Effects vary
4. Timber Production	Detrimented by increased supply if threatens quality of recreation experience.	Increasing the supply may threaten environmental values.	Similar to Group 1.	Similar to Group 1.	Benefits from vegetative management with goal of maintaining environmental values.	Thwarted by use of land coverage for timber production instead of residential development.
5. Grazing	Benefits from allocation of pasture for saddle horses but not for red meat.	Similar to Group 1.	Similar to Group 1.	Effects vary	Aims thwarted by any grazing of stream environment zones.	Effects vary
6. Fish and Wildlife Habitat	Values conflict with habitat blocking recreation developement.	Benefits from more active habitat enhancement.	Similar to Group 2.	Values favor habitat enhancement as a benefit to recreation experiences.	Benefits from habitat protection and enhancement as an important environmental value.	Effects vary
7. Scenic Quality	Benefits from scenic quality enhancing recreation so long as it does not block recreation development.	Benefits from scenic quality protection and enhancement, even if it constrains other activities.	Similar to Group 2.	Similar to Group 1.	Similar to Group 2.	Benefits from scenic quality enhancement so long as it does not block development of their lots.
8. Water Quality	Impaired by water quality considerations blocking recreation development. Believes all impacts can be adequately mitigated.	Helped by protection and enhancement of water quality, even if it constrains other activities.	Similar to Group 2, except hurt by removal of summer homes and resorts from environmentally sensitive land	Similar to Group 1.	Similar to Group 2.	Hurt by water quality as a constraint preventing development of lots.
9. Off-Highway Vehicle	Effects vary	Hindered by use, especially near residential areas.	Aims furthered by decreasing existing use as it impacts traditional lifestyles.	Effects vary	Effects vary	Effects vary

Community Stability. Community stability refers to the rate of change with which people can cope without exceeding their capacity to deal with it. The LTBMU area of influence is a fast growing area regardless of Forest Service influence. Thus, in the future, it is expected that forest outputs will have a smaller economic influence and will have a decreasing effect on community stability.

Population Growth. Changes in population have an effect on all of the variables mentioned above. In the LTBMU area of influence, effects on population due to Forest Service activities are minor. There are concerns that an increasing population will exceed capacities of community services and the ecological carrying capacity of the land, resulting in pollution and land use/ownership changes.

Community Services. LTBMU users require law enforcement, solid waste disposal, sewage disposal, access roads, and drinking water services from local government. Currently, national forest facilities are contributing only about 1% to the total peak day use of utilities in the basin, with another 1% being contributed by the commercial and residential development attributed to national forest activities.

An equitable method of reserving future utility capacity (from the pressure of private landowners who might want it) has not been resolved. Not only do Forest Service activities require public utilities, the local communities depend on national forest land for utility facilities rights-of-ways such as powerlines, gas and sewer pipelines, electronic sites, etc., to support urban development in the basin. Neither residential social group would benefit from designation of corridors for interstate utilities such as large electrical transmission lines that do not serve local customers.

Law Enforcement - The beauty and recreational opportunities of Lake Tahoe draw many visitors. The development of campgrounds, ski areas, reservoirs, and the general forested environment attract all types of people. This influx of people increases demand on local law enforcement. Other commodities that are available in the LTBMU are fish and game. The California and Nevada departments of fish and game are responsible for enforcing the fish and game laws.

Sewage - The availability of utility capacity has been a major concern in the basin for several years. Only one of the four sewage-treatment plants has substantial capacity left, and that is at Incline Village where the Forest Service has almost no development opportunities. Sewage capacity has been reserved and paid for in the South Tahoe plant.

Domestic Water - All Forest Service-developed sites and special-use permits are required to have a periodic testing and monitoring of their water systems. These tests are conducted by Forest Service personnel and county sanitarians. Water rights are extremely limited and, in many places around the basin, being disputed. It is imperative that the Forest Service identify water needs for future development and obtain the necessary water rights.

D. The Resource Environment

1. Air Quality and Noise

Breathing clean, fresh, mountain air and excellent visibility are essential parts of the "Tahoe Experience". Although superior to most urban areas, air quality and visibility declined at Lake Tahoe through 1981 with minor improvement since.

The basin is significantly influenced by the prevailing westerly winds which may carry pollutants from the Sacramento and San Joaquin Valleys. The bowl-shape of the basin is susceptible to frequent inversions (colder air trapped under relatively warm air) from October to April during the evening and early morning. High traffic volumes during these inversions can lead to entrapment and concentration of carbon monoxide and other harmful air pollutants for several days.

The four air quality components of greatest significance are carbon monoxide (CO), ozone, oxides of nitrogen (NOx), and particulates. Carbon monoxide is largely produced by automobile emissions and is believed to pose a greater health risk at high elevations. The federal standard states that CO may not exceed 9.0 parts per million (ppm). However, the two States and the TRPA have adopted a standard of 6.0 ppm mean average CO over an 8-hour period. At the south shore stateline monitoring station, CO has been as high as 16.3 ppm in 1985 with 27 violations of the federal standard and 188 violations of the State standard in the same year.

The Federal ozone standard is 0.12 ppm averaged over one hour, but the TRPA standard is 0.08. Ozone results from a complex chemical reaction of hydrocarbons and oxides of sulfur and nitrogen in the presence of sunlight. Again, the automobile is the primary source of the problem, producing 60-70% of the hydrocarbons. Another 10-15% is from wood smoke. (Source of information on relative amounts of pollutants in the air on an average summer and winter day is a study done by the TRPA in 1977 with data updates in 1981 and 1985.) Preliminary studies have shown slight ozone damage to trees at Luther Pass, Nevada Beach, and D.L. Bliss State Park. A broader survey for ozone injury in Jeffrey Pine has been proposed by the University of California, Davis.

Oxides of nitrogen are also primarily the products of automobile emissions (83% in summer; 71% in winter) and other combustion. These oxides are primarily a problem to water quality as they can be deposited directly upon Lake Tahoe and support algal growth. A complete understanding of the amount and effects is not available. The nitrogen oxides also affect ozone formation and visibility.

Visibility has been diminished to the point where the views of distant vistas is occasionally obscured. There are also many days, especially in the winter, when a layer of dirty air is seen at several points around the lake. Particulates in the air on an average summer day are 70% the result of road dust, 24% from wood burning including campfires, and 6% from all other sources. This changes in the winter to 40% road dust, 57% wood burning and 3% all other sources.

The Federal Environmental Protection Agency plans to designate only El Dorado County and the urbanized portion of Douglas County in the basin as a non-attainment area for CO. Until that designation occurs, the entire basin is considered a non-attainment area. A plan is required by the Federal Clean Air Act that demonstrates attainment of CO standards by December 1987 (EPA is considering an extention of the attainment date by 4 or 5 years). Measures that reduce CO will also have the effect of reducing ozone, NOx, and to a lesser extent, particulates.

California and Nevada assigned the task of preparing the Air Quality Non-attainment Plan to the TRPA. A plan was approved in 1982. Six major actions were identified in the plan as important to improving air quality. They are: (1) federal and state auto emission standards; (2) vehicle inspection and maintenance programs in major urban areas and in the south shore portion of the basin; (3) computerized traffic signals on Highway 50; (4) intersection modifications on Highway 50 to improve traffic flow; (5) transit improvements; and (6) mail delivery in the El Dorado County portion of the basin. To date, vehicle inspection has not been implemented at Lake Tahoe though inspections are made in major urban areas in California and Nevada; intersection modifications and computerized signals are continuing to be installed; transit improvements and mail delivery improvements are starting. Defeat of a 1/2 cent local sales tax to support public transit will require reassessment of that measure and probable amendment of the Air Quality Plan.

Monitoring has indicated that although some improvement is noted, the rate of progress the on implementation of the Air Quality Plan is not sufficient to attain CO standards in 1987. Efforts must continue on control measures until air quality standards are attained and maintained. Modeling indicates that if the strategies outlined in the TRPA Air Quality and Regional Transportation Plans are implemented, CO standards can be achieved by 1991 and all other standards by 2005.

National forest activities contribute to the air quality problems in the basin, though what portion of the cumulative effect has not been determined. Vehicle travel from recreation visitation, burning of slash from vegetation management, dust from vehicles traveling on dirt roads and, indirectly, the smoke from campfires and wood burning stoves, are some of the more notable sources of air pollution. On an average day, debris burning to reduce slash from vegetation management projects is not a large source of air pollution. However, because it usually occurs during a few weeks of each year, the smoke can be a major problem at that time.

The Forest Service has undertaken many different approaches to help protect air quality in the basin. Perhaps the most significant contribution has been to prevent private development which expands sources of air pollution. This is accomplished by acquiring the land. For example, the 10,000 acres purchased from Fiberboard Corporation prevented new subdivisions proposed for up to 14,000 people, and the purchase of the Jennings Casino site prevented 10,160 vehicle trips per day plus a population increase of 5,000 people and their impacts.

Although the Forest Service could operate independently to improve air quality, many of the more significant measures outlined in the TRPA Air Quality Plan are best undertaken in a cooperative manner with other agencies.

Therefore, the Forest Service supports a unified implementation of the Air Quality Plan. In all, 70 separate control measures are defined which will allow the Tahoe region to attain and maintain the thresholds and the State and Federal air quality standards.

Control measures associated with motor vehicles that can be implemented directly by the Forest Service or its permit holders, include bicycle and pedestrian facilities, employee ride sharing programs, indirect source review and traffic mitigation, parking management programs, driver advisories, and OHV controls. Control measures not related to motor vehicles include management of open burning, revegetation for dust control, building weatherization and education on the most efficient use of wood burning appliances. The Forest Service has initiated some of these measures. Bicycle trails have been built. Public transit to recreation sites to cut back on vehicle use have been supported. Alternate slash treatment measures have been occasionally used to reduce the impacts of burning. Surfacing of roads and other dust abatement measures have been used both as a water quality and air quality protection measure.

Mass transit and other techniques as air quality control measures, are also of special interest to help reduce traffic problems. A basinwide goal has been set to reduce vehicle miles traveled (VMT) by 10%. This represents a reduction from 1,700,000 miles traveled per day in 1981 to 1,530,000 VMT per day. A difficult task without any growth, it becomes even more so as the resident and tourist populations are allowed to increase. New development anticipated in the TRPA Regional Plan would tend to increase VMT by 10.5% to 1.88 million if VMT reducing control measures were not employed. Recreation improvements planned for the national forest land, especially ski area and campground expansion, are required to provide measures for mitigation of traffic problems and reduction of VMT, either directly through implementation of a VMT reducing project or indirectly through contributions to a cooperatively funded project. Such measures would be selected with the TRPA in order to assure a coordinated approach to the transportation and air quality problem.

Desolation Wilderness has been established as a Class I air quality area. This means that Congress has directed the land manager to preserve the air quality in wilderness areas. Some determinations have been made of baseline air quality conditions, called air quality related values (AQRV), within the wilderness. Those selected are visibility, lichen population changes and chemical composition, and acidity of lake water. In 1977, visibility was recorded using color slide photography. In 1986, an inventory was made of the lichen genera found in Desolation. Several study plots were set up to help determine trends in lichen populations. The plots focus on the genera Bryoria, because of its high sensitivity to chemical composition of the air. In addition, samples of two genera, Letharia and Bryoria, were analyzed for 27 different elements including aluminum, lead, and vanadium. Water analyses for conductivity, alkalinity, and pH have been taken of Lake LeConte since 1982 to add to the data that can be compared over time.

Noise

Most of the man-made noise in the basin is the result of vehicular traffic: cars, trucks, boats, planes, motorcycles, and snowmobiles. Sources of noise on

the national forests include off-road vehicles, chain saws, and helicopters for skiing or search and rescue. To keep noise within acceptable levels some activities have been confined either to certain times of the day and certain days of the year or to certain locations where the conflict with residents, other users, or wildlife can be minimized. Few complaints are received even though the Forest Service has not actively regulated noise in the past. The exception is with OHV activity in the vicinity of urbanized areas, which has aggravated many residents.

The environmental thresholds established for the Tahoe Basin set a noise standard of 25 decibels for cumulative noise event level (CNEL) for wilderness, roadless areas, and critical wildlife habitat. The Forest Service measured CNEL levels in Desolation Wilderness in September, 1982, and recorded ratings over 40 decibels just from natural sounds and occasional aircraft noise. If additional measurements confirm that a threshold of 25 is below natural conditions, efforts will need to be taken to revise the threshold.

Another concern is low-flying aircraft over Desolation Wilderness. The Forest Service has no jurisdiction over aircraft and must rely upon the controls established by Congress and the Federal Aviation Administration. It is unlikely that the FAA regulations, which allow flights at least 500 feet above the ground surface, will be modified. Encouraging pilots (through available information procedures) to fly at higher elevations over wilderness seems to be the extent of our authority.

2. Adjacent Ownerships

Only one large private landholding is left in the basin: the property at High Meadows. This is a change from the draft EIS when Boise-Cascade owned much of the high elevation land east of Incline Village. That land has recently been exchanged into Federal ownership.

The Trimmer property at High Meadows is used for a small summertime grazing operation. There have been some conflicts between the ranch-hands and public visitors going to the meadow, Freel Peak, or Star Lake. Hikers, and an occasional OHV user, sometimes leave gates open and disturb the cattle. The owner prohibits public vehicle access and discourages hikers on occasion. While the Forest Service cannot encourage the public to cross this private land, where there is no public right-of-way, we recognize that some national forest lands with recreational opportunities are not being fully utilized as a result. The owners have expressed no interest in selling the property to the Forest Service.

Wildland fire protection is provided to landowners by the Forest Service in California.

Several ski areas in and adjoining the basin have opportunities to expand their facilities and are dependent on national forest lands being available. This is discussed further in the recreation section of this chapter.

Both public and private lands outside the Lake Tahoe Basin are significantly influenced by activities within the basin. Most of this influence is from private land development in the basin, with activities on the national forest

having a less direct effect. New development in the basin has been slowed appreciably. Land and home prices and rental rates have risen beyond the range of many lower income workers. As a result, there have been spill-over effects on land and communities outside the basin. Carson City, Gardnerville/Minden, Truckee, and Reno have become bedroom areas for many Lake Tahoe workers.

The needs and desires of the many permanent and seasonal residents in the basin were discussed in the social environment section of this chapter.

3. Diversity

It is an accepted ecological concept that diversity provides ecosystem stability. Current LTBMU direction is to maintain healthy, diverse timber stands, current diversity of other vegetation communities, and viable populations of all native vertebrates. The environmental thresholds also encourage diversity of vegetation communities through appropriate management practices as measured by species richness, relative abundance and pattern, and by nondegradation standards for special communities. The maintenance of vegetation diversity in the basin directly affects: 1) provision and maintenance of biological variety; 2) management of fish and wildlife habitats in order to maintain viable populations of all existing native vertebrate species; 3) assurance of aesthetic values through structural variety in the landscape; 4) management of the size, intensity, and distribution of wildfires; and 5) resistance to insect and disease epidemics.

There is little information available about the "natural" level of diversity in the Tahoe Basin. In the late 1800's, vast areas of the forest vegetation were clearcut to supply the Comstock mining towns. Large numbers of livestock grazed in the basin. Major fires were also widespread. These produced changes in the occurrence of brushland and meadow communities. The dominant conifer forests have since been reestablished, reducing the area of open lands. The suppression of fires has also contributed to the closing of the forest canopy. Brushland and meadow acreage has decreased as conifer forests mature. Consequently, most of the basin contains medium sized trees, with very few young stands and little old growth. Plant succession, however, is a dynamic process. Animal diversity has also followed this trend.

In order to maintain diversity of all vegetation types on the LTBMU, it will be necessary to use measures to counteract the trend toward climax conditions and loss of early successional stages. Such measures could include modification of wildfire suppression strategies that allow for more use of containment and confinement strategies and would enhance vegetative diversity. Timber management activities such as thinnings and regeneration harvesting could also be utilized.

Table 3.3, from the Lake Tahoe Environmental Assessment, by the Western Federal Regional Council, 1979, reflects the diversity of plant communities in the basin.

Table 3.3. Vegetative Associations in the Lake Tahoe Basin

Type	Name	Amount Acres	Percent
Coniferous Forest	Mixed Conifer	57,750	28.14
	Jeffrey Pine	36,955	17.52
	Red Fir	32,600	15.88
	Lodgepole Pine/ Mountain Hemlock/ Whitebark Pine	30,530	14.87
	Lodgepole Pine/ Meadow	14,675	7.15
Subtotal		171,510	83.56
Woodland and Hardwood Forest	Riparian Deciduous	1,725	0.84
	Curlleaf Mountain Mahogany	560	0.27
Subtotal		2,285	1.11
Scrub	Basin Sagebrush	4,615	2.25
	Montane Shrub	9,540	4.65
Subtotal		14,155	6.90
Dwarf Scrub	Cushion Plant	650	0.32
Subtotal		650	0.32
Meadows and Marshes	Dry Meadow/ Grassland	1,805	0.88
	Wet Meadow	5,615	2.73
	Marsh	1,040	0.51
Subtotal		8,460	4.12
Miscellaneous	Water	3,350	1.63
	Barren	4,860	2.36
Subtotal		8,190	3.99
Basin Total 1/		205,250	100.00

1/ This represents all land area in the basin; urban development, as it has replaced the natural vegetative association, is not reflected in this table.

Since 1900, 75% of the marshland and 50% of the meadowland in the basin have been lost to urban development. While this development is not the responsibility of the Forest Service, it does raise expectations that the marshes and meadows on national forest will be protected. Since natural succession tends to convert meadows to forest, some management is required to maintain them in their current successional stage.

Table 3.4 displays the structural diversity of the forest stands; that is, the relative amounts of each age and density of stands on national forest land.

Table 3.4. Forest Diversity by Seral Stage

Forest Type	Seral Stage/Timber Strata in Acres and percent 1/							
	1 PL	2 1X	3A 3P	3B/C 3G	4A 4P	4B/C 4G	4C+ 6G	Total
Mixed Conifer	0	40	18,205 (32%)	21,483 (38%)	9,011 (16%)	7,503 (13%)	679 (1%)	56,921 (100%)
Red Fir	0	0	5,998 (30%)	5,832 (30%)	2,819 (14%)	5,044 (26%)	0	19,693 (100%)

1/ Stage 1 = Grass/forbs
" 2 = Shrub/seedling/saplings (up to 20 feet in height)
" 3 = Pole/medium trees (20/50 ft. in height; 0/39 % canopy cover)
" 3B&C = Pole/medium trees (20/50 ft. in height; 40% or greater canopy cover)
" 4A = Large trees (50 ft. or greater in height; 0/39% canopy cover)
" 4B&C = Large trees (50 ft. or greater in height; 40% or greater canopy cover)
" 4C+ = Overmature/decadent trees (50 ft. or greater in height; 70% or greater canopy cover; stands show decadence).

This predominance of timber stands in stages 3 and 4 reflect the reestablishment of the forest following the intensive logging of the late 1800's and the absence of major wildfires or logging in the past 20 or 30 years. If this trend continues, the distribution will shift even further toward stage 4.

All seral stages of the forest community are used by some type of wildlife, as indicated by Table 3.5, computed from Wildlife Habitat Relationships prepared for Lake Tahoe Basin (Osaki, 1980).

Table 3.5. Number of Wildlife Species Associated with Wildlife Habitat Relationship

Wildlife Habitat Relation Type	# of species	% of total species
Riparian/wet meadow/grassland	212	84
Mixed conifer	130	52
Jeffrey pine	107	42
Red Fir	94	37
Lodgepole pine	82	33
Montaine shrub	62	25
Sub-alpine	53	21
Bitterbrush	51	20
Sagebrush	47	19
Mountain mahogany	43	17
Mule ears	21	8
Alpine scrub	11	4

Goals for diversity tend to be vague and difficult to measure. TRPA has set thresholds for maintaining diversity both of vegetative communities and of structural stages. For maintaining species richness, or variety of communities, the thresholds require the perpetuation of all major plant associations, with particular emphasis on the nondegradation of the native deciduous trees, wetlands, meadows, the cushion plant community, and the increase of riparian associations. The threshold for structural diversity requires maintaining 15-25% of the mixed conifer and red fir stands "in seral stages other than mature". Interpreting this as stage 3 or younger, the current level is 70% mixed conifer and 60% of the red fir. However, if no stands were ever cut and regenerated, in time this threshold could be violated. From a wildlife standpoint, more stage 1 and 2 timber stands would be desirable to enhance viable populations of early successional stage dependent species, especially deer. However, the land base available and suitable to manage for early successional stages will be limited by environmental factors in the basin.

4. Facilities

The Forest Service constructs, maintains, and manages a variety of structural facilities to support resource management programs. On the LTBMU, these include roads, trails, dams and diversions, and administrative sites such as storage buildings and fire stations. Existing facilities are shown on the facilities map which accompanies the forest plan. These facilities entail costs and have environmental consequences. This section looks at the existing facilities and their adequacy for the future.

a. Roads

The existing State and county road system provides good vehicle access to the Lake Tahoe Basin. The seven major routes, (totaling about 146 miles with 32 miles on national forest land) into or through the basin. A Regional Transportation Plan, prepared by the TRPA, defines the improvements necessary to enhance the system in the future. For the most part, these roads are not managed by the Forest Service, thus they are not discussed in depth here. Impacts of Forest Service activities on the public transportation system are discussed in the sections on recreation and air quality.

A special district was established through the Tahoe Regional Planning Compact as a means of dealing with public transit in the basin. The Tahoe Transportation District has the responsibility for planning for and operating public transit systems serving the basin. Service to national forest recreation sites are included in the transit system plan. In 1984 and again in 1986, resolutions were defeated by local voters to establish a 1/2% sales tax to help finance operation of the public transit system. Without funding, the district orgainization was disbanded until its future could be redefined.

Most of the roads under Forest Service jurisdiction were developed when design standards were less stringent than today. Some of these roads evolved from wagon roads or primitive logging roads from the late 1800's. As a result, most do not meet current standards for drainage, stream crossings, or stable cut and fill slopes. Erosion from these roads is the most significant impact on water quality from national forest land.

In 1979, the LTBMU began an aggressive program to eliminate water quality problems caused by roads. Slope stabilization and installation of water bars, culverts, and rip-rapped ditches have been undertaken. In addition, 20 miles of unnecessary roads have been closed and revegetated as part of the watershed restoration program. Additional road closures or reconstruction remain to be accomplished for watershed protection purposes.

The road system currently consists of 240 miles of various types of forest roads. This amount seems adequate for the current level of programs and use such as motorized dispersed recreation, commercial and public woodcutting, access to developed recreation sites, and fire suppression. On national forest land, the following degrees of road access currently exist:

Fully accessed (a road is within 1/4 mile) ---------- 48,456 acres

Marginally accessed (nearest road is 1/4 to 1 mile) ---- 43,701 acres

Remote (nearest road is more than 1 mile away) --------- 24,854 acres

Inaccessible (Desolation Wilderness) ---------- 21,300 acres

The density of roads for resource management and use varies considerably. The south shore has a relatively low density road system except around developed recreation sites and on the flat to gently sloping land. The west shore has a moderately dense road network, including the McKinney-Rubicon road (a popular

OHV route) and the Barker Pass road (a major timber haul route from the Tahoe National Forest). The north shore was industrial timber land before acquisition by the Forest Service in the early 1970's, therefore, it has a very dense road network. The east shore, in contrast, was logged in the 1800's via horse trails and railroads and thus has a very low road density.

Significant increases in resource programs, especially timber management, would require additional roads, some of which would be located on steep, high erosion hazard lands. Preliminary investigations indicate that a total of about 45 miles of arterial and collector road, plus many miles of local road, would be required to access roadless areas at costs of $100-175,000 per mile. High construction costs, including measures to protect water quality, make most construction on environmentally sensitive land uneconomical.

El Dorado County recently relinquished jurisdiction over a number of roads, such as Angora Lakes Road, to the Forest Service. This has increased both the miles of road requiring Forest Service maintenance and the backlog of road reconstruction needs. Some of these roads serve national forest and private residential improvements and, therefore, should have shared maintenance. Land acquisitions may also add roads to the system.

b. Trails

The LTBMU presently manages a 127.6 mile trail system. Trails accepted on the system have been inventoried as meeting long term management or recreation needs, as being substantially located in an appropriate location, and as meeting trail design standards. Due to acquisition of land and the rapid growth of residential areas with related dispersed recreation use there are many routes, paths, and trails on national forest lands within the basin that have not been added to the trail system and which are not actively managed or maintained. While most of these routes which haven't been inventoried do not meet the criteria for retention and may in fact be the cause of serious erosion, approximately 70 miles have been identified for eventual addition to the trail system. These existing trails that will be retained and managed as part of the trail system are referred to as "non-system trails" in this EIS. Once the non-system trails are inventoried and added, the LTBMU trail system will total about 198 miles.

Nearly all current system trails are hiker/horse trails, typically providing access to wilderness or relatively remote areas. Only four miles are open for motorized vehicle use. Many of these trails are used in the winter for cross country skiing and snowmobiling, and a number of them are signed for such uses. In contrast, approximately 20 miles of the non-system trails are open to and primarily used by off-highway vehicles, mostly motorcycles. An additional 25 miles of non-system trails are used almost exclusively by equestrians as part of riding stable operations located on national forest land under permit. The remaining 33 miles of non-system trails are used mostly for hiking.

The Forest Service contributes to the Regional Transportation Plan's goal of improving the basin's bikeways and pedestrian system by maintaining the Highway 89 bicycle trail, a popular route through south shore's beaches. The numerous bicycle rental locations at the start of the trail and the high ridership

evidence that the bicycle provides a viable alternative to the automobile in this area. This plan also adds new trails to the system at the rate of one mile per year.

There are 30.7 miles of trail identified as nationally significant. The Hawley Grade and the Highway 89 bicycle trail are designated National Recreation Trails. The National Park Service is currently studying the California and Pony Express Trails for their eligibility as National Historic Trails. Portions of both of these trails pass through the LTBMU. The Pacific Crest National Scenic Trail was created by Congress in 1968 and is managed according to the Pacific Crest Trail management plan.

Like most of the forest road system, most trails in the Tahoe Basin were developed under less stringent design requirements than exist today. Many trails evolved from livestock trails. Many do not fully meet current standards for drainage, grade, or stream crossings. Erosion is contributing significant water quality impacts. During the 1960's and early 1970's some of the most heavily used trails in Desolation Wilderness were reconstructed and have been maintained in fair condition; however, three-quarters of the existing trail system requires major investment to fully meet water quality standards and recreational needs. Since 1980, the LTBMU has been implementing a program to correct the worst deficiencies. Correcting the remaining backlog of 100 miles of trail reconstruction is estimated to cost $450,000 or an average of $4,500 per mile. Routine maintenance of trails to an adequate standard is estimated at $100 per mile per year, or $20,000 per year for existing trails.

Presently, most system and non-system trails are located in the southwest corner of the Tahoe Basin and only a few are located on the west, north, and east shores. This is partly a result of the recreation attractions concentrated in Desolation Wilderness and Meiss country with their numerous lakes and dramatic scenery, and partly because much of the land in other areas has come from recent acquisitions. There are opportunities to provide increased trail access to recreation attractions throughout the basin. Out of a total of 278 miles of potential new trails reserved as the public "fair share" for recreation in the TRPA Plan, 154 miles are considered currently economically efficient to develop during the next five decades.

A new trail of major interest is the Tahoe Rim Trail which will eventually circumnavigate Lake Tahoe on the watershed divide. The Tahoe Rim Trail will consist of approximately 93 miles of new trail and 57 miles of existing trail including a portion of the Pacific Crest Trail. This exciting concept is being realized by the Tahoe Rim Trail Foundation, a dedicated group of volunteers who are planning, constructing and maintaining the trail. During the first three years of actual construction (1985 to 87) over thirty miles of trail were completed.

Table 3.6 shows the distribution of existing trails and potential trails.

Table 3.6. Distribution of Trails

County	Existing System Trails miles	%	Existing Nonsystem and System Trails miles	%	Existing and Potential Trails miles	%
ElDorado, CA	112.0	88	148.0	75	178.0	51
Alpine, CA	5.1	4	10.0	5	17.0	5
Placer, CA	3.3	3	13.5	7	54.5	15
Washo, NV	5.0	4	12.5	6	27.5	8
Carson, NV	2.0	2	6.0	3	24.0	7
Douglas, NV	.2		8.0	4	49.0	14
CA total	120.4	94	171.5	87	249.5	71
Nevada total	7.2	6	26.5	13	102.5	29
Projected bicycle and pedestrian trails					20.0	
Total	127.6	100	198.0	100	372.0	100

1/ Includes existing trails and all potential new trails.

Included in the total potential trail system mileage on Table 3.6 is approximately 20 miles of surfaced bicycle and major pedestrian trails proposed for Forest Service construction in the TRPA Regional Plan. These trails are part of the Regional Transportation Plan that would help to relieve traffic and air quality problems. The cost of these surfaced trails is estimated at $60,000 per year for the first decade and $40,000 per year for the second decade, for a total of $1,000,000. These trails are not geographically distributed because their potential locations have not been identified and thus it is impossible to project in which county and state they are most likely to occur.

c. Dams and Diversions

There are 15 dams on the LTBMU. Fallen Leaf Lake Dam was built in 1934 and has been operated by the Forest Service since acquisition of the Baldwin Estate in 1951. This is the most important Forest Service-owned dam on the LTBMU. Numerous summer homes and a private boat rental concession need high water levels for boat access. High levels, however, reduce the available beach area on the lake. Kokanee salmon spawn in Taylor Creek below the dam and are dependent on lake storage to provide adequate streamflows in the late summer and fall months. It has been difficult to find the balance point between these competing uses. Fallen Leaf Lake dam is classified as a moderate hazard in the event of failure.

Nine streamflow enhancement and lake level maintenance dams were constructed in the 1940's by the California Department of Fish and Game to improve fish habitat. Six of these are located within the Desolation Wilderness and three are in the Upper Truckee River watershed. The Forest Service recently assumed responsibility for these dams and is reviewing operation and maintenance needs. Operation and maintenance plans will likely be developed for those which are still in operable condition. All nine are classified as low hazard in the event of failure, thus can be maintained at low cost. The value of these dams to fisheries and dispersed recreation is high. The increase in lake surface area due to the dams causes a slight increase in evaporation. This increased evaporation may be considered as part of the Forest Service water rights allocation in California when the water rights issues in the basin are resolved (see Water section of this chapter).

The waters of Heavenly Valley Creek are impounded behind an earth fill dam for domestic, snowmaking, and erosion control irrigation uses by the ski area operator.

The Echo Lake Dam (classified as high hazard) was built in the 1890's and is owned and operated by the Pacific Gas and Electric Company. Flow releases are diverted into the South Fork of the American River system and are used to generate electricity.

The other three dams are privately owned low hazard water diversions for domestic water supplies.

There are several dams which (although not located on national forest land) may cause damage to national forest land in the event of failure. These are Spooner Lake and Marlette Lake dams owned by the State of Nevada and Lake Tahoe Dam owned by the Bureau of Reclamation.

Topography and surface water flow conditions are suitable in the basin for hydroelectric developments. There has not been a large interest in new hydroelectric development primarily because of potential conflicts with other resources. Should proposals occur, the Forest Service can only make recommendations to the Federal Energy Regulatory Commission (FERC). Recommendations are made through the environmental review and licensing process and may include denial of the project where mitigation of impacts is not found acceptable.

d. Administrative Facilities

The LTBMU has sixteen administrative sites including fire lookouts and stations, storage, employee housing, and work centers containing 69 government owned buildings or trailers. The main headquarters is located in a leased office building. (Appendix B of the forest plan is a summary of the administrative sites.)

Many of the facilities were obtained when the land was acquired and were then adapted to Forest Service needs. As a result, many are old and in need of repair. Other features that need to be installed include runoff infiltration trenches, surfaced roads and parking, measures to protect established vegetation and soil stabilizing devices. The most recent estimate of the funds needed to complete the backlog of health and safety and general maintenance

requirements is $515,000 for the buildings. Site rehabilitation to install Best Management Practices is estimated at an additional $300,000. Once the backlog is eliminated, the current budget level will be adequate for routine maintenance, using a rate of 3% of the replacement value.

Because many Forest Service facilities are old, some have the potential for nomination to the National Register of Historic Places. Besides the Valhalla, Pope, and Baldwin Estates, which have already been listed on the National Register, preliminary evaluations indicate that the following structures are eligible: Camp Richardson Resort, Glen Alpine Springs Resort, Angora Lookout, Zephyr Lookout, and perhaps Skunk Harbor House, Fredericks House, the Old Mill, Round Hill Pines Resort, Upper Truckee Ranger Station and portions of the Meyers Work Center. This has special implications when considering maintenance, replacement, or elimination of buildings.

Generally, existing facilities are meeting most needs. Additional employee housing, warehouse, and shop space are planned for existing sites. Also of current concern is the headquarters office. Annual cost for leasing the office runs over $160,000 per year. It is estimated that the cost to build equivalent office space on national forest land would be $720,000, which would have a payback period of five years.

5. Fire and Fuels

The Tahoe Basin can be characterized by two different natural fire regimes based on climate, vegetation, and topography. The higher elevations tend to have infrequent, low intensity fires because of the sparse vegetation and long winter snowpacks. The forested, lower elevations historically had infrequent but high intensity fires that occasionally reached a large size. This burning kept residual fuel levels at relatively low levels. The aggressive fire suppression program in operation for the last 50 years has resulted in an increase in fuel loading. Much of the accumulation is in the form of live, overstocked timber stands. This could result in a greater fire hazard. To counteract the trend toward heavily stocked stands emphasis will be placed on timber management activities such as thinnings and regeneration harvesting.

The current fire protection program has been very successful. The 10-year average shows 83 fires per year on the LTBMU. Of these, 71 are man-caused and 12 are lightning. Most fires are suppressed quickly and are generally under 1/4 acre in size. Current direction calls for suppressing fires at two acres or less, 90% of the time. This intensive suppression emphasis has been based on the potential hazards of wildfire on watershed stability and on private and public property values in the basin. In addition, non-dollar values are particularly important to the more sensitive issues at Lake Tahoe and are equally important in determining the fire organization. These include air quality, aesthetics or visual experiences, public concern and safety, and impacts upon the operations of other fire agencies. Alternative levels of fire management considered in the forest planning process would need to address these values.

Selecting the appropriate level of fire management is difficult because of the trade-offs between small short-term impacts and major long-term ones. For example, prescribed burning to reduce fuels produces smoke which reduces

visibility and may degrade water quality. Water quality is affected by the deposition of nutrients contained in the smoke and from removal of vegetation that stabilizes soil and absorbs nutrients. These effects are all of relatively short duration. However, this activity also reduces the possibility of larger wildfires that could destroy watersheds, threaten life and private property, and mar the scenery for years. As the resident population and number of tourists in the basin increases, the possibility of fire starts also increases.

The potential for fire starts and fire hazards is greatest within and adjacent to urbanized areas. The amount and value of urban and resource investments vary throughout these areas. Therefore, alternatives to the current wildfire response strategy of control of all fires at two acres or less should be considered. Current wildfire suppression strategies allow for the use of containment and confinement in addition to complete control of fires.

Current LTBMU policy on treatment of fuels generated by timber management requires complete disposal, which is usually done through piling and burning. Most of the treatment is done for aesthetic reasons as opposed to reducing fire hazard. This treatment adds to the already high cost of timber management in the basin and is being done in areas not readily viewed by the public. It also produces smoke, which conflicts with the environmental threshold to reduce smoke and increase visibility. Use of prescribed fire to accomplish objectives other than treating activity fuels, such as converting from one vegetation type to another, controlling insects and pathogens, or simulating natural ecological succession, is being considered and would run into the same conflicts.

Structural fire suppression is generally well provided for by municipal fire service agencies in the basin. Occasionally Forest Service units must respond to structural fires when responding units are inadequately staffed for safe operation.

6. Fish

The regional deferred issue regarding fish is included in LTBMU Issue #3. The management indicator species (see Wildlife section discussion on Management Indicator Species Concept and Population Viability) for fisheries are Lahontan cutthroat trout, rainbow trout and brook trout. Table 3.7 identifies the reason for their selection and the habitats they represent. The Lahontan cutthroat trout was selected because it is a federally threatened species and was the historical gamefish of Lake Tahoe. The rainbow and brook trout are both RPA emphasis species with the former both a migratory and resident species in both lakes and streams and a spring spawner. The latter is a resident species in most of the small streams and almost all lakes on the LTBMU, and is a fall spawner.

Table 3.7. Fish Management Indicator Species

Species	Reason for Selection	Habitat Components and Ecosystems Indicated
1. Lahontan cutthroat	Recovery Species (threatened)	Small to large streams and alpine lakes. Spring spawner, stream spawner.
2. Rainbow trout	RPA Emphasis group (cold water resident and migratory fish harvest)	Medium to large streams and some large lakes with tributary streams, including Lake Tahoe. Spring spawner, stream spawner.
3. Brook trout	RPA Emphasis group (cold water resident fish harvest)	Small to large streams and alpine lakes. Fall spawner stream and lake spawner.

Since the Forest Service is responsible for management of the habitat of species, changes in habitat capability as expressed in potential pounds of fish the habitat could produce are used to evaluate management effects on management indicator species.

Current Situation

Lake Tahoe supported a large commercial and recreational fishery of Lahontan cutthroat trout, currently a federally threatened species, until the late 1800's. A combination of overharvest, habitat deterioration, and competition and hybridization with introduced nonnative fish species virtually eliminated this resource. During the early 1900's the species declined and eventually was replaced by a variety of introduced trout species. Watershed degradation from both early logging and more recent urbanization has reduced the capabilities of tributary streams for spawning.

Fishing is currently a major summer recreational use on the LTBMU with over 45,000 Wildlife and Fish User Days (WFUD) reported each year. Approximately 80% of that use is associated with lakes and CDFG stocking programs. The remaining 20% is associated with stream habitat and self-sustaining populations. LTBMU streams also contribute to sportfishing in Lake Tahoe by providing spawning areas for lake sportfish. In general the most accessible lakes and streams receive most of the use. Demand appears to exceed supply in easily accessible areas, while supplies exceed or meet demands in inaccessible areas. This demand should continue to increase in the future as a function of increasing dispersed recreation use.

There are more than 98 lakes on the California side of the LTBMU, covering over 1,600 surface acres. Most are in Desolation Wilderness. Generally, the lake habitat is of good quality. In the 1940's, dams were constructed on 14 lakes to improve fish habitat and regulate downstream flows, 9 are still operable (see section on Dams for more details).

The LTBMU includes 41 perennial streams, totaling approximately 164 miles. Most are located in California. Ninety-eight percent of the stream miles support resident fisheries with over 64 miles supporting both resident and migratory trout and salmon populations.

Most resident trout streams are small with seasonally fluctuating flows. Most of the trout they contain are small. Current habitat quality of resident trout streams is estimated in Table 3.8. Over 60% is good to excellent quality habitat. Instream flow studies have been completed for Burton, General, McKinney, Slaughterhouse, Taylor, Third, Trout, Upper Truckee and Ward creeks. During low-flow periods these streams have flows that are marginal for supporting fish. Therefore, it has been concluded that any diversion has adverse effects. It would be desirable to shift diversions, such as for domestic water supplies, to the lake.

A total of 14 species of fish are known to occur in streams and lakes on the LTBMU. Rainbow, brook, and brown trout are most common in resident streams, with brook trout the most abundant and widespread. Table 3.9 lists the miles of stream and surface area of lakes inhabited by the most common fish.

Presently, only historical habitat exists for the Lahontan cutthroat trout on the LTBMU. However, currently 40 surface acres of lakes and over 20 miles of streams contain hybrid Lahontan cutthroat trout. These are not self-sustaining and must be sustained by planting. Some 37 surface acres of lakes and approximately four miles of streams in the Upper Truckee River watershed are currently being studied for possible reintroduction of pure Lahontan cutthroats in accordance with recovery efforts.

Kokanee salmon, mountain whitefish, and migratory rainbow and brown trout from Lake Tahoe use some of the streams seasonally for spawning and as rearing habitat. Current habitat quality of these migratory stream sections is estimated in Table 3.8. Over 80% of these stream miles are rated as poor for migrating trout because of barriers and poor habitat quality. The migratory habitat is very important for Lake Tahoe fisheries.

Table 3.8. Current and Potential Stream Quality

	Miles of Streams			
	Resident		Migratory	
Quality Rating 1/	Existing	Potential	Existing	Potential
Excellent	24.1	42.8	4.8	5.8
Good	37.9	37.5	6.7	52.2
Marginal	38.0	19.7	52.5	6.0
Total	100.0	100.0	64.0	64.0

1/ Quality ratings based upon TRPA stream survey methodology which evaluated each stream by streamflow, pool abundance, aquatic cover, substrata, slope, canopy, aquatic vegetation, benthic fauna, fish abundance, reproduction, bank/channel stability, stream gradient, barrier/obstructions and diversions (TRPA 1982).

Table 3.9. Fish Species Occurrence 1/

Fish Species	Surface acres of natural and artificial lakes on national forest in the basin	Miles of Stream 2/ CA	NV	Total
Brown trout	247	90	0	90
Rainbow trout	997	95	8	103
Cutthroat trout (hybrid)	40	16	7	23
Eastern brook trout	580	131	27	158
Golden trout	12	0	0	0
Lake trout	638	0	0	0
Mountain whitefish	0	13	0	13
Kokanee salmon	690	13	1	14
Lahontan redside	Unknown	11	1	12
Tahoe sucker	Unknown	20	1	21
Speckled dace	Unknown	17	1	18
Tui chub	Unknown	10	0	10
Piute sculpin	0	2	0	2

1/ TRPA and USDA Forest Service, 1971, Fisheries of Lake Tahoe and its Tributary Waters, A Guide for Planning.

2/ Some overlap where more than one fish species exists in same stream sections or lakes.

Self sustaining populations of most of the nonnative game fish species with the exception of Kokanee salmon appear stable. Kokanee spawning in Fallen Leaf Lake and Taylor Creek is cyclic. The cause is thought to be related to changing food supplies in Lake Tahoe, storm events affecting survival of young in spawning streams, and reduction in spawning stream quality.

There is a decreasing trend in habitat capability of tributary streams due to a large number of factors, some historical and some presently occurring. These include habitat loss due to past dredging and channelization, sedimentation of spawning gravels, damage of streamside vegetation and stream banks, poor culvert/stream crossing design, inadequate instream flows due to diversions, beavers, natural barrier accumulations, contamination of streams by pollutants and minor conflicts with timber, range and recreation management.

Currently, based upon habitat capability ratings for streams and an estimate of habitat capability of lakes, 88,900 lbs. of fish are produced in lakes and streams on the LTBMU; roughly 7,000 lbs. of fish in streams and 81,900 lbs. in lakes.

Like wildlife management, fisheries management is a shared responsibility. States regulate harvesting, and the Forest Service has jurisdiction over the habitats. Lake Tahoe and Fallen Leaf Lake are the exceptions, however, as their habitats are managed cooperatively.

An active and highly developed watershed program in the basin has restored or improved habitat. Streambank stabilization, barrier removal, erosion control, and bridge construction not only reduce sediment entering Lake Tahoe, but decrease sedimentation of bottom gravels in the tributary channels, improving the quality of spawning habitat. Riparian vegetation enhancement also provides shade and cover.

Habitat Capability, Management Opportunities for Change

The RPA goal is to improve the capability of resident trout habitat by 20% by 1990. The environmental thresholds also call for enhancing stream habitat for resident and migratory species. Seventy to seventy-five miles of stream habitat on the LTBMU are available for improvement. Few, if any, acres of lakes are physically available for improvement. In general this habitat is low and medium quality in streams as identified in Table 3.8.

An intensive program of direct habitat improvement involving three to eight acres of habitat improvement each year coupled with moderate to high intensity watershed restoration programs would be necessary to realize the potential for habitat capability identified in Table 3.8. These efforts should result in increasing the habitat capability of streams by approximately 5600 lbs by years 30 to 50 of the planning period. This is a 6% increase in overall total fish habitat capability and an 80% improvement of current stream habitat capability.

Fish habitat improvement opportunities include removal and/or modification of barriers and diversions in spawning streams, improvement in instream and bank cover, improvement of stream bank stability, and nearshore fish habitat improvement at Lake Tahoe.

Another critical factor in maintaining and enhancing fish habitat is maintaining instream flows for all resident and migratory trout streams. Instream flows were measured basinwide in 1985-86 by teams representing Forest Service, California Fish and Game, and TRPA.

Importantly, the LTBMU will implement the "Rise to the Future" program of the Pacific Southwest Region. This program will help produce more fish through habitat maintenance and habitat improvement by the protection, restoration, and enhancement of fisheries habitat. This "Rise to the Future" program will be achieved through cooperative efforts with partners in fisheries.

7. Forest Pest/Integrated Pest Management

Several insects, diseases, and vertebrate animals periodically cause problems in the basin. Pest damage varies by year and place throughout the basin. Since 1979 pest related salvage has accounted for 50% (2.0 MMBF) of the annual timber harvest in the basin. Pest-related damage is often a result of a pest complex rather than the action of a single insect or disease. Pest complexes frequently involve, in addition to the pest, the condition of the vegetation (e.g. age, density, species composition), environmental factors (e.g. drought, freezing, air pollution, road salt), and the effects of management activity.

Insects and diseases occurring in the LTBMU were described in a 1971 TRPA - USDA Forest Service report Vegetation of the Lake Tahoe Region, A Guide for Planning. The most important forest insect pests in the basin are the Jeffrey

pine beetle, which attacks Jeffrey pine, and the Mountain pine beetle which attacks lodgepole pine. Historically, these bark beetles have caused localized single-tree and group mortality throughout the basin. Recently, unacceptable Jeffrey pine beetle caused mortality has centered around the south shore recreation complex (Estates, Kiva Beach, Camp Richardson Resort, and Fallen Leaf Campground). A suppression project was initiated in 1983 to mitigate the problem. In addition, the fir engraver beetle has periodically caused mortality and top-kill to white fir. Much of the bark beetle damage has occurred to trees in stands which were also affected by various combinations of overstocking, dwarf mistletoe, and Elytroderma disease.

The most important diseases in the basin include dwarf mistletoe, annosus root disease, and Elytroderma disease. The most important conifers infected by dwarf mistletoe include Jeffrey and lodgepole pine and white fir. Dwarf mistletoe is a parasite that causes growth loss and helps predispose its host to bark beetle attack. Western dwarf mistletoe infection in the Nevada Beach area was significant enough to warrant initiation of a control project in 1984. Annosus root disease has been found on Jeffrey pine and white fir in several areas in the basin. This disease decays the roots and lower bole of the host tree. Bark beetles frequently kill trees in disease centers. Freshly cut pine and fir stumps in developed recreation areas are treated with borax to reduce the chances of initiating new root disease infections. Elytroderma disease is prevalent in Jeffery pine in the Kiva Beach/Taylor Creek area. This disease kills year-old needles, deforms infected twigs and branches, and can cause mortality of infected twigs and predispose trees to bark beetle attack.

Ground squirrels, chipmunks, and other rodents can be a problem in campgrounds and other recreation sites. They sometimes cause damage to structures with their chewing and digging behavior and can also carry plague. The appropriate State and county health agencies are responsible for controlling plague problems. The Forest Service provides monitoring and reporting support in cooperation with the State and county agencies.

In the Lake Tahoe Basin, ozone values equalling the State standard for air quality (10 parts per 100 million) have been recorded on the north shore and at or near South Lake Tahoe, but their duration has been insufficient to cause measurable damage to conifers (growth loss or mortality). In 1979 and 1980, ozone injury symptoms were found in Jeffrey pine three miles south of Meyers on Highway 89 and at Luther Pass. The observed symptoms were slight to very slight, just at or below the threshold for damage.

The LTBMU will continue to utilize an integrated pest management (IPM) approach to reduce and/or maintain pest-caused losses at acceptable levels. This approach calls for the integration of the pest management activities of prevention, detection, evaluation, and suppression into resource management planning and actions. This includes consideration of pest information in the development and implementation of silvicultural prescriptions. The goal of IPM is to prevent and/or reduce resource losses which the resource manager finds unacceptable in terms of their impacts on human activities and resource management objectives. In the selection of appropriate control methods, all methods including chemical, biological, mechanical, manual, and cultural are considered on a case-by-case, project level basis as required by NFMA, NEPA, and RPA regulations. The preferred pest management method or methods are selected on the basis of biological effectiveness, cost effectiveness, human

health, and environmental safety. In the basin, most pest management activities have been in heavily used developed recreation sites like the south shore recreation complex because of the importance of vegetation to the character of the site.

Under the IPM approach, the level or intensity of pest management practices will vary to meet resource management emphasis and targeted outputs. For example, when activities involve high levels of vegetation management and high resource outputs, the opportunity for the implementation of high (intensive) levels of IPM will be required and/or provided. High levels of IPM would involve frequent surveillance and detection activities and reporting, a high level of pest management training for forest personnel directly involved in resource management, an increased number of site-specific biological evaluations and an increased likelihood, directly related to the high resource output targets, of the need for direct control against pests. In addition, the timely utilization of new methodologies (technology transfer) and close coordination with pest management research would be of increased importance. The need for a high level of IPM would also mean increased opportunities to integrate pest management considerations into resource management decision-making and to implement preventive actions, including vegetation management which should, through time, reduce the need for future direct control projects. Lower resource outputs and less vegetation management would require less frequent pest management activities and would also provide fewer opportunities to implement preventive strategies.

8. Geology and Groundwater

Geologic Setting:
The geology of the Lake Tahoe Basin has been influenced primarily by three factors: faulting, volcanism, and glacial action. Though other natural processes, such as weathering and deposition, continue to modify the landscape, these factors began forming the basin's distinctive landforms millions of years ago.

Located in the northeastern portion of the Sierra Nevadan range, the Lake Tahoe Basin is bounded by fault-block mountains. It is postulated that movement along fault lines created the graben, or down-dropped trough, that is now Lake Tahoe. Magma upwelled through the activated fault system. When cooled beneath the earth's surface, magma formed granitic rock, which underlies the entire Tahoe Basin and much of the Sierra Nevadan Range. The heat and pressure associated with the upwelling magma metamorphosed the sedimentary rock with which it came into contact, and folds of this metamorphic rock can be found within the granite.

Magma also erupted at the surface forming volcanic deposits. While remnants of such volcanism are evidenced throughout the basin, volcanic centers were chiefly associated with the north end of the lake where most rocks are of volcanic origin. Hot springs, cinder cones, and eroded necks of volcanos also exemplify this volcanic history. An important legacy of Tahoe's volcanic past is the natural dam at the outlet of the lake in Tahoe City. Mudflows of hot lava, combined with water and earth materials, solidified into andesite to form the current dam. Geologic evidence demonstrates that other volcanic dams, long

since eroded away, as well as an ice dam, have historically raised the lake level by several hundred feet.

Many of the spectacular landforms of today owe their origins to three major glacial events. For example, the outlet of Emerald Bay is bordered by glacial moraines. Interspersed between glaciers were interglacial periods distinguished by warming trends. Glaciers almost a thousand feet thick retreated, leaving cirques, erratics and glacial lakebeds in their paths. Perhaps the most significant aspect of glacial retreat was the melt water runoff. The water's erosive action picked up sediments and deposited them into the lake. Such depositions formed deltas, the most notable being the one on which sits the City of South Lake Tahoe.

Geologic Hazards and Resources:
Geologic issues center around potential hazards to people, the environment and structures, and geologic resources which can be developed and/or enjoyed. Geologic hazards include various types of landslides and slope movements (mass wasting), earthquakes and fault movement, and volcanic activity. Geologic resources include groundwater, rock and soil materials for construction purposes, and geologic Special Interest Areas. Snow avalanches will also be discussed here due to their similarity to land mass wasting.

Hazards:
In recent history, geologic hazards have played a small but significant role in altering the landscape and posing risks to human safety, the environment, and various types of developments. Of the various types of geologic hazards, landslide hazards, including rockfalls, debris slides, and rock/soil avalanches, occur most frequently and do the most damage on the LTBMU. Problems associated with landslides include stream and lake siltation (water quality), temporary stream blockages, decreased soil productivity, threat to human safety, damage to developments, disruption of fish habitats, and impacts on visual quality.

The threats to the water quality of Lake Tahoe and to human life are especially significant. In the mountains around the lake, recreational operations, roads, and residences are located in areas geologically most susceptible to mass wasting activity and snow avalanches. The basin was mapped for the potential of such natural hazards in 1974. This data will be supplemented in the future and information will be available for project level planning.

In the basin, mass wasting commonly occurs within a few types of areas. Steep alpine highlands are characterized by rock and soil movements, especially when these areas become saturated by heavy precipitation or snow melt. They are also prone to rockfalls on steep cliffs and in unconsolidated (glacial) materials. Steep canyons at lower elevations, where soils may be somewhat thicker and more developed, can exhibit slide activity on their slopes or in stream channels. Cuts and fills associated with road building and excavation for construction projects are highly susceptible to slides and rockfalls, especially when slopes are oversteepened, materials are loosely consolidated, and rock units are highly fractured or jointed.

The types of geologic and geomorphic factors which affect the slope stability of the basin include: steepness of slope, structural and weathering characteristics of rock formations (especially degree of consolidation of soil

and rock units and fractured or jointed rock units subject to freeze conditions), and the amount, timing and duration of periods of precipitation (and its effects on fluctuating groundwater levels and earthquake shaking). Man can affect land stability by oversteepening slopes with cuts and fills and by manipulating vegetative cover.

New activities, or conditions, such as timber harvesting, road excavation, mining operations, burned areas, etc., can reactivate existing landslides or trigger new landslides. The greater the activity level in areas sensitive to land instability, the higher the likelihood of altering the equilibrium of the slopes and thereby causing mass movement. A good example is the thirty-year-old cutslope slide at Emerald Bay, which has suffered numerous secondary slides in recent years. The 1983 fillslope slide on Highway 50 near Glenbrook also highlights the need for careful geological engineering in the basin.

Seismic hazards pose a potential threat to the basin. Earthquakes and faulting activity have played a major role in development of the basin and are still factors in its ongoing evolution. Many of the postulated faults which have allowed down-dropping of the central portion of the basin are covered by more recent volcanic, glacial and sedimentary deposits. Some of the faults are still active. Geophysical studies have identified large areas of massive underwater slumps and nearly vertical fault scarps in the most recent bottom sediments within Lake Tahoe, caused most likely by fluctuating lake levels and earthquake shaking.

Fault scarps along the eastern front of the Carson Range were probably formed by destructive earthquakes of approximate magnitude 8 to 8 1/2 on the Richter scale during geologically recent, if not historic, time. A number of moderate to high intensity quakes occurred near or in the basin in the 1800's. Since 1916 only earthquakes of intensity less than 5.0 have been recorded in the basin. Geologists feel there is every reason to believe that great and destructive earthquakes will occur again sometime in the future.

The basin is adjacent to two areas of historically moderate to high earthquake activity, the Sierra Nevada frontal fault and Carson Valley on the east, and the Truckee basin and Mohawk and Sierra Valleys to the north. As these areas are considered active, the maximum seismic event for the Lake Tahoe Basin is estimated to be 7.5 Richter magnitude. Potentially damaging earthquakes (5.5 or higher) could affect structures, especially those on soft wet ground, thick alluvial deposits, and areas below unstable slopes. The dam on Lake Tahoe and other dams could sustain significant damage. Bridges and highways could also be affected. If a potentially damaging earthquake occurred during mid-winter, avalanches could result, increasing structural damage and blocking roads. Human lives could be at risk.

The volcanic rocks in the northern portion of the basin indicate past volcanic activity, but do not define the level of volcanic hazard. Most of the volcanic mudflow deposits appear to have been erupted over two million years ago, although thinner flows, ash deposits and cinder cones have formed as recently as 6-7000 years ago. The possibility of a volcanic eruption in the area is unknown. Impacts from volcanic activity in adjacent areas are considered possible.

The basin is adjacent to several areas which have displayed evidence of volcanic activity within the last 2,000 years. Mt. Lassen has erupted more recently than any other vents in the region (1914-1921); however, attention has recently been focused on the Mono Basin-Long Valley region following the series of earthquakes in 1980. The Lousetown region, located near the north end of Lake Tahoe is considered potentially active rather than active, due to lack of activity within the last 2,000 years. Although the probability of an eruption is not known, the Mono Basin-Long Valley region appears to be the most likely location for an eruption which could affect the Lake Tahoe Basin. The most probable volcanic hazard to the Lake Tahoe Basin would be the effects of a thin ash-fall layer dispersed by an eruption in the Long Valley region. The effects of such an event include stream and lake sedimentation and minor inconvenience to people and animals.

Snow avalanches behave similarly to some types of mass wasting activity and are potential threats to human safety and recreational operations. Winter travel and winter sports require significant alteration of the topography and consequently contribute to the hazards of avalanches. Avalanches have not caused significant damage on the LTBMU in the recent past. Their hazard zones have been mapped on the basis of topographic conditions and they will be considered in project level planning. However, specific guidelines for the management of these hazard areas have not been developed.

Groundwater Resource

While the quantity and quality of surface waters (streams and lakes) of the Lake Tahoe Basin have been measured and studied for years, groundwater supplies and characteristics remain relatively unknown. In recent years, this little understood resource has become increasingly important in the issues of domestic water supply, maintenance of instream flows and effect upon lake water quality.

The Interstate Water Compact treats surface and groundwater sources as interconnected. Therefore, groundwater is considered as part of the waters available for allocation (see the water quantity section of this chapter). Approximately 50 acre feet per annum (or about 6% of present forest water use) is withdrawn from wells for domestic use on national forest land. Most serves recreation residences in California. Groundwater use is likely to increase (in place of surface sources) to reduce purification required for domestic use2 Data is not adequate to determine if groundwater availability will constrain proposed Forest Service development, nor whether forest management activities could be impacting groundwater recharge areas.

Water supply from both surface and groundwater sources may become a limiting factor on urban development in the basin, primarily due to provisions of the Interstate Water Compact. The TRPA, Forest Service, and other agencies are concerned about pumping additional groundwater from riparian areas because that may reduce water levels, both above and below the ground. The maintenance of instream flows is closely linked to groundwater levels. Instream flows are critical in maintaining riparian resources such as fisheries, plant composition, water quality, and the associated nutrient uptake capabilities. Further study is needed as part of a Geologic Resources Inventory to identify major aquifers and recharge capabilities. It is anticipated that the LTBMU may in the future need to be a cooperator in development of groundwater management plans.

Rock and soil materials. Although potentially abundant within the basin, rock and soil material are primarily imported from private sources outside the basin. Sources on the LTBMU include waste from the Emerald Bay slides stockpiled at Bayview borrow pit, a widened roadcut at Spooner Summit where material from the Glenbrook slide is stockpiled, material stockpiles at the old Meyers landfill, and a talus slope north of Tahoe City on Highway 89 which has been quarried in the past and is currently planned for rehabilitation. Environmental constraints restrict development of new materials sources. Costs of importing material from long distances encourage prudent use and stockpiling of surplus materials from construction or restoration projects. Rock and soil materials, also known as "common variety materials' or "saleable materials", are also discussed under the Minerals section.

Although there are no formally designated geologic Special Interest Areas on Forest Service lands, there are many areas of geologic and geomorphologic interest on the LTBMU. Cave Rock on the East Shore and Eagle Rock on the west shore provide clear evidence of ancient volcanic activity. Good examples of glacial moraines, outwash, till, and glacial landscapes are present in the southwest corner of the basin. Glaciated volcanic flowlands are well represented in Ward and Blackwood Canyons on the west shore. None of these features are known to warrant special designation for protection relative to Forest Service land management activities.

9. Historical and Cultural Resources

Cultural resource management was not identified as a major issue in the forest plan. The unit is charged with managing cultural resources as nonrenewable resources and with maintaining their scientific, historical, and social integrity.

Basic direction for the LTBMU cultural resource management program is provided by a number of laws, regulations, and executive orders which have been incorporated into FSM 2361 in the form of objectives, policies, and delineated responsibilities. Briefly summarized, the LTBMU is charged with conducting an inventory of resources located on national forest lands, evaluating resources for their eligibility for inclusion onto the National Register of Historic Places, and managing those resources according to their historic, scientific, or social significance.

As part of the management process the LTBMU maintains formal working relationships with the California Office of Historic Preservation and the Nevada Division of Historic Preservation and Archaeology, as specified by 36 C.F.R. 800. Relationships with others include the local educational institutions, historical societies, the Tahoe Regional Planning Agency, individual State agencies, and individual private parties interested in local history and prehistory. Additional coordination will occur with the State cultural resource plans upon their completion and implementation.

Consultation with local American Indian groups (specifically the Washoe Tribe of Nevada and California) occurs whenever management decisions may affect cultural resources of interest or concern to that group. Those resources may include archaeological sites and artifacts, religious areas, or areas

traditionally utilized for specific purposes by American Indians. The LTBMU is directed by Federal policy (through the American Indian Religious Freedom Act) to ensure that its actions, policies, and procedures do not infringe upon American Indian religious freedom.

Current management objectives for cultural resources include the improvement of public awareness of their cultural heritage. This has been partially accomplished through opening of the Tallac Historic Site to the public in 1981. It will be furthered through plans for development of a cultural center proposed by the Washoe Tribal Council on a site near Taylor Creek or through other means of reestablishing their presence at Lake Tahoe. The LTBMU has provided consultation and assistance to the Washoe during their planning process for the center which is documented in several Environmental Assessments prepared for the proposal. A permit application is currently being reviewed.

Based upon current information from a site near Spooner Lake, the earliest known occupation of the Tahoe Basin occurred at a site near Spooner Lake approximately 9,000 years ago. Additional information has been developed which leads Elston (The Archaeology of the Tahoe Reach of the Truckee River, University of Nevada Reno, 1977) to suggest several phases of the cultural sequence which indicate the changing cultural and use patterns through time. They include the Martis, from 4000-1500 BP (before present), and the Kings Beach, dating from 800 BP to historic contact. The Martis period is possibly associated with ancestral Washoe, with the Kings Beach being similar to the Washoe culture as represented in the existing ethnography.

Historic cultural resources in the Tahoe Basin are much more visible than those from the prehistoric period. The earliest are the pioneer wagon routes, such as the Hawley Grade National Recreation Trail. Logging became the dominant activity in the basin in the late 1800's in support of the Comstock mining in nearby Virginia City, Nevada. Evidence of this activity can still be seen in the remains of railroad grades; log flumes, chutes, and inclines; sawmill sites, and the camps and cabins occupied by the American, European and Chinese mill and woods workers.

After the logging and lumbering intensity subsided, the basin became a recreational attraction, initially to the wealthy who first stayed at grand hotels such as the Tallac and Tahoe Tavern, but later built large rustic, though elegant, summer estates like those found at the Tallac Historic Site. As access to Lake Tahoe improved through construction of improved transportation routes and facilities, a thriving resort trade developed based on a more middle class clientele. Offering a mix of lodge, cabin, and camping facilities with various outdoor-oriented activities, these resorts prospered into the 1960's and 1970's, at which time several of them were acquired by the Forest Service.

Cultural resource inventory of national forest lands in the Tahoe Basin began in 1972, although formally documented surveys did not begin until 1976. Due in part to the small number of ground-disturbing projects initiated on national forest lands, the inventoried acreage has remained low, especially compared to total LTBMU acreage which has continued to increase, most recently with the emphasis provided by the Santini/Burton program. Approximately 10,000 acres, or seven percent, of the LTBMU has been surveyed with approximately 200 sites noted or recorded. Priorities for future surveys will be closely tied to

project activities such as timber sales. It is anticipated that the greatest need for additional surveys will occur in the northern portions of the basin with timber cutting activities proposed for those areas.

The Pope, Baldwin, and Valhalla Estates have been listed on the National Register of Historic Places. Nominations are being prepared for Camp Richardson Resort, which has been determined eligible by the California SHPO and Glen Alpine Springs Resort. Several other properties have been listed on the National or State Registers which are privately-owned but immediately adjacent to national forest lands. Additionally, there are several unevaluated Forest Service properties which may be eligible for inclusion on the register. These include several prehistoric habitation sites, the Round Hill Pines Resort, the Tallac Resort Site, the Newhall House at Skunk Harbor, the Meiss Cabin, the Upper Truckee Guard Station, and Angora and Zephyr Lookouts. Management activities involving these properties will generate additional cultural resource workload through required evaluations and consultation with State Historic Preservation Officers.

Pending completion of the LTBMU Cultural Resource Overview, a number of different sources are used to provide information and perspective for cultural resource management activities. They include various published references and manuscripts, previously completed archaeological surveys (public and private sectors), forest cultural resource files and collections, other professionals in the fields of history, archaeology, and anthropology, the State Libraries of California and Nevada, and archival material at the Universities of Nevada, Reno, and California, Berkeley. Several works which provide valuable information on a forest-specific basis include: A Preliminary Archaeological Reconnaissance of Fallen Leaf Lake by Davis, et al; The Archaeology of the Tahoe Reach of the Truckee River by Elston, et al; "An Ethnohistoric and Ethnoarchaeological Study of the Washoe Cemetery at Camp Richardson, Lake Tahoe by Fowler, et al; The Saga of Lake Tahoe, Vol 1 and 2 by E.B. Scott; The South Lake Tahoe Estates, an Historical Study by Townley; The Lake of the Sky, Lake Tahoe, by G.W. James; and Archaeological Investigations at Tallac Point, South Lake Tahoe, CA, by S. Lindstrom.

Basic criteria used in assessment of relative importance of cultural resources on the unit include the national register criteria but examples typifying local social, cultural, and economic evolutions within the basin are important and desirable to maintain for interpretive purposes. Additionally, a set of draft Tahoe Regional Planning Agency ordinances have been proposed dealing with historic preservation and may result in additional guidelines being considered in the course of coordinating Forest Service project activities with TRPA.

The LTBMU presently does not have a cultural resource overview or a sufficient quantity of surveyed acreage to consider the data base as "adequate." The unit is charged with managing cultural resources as nonrenewable resources and with maintaining their scientific, historical, and social integrity. Since most known prehistoric sites have been heavily impacted by subsequent activities from the historic period, those sites with a potential for yielding additional information should be protected from further impacts whenever feasible, since they represent the remainder of that portion of a limited non-renewable resource. Important aspects of the historic resource remain unevaluated, examples being the Chinese sites from the early logging and the tree carvings

produced by early Basque sheepherders. Completion of the cultural resource overview would provide a first step to remedying many of these problems.

10. Lands

The lands program is made up of five parts; adjustments, landline surveys, special uses, withdrawals, and rights-of-way.

a. Landownership Adjustment

Generally, land adjustments are intended to improve resource management by consolidating national forest ownership or disposing of isolated parcels. Prior to 1965, the principle means of adjustment was by land exchange. Since 1965 the emphasis has shifted to purchase through the Land and Water Conservation Fund (LWCF), with about 46,000 acres acquired at a cost of $76.8 million. Much of this acquired land has significant lakeshore, recreational, open space, or wildlife value. Current land exchange and LWCF purchase priority is for lake and stream frontage, sites for recreation development, and lands where development would adversely affect national forest lands or water quality.

As awareness and knowledge expanded about the effects development has on the lake, concern for its future became more widespread. It became apparent that new subdivisions and development on environmentally sensitive land within existing subdivisions should be prohibited. Action by regulating agencies has been partially successful. A permanent solution, which would help achieve the goals for Lake Tahoe, was to authorize public acquisition of these environmentally sensitive lands. This was the basis for PL 96-586, the Santini/Burton Act signed by the President in December, 1980. As required by the act, environmentally sensitive land was identified and a plan developed to purchase or otherwise acquire the land. Approximately 8,000 environmentally sensitive building lots and numerous larger parcels of land totaling 21,220 acres were identified. Estimated cost of this program was about $150 million. Funds for purchases are to be generated from sale of Federal land in the Las Vegas area. Detailed direction for implementation of PL 96-586 is the Forest Service Land Acquisition Plan, 1982 and the Acquisition Plan Maps.

Through July 1, 1987, 1,804 parcels totalling 7,833 acres with a value of $39.7 million have been acquired through the Santini/Burton Act. Donations of another 130 parcels of 376 acres with a value $1.37 million have been received.

The Santini/Burton Act authorizes acquisition of land not typically managed by the Forest Service. Lots within developed communities will present the greatest difficulties. For acquired parcels determined unsuitable for Forest Service administration, the act authorizes them to be transferred to an appropriate State or local government for administration. Where such transfers are made, the Act requires restrictions to protect the environmental quality and the public recreation use of the land. Parcels eligible for transfer will be determined on the merits of each case until criteria is developed.

Acquisition programs administered by the States of California and Nevada should help reduce the number of privately owned environmentally sensitive lands in the Tahoe Basin. Since 1985, the California Tahoe Conservancy has been

acquiring land with funds from an $85 million bond act. By 1988 the State of Nevada expects to begin acquisition with about $23 million authorized by a similar program.

In addition to environmentally sensitive land currently eligible for acquisition under the Santini/Burton Act, there are other lands needed for national forest purposes. These lands must be acquired through land exchanges or Land and Water Conservation Fund purchases. Such acquisitions will help achieve goals for recreation and other resources and will facilitate management efficiency.

b. Landline Surveys

Posting of national forest land supports a variety of resource programs and helps prevent and control unauthorized occupancy of national forest land. The lands of the basin were originally surveyed in the 1860's and 1870's. Some of these original surveys were fraudulent or of poor quality. During the period of rapid urbanization of the 1960's and 1970's, many private surveyors were active in the area. Numerous conflicts between surveys have occurred, leading to a number of cases of unauthorized occupancy and use of national forest lands. Many of these cases involve building a fence or stacking firewood on national forest land. More serious cases involve homes or businesses constructed on the national forest. In 1977, a Forest Service study indicated an average of three unauthorized occupancy cases per mile of national forest boundary in urbanized areas. At Kings Beach, there are over 30 cases per mile. There are approximately 300 miles of property line between the national forest and other ownerships. At three unauthorized occupancies per mile of below standard boundary line, this could produce 780 cases to be resolved. The Santini/Burton Act for land acquisition is increasing the backlog of survey needs. The purchase of residential lots significantly increases the amount of boundary to be surveyed.

Another purpose of locating forest boundaries is to support resource programs to prevent the Forest Service from unintentionally authorizing uses or expending federal funds on private land.

Through 1986, 40 miles of national forest boundary had been marked and posted to standard with another 26 miles projected for completion in 1987. The average cost of landline location in the basin is $5,300 per mile. With 230 miles of backlog, this amounts to $1,219,000. Table 3.10 shows the annual needs to complete the backlog by 2000 and 2020.

Table 3.10 Landline Location Backlog

	Miles/Year	Necessary Funding
Level to complete backlog by 2000:	18	$95,400
Level to complete backlog by 2020:	10	$53,000

The average cost of resolving unauthorized occupancies ranges from $500 to $1000 per case. Since there are an estimated 780 cases, this could total up from $390,000 to $780,000.

The RPA goal is to complete all property line surveys by the year 2020 and to resolve existing unauthorized occupancy cases by the year 2000. A program to complete this work on schedule is being developed.

c. Non-Recreational Special Uses and Utility Corridors

The LTBMU administers 113 nonrecreational special use permits. Most of these support urbanization within the basin and not national or regional needs. These occupy over 900 miles of rights-of-way and over 1,000 acres of national forest land. Table 3.11 displays the categories and acreage of permits.

Table 3.11 Special Use Permits by Category

Category of Permit	Number of Cases	Acres Under Permit	Miles of Right-of-Way
Agriculture	1	5.8	0.0
Community Uses	17	165.8	24.1
Industrial Uses	3	24.3	0.0
Transportation	36	563.6	113.4
Utilities & Communications	27	214.2	52.6
Water Uses	29	44.2	723.2
Totals	113	1,018.0	913.3

In addition to the above permits, there are many miles and acres of public service facilities on acquired lands. These are usually guaranteed under deeded easements from the original landowner and are not under permit. These often contribute to the impacts from national forest lands. However, the Forest Service has limited authority to require correction of these impacts, and occasionally must spend taxpayer's dollars to correct them.

Increasing urban development generates the greatest demand for special uses of national forest land. Future demand will probably be for utility lines, communications facilities, and access to private land. Sierra Pacific Power Company's Master Plan calls for five new transmission lines and five upgraded ones to meet future service demand. Most of these lines would have to cross national forest land. (Sierra Pacific Power Company, 1978) There is some interest in small hydroelectric facilities.

The Western Utility Group identified general locations for future corridor needs in California and Nevada. Two were identified in the basin; one generally following Highway 50 through south shore and one in the vicinity of Carson Pass on Highway 88. (Western Utility Group, 1980)

The Sacramento Municipal Utility District and Sierra Pacific Power Company are looking for a route for a high voltage transmission line to link the Sacramento

and Reno service areas. This would allow them to exchange surplus power and reduce the need for additional generating plants. An intensive evaluation of potential routes in the vicinity of Interstate 80 (north of Lake Tahoe) and Highway 50 through the southern end of the basin has been undertaken. Echo Summit, Daggett Pass, and Luther Pass were identified as "windows" for this study. Though a final decision has not been made, it is apparent that the Interstate 80 corridor is the preferred location.

The only significant change needed in current land use direction is in the level of detail. More specific direction is needed on handling applications for utilities, electronic sites, hydroelectric dams, etc.; on how to determine land coverage; on how to assure capacity (land coverage) for essential public services before the capacity is used for private land development; and for determining priorities among competing special uses and resource uses.

d. Withdrawals

A withdrawal is the withholding of an area from application of the general land laws (including the mining laws). The purpose is to limit activities in order to maintain other public values in the area or to reserve the area for a particular public purpose or program. On the LTBMU, there are 31816 acres withdrawn from mineral entry.

The Forest Service will pursue withdrawal from mineral entry for areas needed for administrative sites, developed public recreation areas, special interest areas, wetlands, and other areas highly valued for use by the public.

In compliance with the Federal Land Policy and Management Act, PL 94-579 (Section 204, FLPMA), administrative withdrawals will be reviewed for need to determine whether or not the withdrawal should continue and for how long. This review is to be completed by October 21, 1991.

e. Rights-of-Way Acquisition

Frequently administrative, permitted, and recreational use of national forest lands, resources, or services are precluded because there is no public right-of-way to allow access. Existing administrative, permitted, and public access into the forest along the urban fringe often involves trespass on private land. These areas are often the most suitable for timber management, or dispersed recreation, or are in need of treatment for pests, or have fire problems.

It is estimated that 13 miles of road and 17 miles of trail rights-of-way are necessary. Some needs for rights-of-way may be met by land purchases.

11. Minerals

The Tahoe Basin is located between the Comstock Lode in Nevada and the Gold Rush country in the western Sierra foothills. Although there were a few mines actively worked in the past, at present there are none. Increased exploration can be expected if the area becomes cost effective relative to other sources.

Laws and regulations that are most significant to the management of minerals in the basin are:

Locatable Minerals -------	Mining Law of 1872 (36 CFR 228 Subpart A) Minerals Resources on Weeks Land, 1917 Multiple Use Mining Act, 1955 Mining Claim Rights Restoration Act, 1955 Wilderness Act, 1964 (36 CFR 293)
Leasable Minerals --------	Mineral Leasing Act, 1920 Mineral Leasing Act for Acquired Land, 1947 Geothermal Steam Act, 1970 Federal Land Policy and Management Act, 1976
Mineral Materials --------	Materials Act, 1947 (36 CFR 228 Subpart C)

An estimated 55 mining claims have been recorded of which 26 were declared abandoned by the Bureau of Land Management. These claims give indication of interest but do not necessarily mean immediate or future development.

Lands acquired under the Santini/Burton Act have acquired land status and are thus not open to entry under the mining laws.

Outstanding rights to the mineral estate have been reserved by previous owners of the land on about 5,500 acres of national forest land. About 10% of acquisitions under the Santini/Burton Act program have mineral reservations.

About 2,500 acres have been identified as having a high probability for the occurrence of metallic mineral resources. Over 30,000 acres have a low to moderate probability for metallic minerals. The remainder is considered to have an unknown, but most likely a low probability. Uranium prospects have been reported, but tests have not shown any radioactivity. This is the only known critical or strategic mineral identified in the basin.

The BLM has classified much of the north shore as being "prospectively valuable" for low-temperature geothermal energy suitable for direct heating. Because of the basin geology, the east side of the lake has a moderate probability for similar opportunities. No geothermal development has occurred within the basin, although a hotspring on private land is utilized for recreational and healing purposes.

The basin has no known occurrences of leasable minerals such as oil, gas, sodium, potassium, phosphate, or bitumen, and the probability of these being found is low. Hydroelectric energy is discussed in the facilities section.

On December 31, 1983, Desolation and all other wilderness areas were withdrawn from future mineral entry. Existing valid rights will be honored, but none are known to exist in Desolation Wilderness. Some recreation and administrative sites are also withdrawn. Prospecting may continue in withdrawn areas, provided it is compatible with the designated uses.

Access for mineral exploration and development is generally unrestricted. The exception is in specially classified or designated areas where surface disturbing activities are highly restricted to maintain their integrity. Within the basin, however, there is concern that mineral and energy production would seriously effect water quality and other environmental and recreational

values. Therefore, low emphasis is placed on mineral and energy development, and many areas of high recreational value have been recommended for withdrawal from mineral entry. In its regional plan, the TRPA favors prohibitions on mineral extraction in order to protect environmental conditions and other values considered most significant to the area.

The Forest Service and others use a variety of mineral materials in road construction, asphalt manufacture, erosion control, and as vehicle control barriers. The LTBMU utilizes approximately 834 tons of mineral materials annually, primarily for watershed restoration and road maintenance projects. Table 3.12 shows the type and amount of materials used by the Forest Service from 1981 to 1983. Although many potential sources of mineral materials exist on the LTBMU, water quality concerns have prevented removal of any significant amount (less than one percent of average annual Forest Service use and negligible use by others).

Table 3.12. Mineral Material Used by the LTBMU

Material	Average Annual Use (tons)
Sand	65
Gravel	419
Rock Aggregate	189
Cobble (rip rap)	106
Boulders	55
Total	834

Future use of mineral materials by the Forest Service will probably be similar to current use, or about 800 tons annually. Watershed restoration and road maintenance activities will continue to be the major projects on which these materials are used. Annual Forest Service use represents close to one percent of total annual mineral material use within the Lake Tahoe Basin. Availability of materials is expected to be fair to good from outside the basin; however, costs may increase due to longer trucking distances. Most material is expected to be imported, largely from the Carson Valley area. Investigation of sources from the Tahoe and Eldorado National Forests may be appropriate. Further discussion of rock and soil material is under the geologic section.

12. Prime Agricultural Lands, Wetlands, and Floodplains

Because of the short growing season and poor soils, no areas in the basin are considered prime agricultural lands. Wetlands and floodplains (which require special management under executive orders) are discussed under the riparian areas and stream environment zones section and the water section of this chapter.

13. Range

For nearly 130 years, the Lake Tahoe Basin, with its crop of forbs and grasses, has been an easily accessible grazing area. Over the last 30 years, rapid urban and recreational development have reduced the area available for livestock grazing in the basin. The LTBMU manages three cattle allotments, two horse pastures, two pastures for Forest Service horses, and part of two sheep allotments administered by the Tahoe National Forest. Current plans allow 1,400 animal unit months (AUM). Actual use is about 1,200 AUM per year.

All allotments on the LTBMU operate on the extensive management strategy. Techniques such as fencing and water developments are used to achieve relatively uniform distribution of livestock and full utilization of the resource. However, no attempt is made to increase forage production by practices such as seeding.

There appears to be no need to change this approach at this time. Overall the condition of the rangeland is considered good, and soil and vegetation trends are stable. This assessment is based on medium to high quality data in the cattle allotments, but on low quality data elsewhere.

There are potential conflicts with grazing and water quality, recreation, wildlife, and fisheries. Streams are monitored downstream from allotments, and there have been isolated instances where water quality standards were not met. Even then, the cause was not certain. Season of use, density of livestock stocking, and other controls are being used to protect streambanks and riparian areas.

All three cattle allotments are in unroaded areas. While some recreationists like the "Old West" image of grazing, others object to cattle and their impacts. Problems such as harassment of cattle by dogs, shooting, and vandalism are increasing.

All lands that can produce at least 50 pounds of usable air-dry forage per acre per year are considered capable rangeland. On the LTBMU, all but 23,218 acres meet the capability criterion. All of the capable lands are considered tentatively suitable except where slopes exceed 50%, where soils are highly erodible, or where watershed restoration areas have not yet reached a satisfactory degree of stabilization. This leaves 115,093 acres of tentatively suitable rangeland which is capable of producing 3,800 AUM. Except for transitory range in existing allotments, few of the tentatively suitable, but currently unused, acres of rangeland could be grazed without fencing and other measures to prevent livestock entering urbanized areas, recreation sites, or environmentally sensitive land.

The national demand for range grazing that the Forest Service is expected to meet is projected to increase 46% over 1981 levels by the year 2030. (President's Revised Statement of Policy March 30, 1981.) The LTBMU share of this increase would raise targets to 2,250 AUM.

National forest range costs less than half of most competing feed sources. Range outputs from all of the national forests in California account for about 3% of total range forage supplies in the state, and output from the LTMBU is less than 1% of total supply in local markets. Locally there is demand for

increased grazing by cattle, sheep, and horse permittees, as well as considerable demand by individual local equestrians for backyard or neighborhood pasture and corrals on national forest. Therefore, the statewide and local demand for range forage from the LTBMU will exceed the productive capacity of the unit.

14. Recreation

Recreation is probably the most significant land allocation and resource production issue facing the LTBMU and one in which nearly all the social groups in the Lake Tahoe Basin have a keen interest. How recreational issues are settled will also affect traffic, air and water quality, water rights, sewage export, visual quality, and the local economy. Often providing for facilities and opportunities for the public at large is in direct conflict with the desires and perceived needs of local residents whose property is near or adjacent to the national forest.

Appropriate levels of use must be determined that do not degrade the resources or the desired recreation experience. Because the basin has a limited carrying capacity, provision for more recreation use on national forest lands has been negotiated with the TRPA as part of the public's "fair share". It is intended that this "fair share" become a stated goal or objective for recreation development and use in both the forest plan and the TRPA Regional Plan.

a. Developed Recreation

Recreation facilities on national forest lands in the Lake Tahoe Basin fall into two groups: sites developed and operated by the Forest Service (developed public), and sites developed and operated by permittees (developed private). Downhill ski resorts are discussed separately from the other privately operated sites under winter sports.

The LTBMU operates six campgrounds, five swimming beaches, four picnic areas, and four interpretive sites with a combined capacity of 7,650 people at one time (PAOT).

During the busiest part of the summer, Forest Service campgrounds are filled to capacity. Over the entire managed season, however, average use is below the practical capacity of the sites. This means that some future demand could be accommodated at existing sites before any new construction was required. The Forest Service sites generated approximately 434,000 recreation visitor days (RVD) in 1982.

The LTBMU administers nearly 600 special use permits for recreation residences on 23 tracts. The largest of these are at Echo Lakes, Echo Summit, Fallen Leaf Lake, Spring Creek, and along the Upper Truckee River. These areas include some of the best recreation opportunities in the Lake Tahoe Basin. Future use determinations have shown recreation resident use is still an appropriate use in almost every case, and that there are no conflicts severe enough to warrant termination of permits.

Some of the tracts are on environmentally sensitive land that is now considered to be unsuitable for development. Relocation or removal of the use has been

considered to protect water quality. However, current policy is to manage the use to avoid increasing the level of activity and to mitigate adverse effects. Some of the recreation residents were granted waivers to the requirement for complete sewage export. Tracts that were sewered were occasionally done at federal expense to guarantee management flexibility in the future.

The LTBMU also administers permits for six resorts, three organization camps, two stables, and one campground operated by the California State Parks. All are important assets for providing public outdoor recreation. Three of the major resorts, Camp Richardson, Zephyr Cove, and Meeks Bay, were acquired by the Forest Service to keep shoreline open to the public. Otherwise they would have undergone commercial or residential development. All three of these were purchased in a run-down condition, and permittees have had economic difficulty because of high maintenance costs. The public has been very vocal about the high value of these resorts.

Collectively, recreation special use permits generated 606,000 RVD in 1982 (not including ski resorts).

Demand for developed recreation on the LTBMU is projected to increase by the year 2030 to over 1.6 million RVD a year (not including skiing). Some of this projected participation can be accommodated through higher utilization of existing facilities. To satisfy the remainder would require development of new sites. However, some new construction would be needed immediately to handle peak day use. There is ample national forest land suitable for development. Suitability is defined by flat, low erosion hazard land, close to existing roads and utilities, and near water oriented attractions.

The TRPA Regional Plan acknowledges the need to provide for meeting the demand for outdoor recreation and has set capacity aside for it. This capacity is recognized as the "fair share" for this purpose. It may be the best assurance that opportunities for meeting outdoor recreation demands will not be lost to the more rapidly occurring private land development.

The Forest Service is not the only provider of outdoor recreation facilities. State and local agencies and the private sector also manage campgrounds, resorts, ski areas, trails, beaches, and other types of recreation improvements. The TRPA Regional Plan is the closest approach to coordinated recreation planning that we find among the agencies of the basin. Further cooperation will be required, particularly among the State parks and the Forest Service.

Public agencies and business organizations have expressed interest in providing one-stop visitor information centers at major entrances to the Lake Tahoe Basin where visitors could conveniently find maps, trail guides, lodging information, and reservation services. Visitor centers have been proposed in Tahoe City, at Spooner Lake, and in Meyers. Some or all of these facilities may be located on national forest land. For efficiency it has been proposed that they be managed on an inter-agency basis where possible. The visitor center at Tahoe City is the nearest reality, with a joint California State Parks/LTBMU facility proposed on national forest land near the Truckee River.

Natural and human history have been interpreted for the public at sites like the Lake Tahoe Visitor Center and the Tallac Historic Site. Interpretation of

national forest management activities and the complex issues of the interrelationships of human and natural systems at Lake Tahoe have been emphasized. Interpretive programs of all types represent a popular, well attended recreation opportunity for visitors to the Tahoe Basin. There are opportunities to better orient visitors to the recreation opportunities present.

The TRPA Plan calls for the Forest Service to share the capital improvement expense necessary to reduce Tahoe's vehicle-miles traveled by 10%. The cost to the Forest Service is estimated to be $1,000,000 over a 20-year period to be spent on trails for bicyclists and pedestrians and to help with a program that educates and encourages people to use alternatives to the automobile for their modes of transportation. This is in addition to the mitigation required for new projects.

b. Dispersed Recreation

Total dispersed recreation has averaged just over 1 million RVD over the past six years. About 5% of this use has been from activities associated with wildlife and fish, primarily fishing. The current plan calls for increasing dispersed recreation opportunities. Projected participation for all dispersed recreation including wilderness is estimated to reach 1.7 million by the year 2030.

Nearly half the current use occurs because of the existence of State and county highways and of local communities. These types of use, such as driving for pleasure, sightseeing, jogging in the woods, or visiting the shoreline of Lake Tahoe occur without any inducement by the Forest Service. Typically, the means available to the LTBMU to increase dispersed recreation involve improving public access: building roads, trails or parking, acquiring rights-of-way, plowing parking for snow play in the winter, etc. (see facilities section for a discussion of trails.) Some opportunities exist to increase wildlife use by creating more early successional stage habitat by timber management and other wildlife projects. This could increase both consumptive uses, like deer hunting and non-consumptive wildlife viewing. Fishing may also be increased slightly through habitat enhancement projects or restoration of disturbed fisheries.

Of the twenty or so places in the Tahoe Basin that receive significant use by hikers, only two are adequately provided with developed parking and accessory trailhead facilities. The rest of the trailheads are dirt turnouts on the shoulders of roads. Soil erosion, adverse visual quality impacts, and highway safety problems are usually associated with these undeveloped trailheads.

Parking and access for cross-country skiing and other winter sports is limited. State and county highway departments plow mostly roadways and a few emergency turnouts. The Forest Service occasionally plows a few developed parking sites. The California State Sno-park program plows and maintains some of the most popular parking areas for dispersed winter sports. Because this is a rapidly growing part of the total use of forest lands in winter, the LTBMU anticipates increased competition for parking, crowding, and conflict between nonmotorized and motorized recreationists.

Rights-of-way are another obstacle to accessing the national forest. Many system roads tie with subdivision streets and pass through private land. The LTBMU has identified 22 locations, covering 13 miles, where rights-of-way are needed. Although access is available for administrative purposes, such as fire suppression, access for resource production and recreation use on these lands may be severely restricted.

Under the pressure of summer use, dispersed recreation use areas sometimes become developed sites in all but name. The East Shore beaches south of Incline Village are an example. They are nearly as popular as developed beaches but lack the developed facilities and access needed to protect the sensitive land.

Continuing requests are received for outfitter/guide permits to lead tours on national forest lands. Many involve winter operations such as snowmobiles or helicopter skiing. Permits are usually granted for these uses, but care is necessary to assure compatibility with other uses.

Among the more successful outfitter operations are the two rafting concessions on the Lower Truckee River. Rafts are rented to float from Tahoe City to the River Ranch Resort about four miles downstream. The operator's permit is with Placer County which has jurisdiction over launching and take-out areas. In between these points the Truckee River flows through national forest land.

c. Winter Sports

An important recreational special use permit is Heavenly Valley Ski Area. Apart from a small portion of Ski Incline and Alpine Meadows (administered by the Tahoe National Forest), Heavenly Valley is the only ski resort on the LTBMU.

Current use at Heavenly Valley generates an average of about 350,000 RVD. Projected participation by the year 2030 on the LTBMU is estimated at 912,000 RVD, based on the RPA trend of 2% per year. This also assumes a constant market share of skiing in Northern California.

Ski Incline was given permission to expand through a master development plan approved in 1987. Runs are the only improvements presently approved for national forest land. Snow making capability may be considered in the future.

Expansion of Alpine Meadows and Deer Park Ski Area into Ward Valley, and Homewood/Tahoe to Ellis Peak, and North Star are to be considered through master plan development.

Other proposed ski developments near the Tahoe Basin may also help meet demand. Squaw Valley Ski Area has been steadily expanding, and proposals have been made for major new resorts near Mt. Rose and Truckee (Coldwater). Sierra Ski Ranch, west of Echo Summit, also has plans to expand.

As with developed recreation, capacity for alpine skiing has been established in the TRPA Regional Plan. Though capacity is provided for expansion of skiing, there are substantial requirements for mitigating the effects. Probably the toughest is traffic mitigation; not only is parking for

automobiles not to expand, but measures necessary to offset projected increases in traffic would be beyond those outlined in the basin transportation plan.

d. Off-Highway Vehicle Use

In response to Executive Order 11644, as amended by Executive Order 11989, the LTBMU in 1976, developed an Off-Highway Vehicle Plan for the Tahoe Basin. The Order established policies and provided for procedures that helped to ensure that the use of off-road vehicles on public lands would be controlled and directed in order to protect the resources, promote the safety of all users of the public lands, and to minimize conflicts among the various users of these lands.

Off-highway vehicle activity on the LTBMU, particularly summer use, has been a controversial and emotional issue. Because of the emphasis on protecting the water quality of Lake Tahoe, and concerns for minimizing the social conflicts between area residents and OHV users, the LTBMU adopted in 1976 a restrictive policy towards the management of summer OHV, and to a lessor degree, winter OHV activity on national forest lands. OHV activities were recognized as a legitimate use of the national forest, but were permitted on designated routes or areas only. This recreational activity is not permitted or encouraged where urban areas interface the national forest, in environmentally sensitive areas, or within administratively closed areas of the basin.

The current direction for the LTBMU is to designate OHV summer and winter routes throughout the basin in appropriate areas while closing those existing routes/areas where this activity is not considered as either compatible or suitable with the environment or other uses. Route designation requires the preparation of environmental assessment documentation and public review before being implemented. Little progress has been made toward implementation of the 1976 OHV management plan despite many efforts. Designated routes were to be shown on maps and signed so that recreationists would know where they could legally operate vehicles. Similarly many roads were to be closed and revegetated. Today, signing is still inadequate to distinguish designated routes from those that are undeveloped or closed to vehicle use. Many miles of closed roads and trails are still being used for OHV travel.

Enforcement of OHV regulations has received little emphasis because of lack of funding. Additionally the lack of signing and public information about OHV regulations and closures has made enforcement difficult or impossible. Users in too many cases are not aware that they are using closed routes.

Even though OHV use still remains a source of controversy, particularly where use is occurring near residential areas, some progress has been made since 1980. Many areas have been successfully closed to use, signing has been installed, education programs have helped change behavior, and steps have been taken toward the designation of routes. OHV user groups have volunteered to correct damage and to implement OHV management. Much of the recent success has resulted from the availability of "Green Sticker" OHV funds from the State of California.

e. Recreation Opportunity Spectrum Classes

The ROS system is a means of classifying recreation experiences by the degree of facilities and of contact with other visitors. None of the classes has been given preference over any other. Most people enjoy experiencing the variety of opportunities offered by the variations between ROS classes. This is especially true in the Tahoe Basin where most campers also go sightseeing, visit a casino, and perhaps go hiking in a remote area.

Table 3.13 displays the current mix of ROS classes on national forest land, their capacity, actual use, potential use, and projected demand. Table 3.14 displays the ROS Class distribution for all lands in the Lake Tahoe Basin. No Primitive ROS Class is found in the Tahoe Basin.

These figures show the basin is relatively undeveloped outside the ring of urbanization that lines the lakeshore. They also show that the national forest provides most of the Semi-Primitive Non-Motorized (SPNM), Semi-Primitive Motorized (SPM), and Roaded Natural (RN) opportunities in the basin, relatively fewer Rural, and no Urban opportunities. The only ROS class where projected participation exceeds capacity is in SPNM. These figures assume that ROS class acreage distribution will remain constant. In both Roaded Natural and Rural Classes the figures suggest that demand will exceed capacity soon after 2030. Only in SPM class does there seem to be excess capacity, and this is probably misleading. Existing poor access in SPM has probably constrained existing use levels well below the true demand. The LTBMU has no existing or potential Primitive ROS opportunities. Similarly, no national forest lands are classified urban.

Table 3.13. ROS, Capacity, Dispersed Use, and Demand on National Forest Lands (based on 1982 land status)

Class	Acres Acres	Capacity (PAOT)	Potential RVD Capacity	Actual Use(RVD)	Demand in 2030 Projected RVD
Semi-Primitive Non-Motorized	53,500	1766	218,984	162,373	254,926
Semi-Primitive Motorized	17,600	443	70,880	9,512	14,934
Roaded Natural Area	55,700	2865	670,410	409,228	642,488
Rural	11,900	3286	834,360	500,169	785,265
Total	138,700	8360	1,794,634	1,081,282	1,697,613

Table 3.14. ROS Class Distribution
(1982 All Lands)

	Semi-Primitive Non-Motorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban	Total
Nat'l Forest						
Acres	53,500	17,700	55,700	11,900	0	138,700
%	26.1	8.6	5.8	5.8	0	67.6
State						
Acres	900	2000	7,800	1,200	0	11,900
%	.4	1.0	3.9	.6	0	5.9
Private/Other						
Acres	2,100	5,800	14,250	23,300	9,100	54,800
%	1.0	2.8	6.9	11.4	4.4	26.5
Total						
Acres	56,500	25,500	77,750	36,400	9,100	205,250
%	27.5	12.4	37.9	17.8	4.4	100%

15. Research Natural Areas

The Research Natural Area (RNA) system provides for various ecosystems to be set aside for scientific study. Management of an RNA precludes activities, such as grazing, timber harvesting, road construction, and recreation development, that would alter natural processes. The LTBMU is entirely within the Northern Sierra Nevada physiographic province. The area identified within the LTBMU as having good potential as an RNA is Grass Lake moss bog. The 360 acre peatland is the largest of its type in California. Among the plants of interest found there are roundleaf sundew (Drosera rotundifolia) and slender cotton grass (Eriophorum gracile). Carex limosa, a sedge, is found only in this location in California, and an insect-eating bladderwort plant is also found here. Though the latter is unusual, it is not rare. Located immediately adjacent to Highway 89 at Luther Pass near the southern edge of the basin, the peatland receives very heavy recreation use by cross-country skiers in the winter. An evaluation has been completed for the area by the RNA committee and its suitability for the RNA system confirmed.

16. Riparian Areas and Stream Environment Zones

There are approximately 7,500 acres of lands classed as Stream Environment Zones (SEZ) on the LTBMU. Riparian areas are included within the SEZ. Because of the concern for water quality, SEZ is more inclusive than riparian areas; with floodplains, areas of high ground water, and ephemeral stream channels included. In the entire Lake Tahoe Basin 60-70% of historical SEZ land has been lost due to development. Restoration work is needed in SEZ.

All fish species and some wildlife species and vegetation communities identified above are dependent upon riparian habitat for their existence. Riparian vegetation provides the most productive wildlife habitats on the LTBMU, with over 60% of wildlife species utilizing these habitats. Riparian vegetation also absorbs a great amount of nitrogen and other nutrients from the surface and groundwater flows (which otherwise would be delivered to Lake Tahoe) further degrading its exceptional water quality.

Riparian areas contribute to the scenic variety of the environment. Recreationists use riparian areas for hiking, cross-country skiing, and fishing. Meadows are very productive forage areas for cattle and horses permitted to graze.

Recognizing the importance of riparian areas, particularly in maintaining water quality, current management direction is restrictive to disturbing activities. Concentrated recreation use in riparian areas can conflict with dependent resources.

17. Sensitive Plants

Sensitive plant species for the LTBMU have been identified from lists of plant species under review by the U.S. Fish and Wildlife Service and the State of California and from lists of plants recommended by the California Native Plant Society for consideration. The basin has six plants classified as "sensitive" by the Regional Forester and one proposed for listing. These are identified in Table 3.15. Rorippa subumbellata (Tahoe Yellow Cress) is listed as "endangered" by the State of California and is being considered for listing as a Federal threatened and endangered species (Category I).

Regional policy states that sensitive plant species must receive special management emphasis to ensure their viability and that species do not become threatened or endangered because of forest service actions. Environmental thresholds require preserving a minimum number of sites for each. Interim management prescriptions have bern prepared for most of the plants and are incorporated to the forest plan by reference. Rorippa subumbellata will require intensive protection measures as its habitat is the beach areas of Lake Tahoe where it is easily disturbed by recreation use and fluctuating water levels. Known populations on national forest lands are beng protected by fencing, and populations are being established through planting in historic sites. However, other potential habitat exists were disturbances may be preventing the plants from becoming established.

Table 3.15. Sensitive Plants of the Tahoe Basin

Species	Management Sensitivity 1/	Population Sites on NF Land	Population Sites on Other Ownership
Listed Sensitive			
Carex paucifructus	3	1	Unknown
Draba asterophora var. asterophora	3	5	0
Draba asterophora var. macrocarpa	2	2	0
Eriogonum umbellatum var. torreyanum	3	Unknown	Unknown
Lewisia pygmaea ssp. longipetala	1	2	0
Rorippa subumbellata	1	2	24
Silene invisa	3	Unknown	Unknown

1/ Management Sensitivity 1 - Current or potential threats or jeopardy from forest management activities; 2 - No or minimal threats or jeopardy from forest management activities; 3 - Insufficient data at this time to evaluate threats or jeopardy from forest management activities.

18. Soils

Soil characteristics affect timber growth rates, forage quantity and quality, ease of road and campsite construction, and other resources production or use. Thus soils are a major consideration in managing the forest.

The soils in the Lake Tahoe Basin are described in the 1974 soils survey of the Soil Conservation Service and the Forest Service. This report identifies 30 specific soil types grouped into 10 soil associations. The survey classifies the soils by their characteristics and analyzes them relative to management activities.

Most of the soils in the Tahoe Basin are of granitic or volcanic parent material, geologically young, and poorly developed. They are generally shallow, coarse textured, have low cohesion, and contain small amounts of organic matter. These factors account for the high erosion potential of over 75% of the soils in the Tahoe Basin.

Table 3.16 lists soil groups, or associations, capable of timber production. Soil groups are listed in order of highest timber production capacity to lowest timber production capacity.

Maintaining soil productivity is a broad goal of the Forest Service. No management action will be intentionally taken that would irreversibly impair soil productivity. Soil productivity will be monitored to detect any changes caused by management activities. Erosion, loss of nutrients, displacement and compaction are probably the greatest hazards to the soil resource. The continual long-term loss of the humus and duff layers by burning is another potential source of productivity degradation.

Historically, logging and burning occurred on much of the land now within the national forest system at Lake Tahoe. Its effect upon natural productivity has not been measured, but adverse effects were probably localized to sites where there was major displacement of the soil. Soil enhancement has also been limited. Problem areas, such as ski runs that have been cleared of vegetation and the earth groomed, or other sites where the earth has been disturbed, have been fertilized to assist revegetation, but not to the extent of being considered as enhancement.

Conserving the soil resource is the underlying strategy for maintaining both the water quality of Lake Tahoe and the vegetation cover of the basin. Keeping soils in their natural condition, in place and adequately covered with native vegetation is the surest way of preventing adverse impacts upon water quality and other environmental conditions. To a large extent, management of the forest in the recent past has been aimed at avoiding land disturbance, especially on the most highly erodible soils and in stream environment zones. This is further discussed in the water section of this chapter.

19. Special Interest Areas

The Special Interest Area (SIA) system provides for the special management of areas with unique recreational or scientific values, such as impressive scenic, historical, geological, botanical, zoological, or paleontological characteristics. It should be noted that the Lake Tahoe Basin as a whole is a special environment and is managed as such. Nothing in the current LTBMU management direction would harm the special features of SIA candidate areas if they are not selected for the program. Rather, SIA designation will serve to highlight specific areas of special interest for public use and enjoyment.

Several potential SIA candidates have been identified both by Forest Service personnel and the public. However, for most candidates there is currently not sufficient information to evaluate them for designation. Candidate areas are retained on the inventory and their special values protected until sufficient data for evaluation is available.

The process of official designation begins with recommendation of an area by the Forest Supervisor. Approval for SIA status comes from the Regional Forester. Each formally designated area is managed with an individualized set of standards and guidelines. These can range from no special management to seasonal restrictions on certain activities to year-round prohibitions of all activities.

Table 3.16a. Soils Associations and Timber Management 1/

Soil Description	Acres & % Timber Land) 2/	Productivity Cubic Feet/ ac/year 3/	Productivity Site Quality 4/	Seedling Mortality 5/	Erosion Hazard 6/	Insect & Diseases 7/	Management 8/
1) Soils moderately deep to deep over volcanic rock; gravelly sandy loam surface layer and gravelly clay loam subsoil; also cobblestones.	5,850 (7%)	225+	High -white fir, Jeffrey pine, red fir	Slight	Slight	Slight	Well suited to timber management
2) Soils moderately deep or deep over volcanic rock or alluvial glacial deposit; gravelly coarse sandy loam or gravelly sandy loam.	5,990 (8%)	224 to 165	Moderate -red & white fir, Jeffrey pine	Moderate	Slight	Moderate	Suited to timber management.
3) Soils generally of sandy texture, moderately deep or deep over granitic rock or alluvial or glacial deposits; stones or rock outcrops common.	8,950 (11%)	164 to 120	Moderate -red & white fir, Jeffrey pine	Moderate	High	Moderate	Suited to timber management; in places, rock outcrops slightly hinder logging.
4) Soils moderately deep to deep over granitic rock or glacial deposit; gravelly sandy loam or gravelly loamy sand texture; stone or rock outcrop common.	19,935 (25%)	119 to 85	Mod/high - white & red fir, Jeffrey	Moderate	Very High	Moderate	Moderately well suited to timber management; stones or rock outcrops and steep slopes limit equipment.
5) Soils deep over glacial deposit; gravelly sandy loam or gravelly loamy sand texture; many stones and boulders throughout.	9,360 (12%)	84 to 50	Mod/high - Jeffrey pine, white fir	Moderate	Moderate	Moderate	Moderately well suited to timber management; stones and boulders limit equip.
6) Soils moderately deep over volcanic rock; gravelly sandy loam texture; rock outcrops in many places.	2,715 (3%)	49 to 20	Mod/high -red & white fir, Jeffrey pine	Moderate	Slight	Moderate	Moderately well suited to timber management; rock outcrops hinder equipment.
7) Soils deep over alluvial or glacial outwash material; gravelly sandy loam or loam texture; seasonal water table within depth of 3 feet.	3,315 (4%)	20 or less	Mod/high - lodgepole pine	Slight	Slight	Slight	High water table limits equipment.
8) Soils moderately deep and deep over granitic rock or glacial deposits; loamy coarse sand texture; stones or rock outcrop in many places.	9,065 (11%)	20 or less	Moderate - Jeffrey pine, white fir	Moderate	High	Moderate	Poorly suited to timber management; stones, rock outcrop, and steep slopes

Table 3.16b. Soils Associations and Timber Management 1/

Soil Description	Acres & % Timber Land)2/	Productivity Cubic Feet/ ac/year 3/	Productivity Site Quality 4/	Seedling Mortality 5/	Erosion Hazard 6/	Insect & Diseases 7/	Management 8/
9) Soils shallower over glacial deposits or or granitic rock; gravelly sandy loam or gravelly loamy sand texture; stones and rock outcrops common.	920 (1%)	20 or less	Low - red & white fir, Jeffrey pine	Severe	Moderate	Severe	Poorly suited to timber management; low site quality.
10) Soils moderately deep to deep over granite rock or glacial deposits; gravelly loamy course sand or gravelly sandy loam texture; stones or rock outcrops in many places.	13,990 (18%)	20 or less	Low - white & red fir; Jeffrey pine	Severe	Very high	Severe	Very poorly suited to timber management; low site quality; stones and rock outcrops and steep slopes

1/ Excerpted from "Soil Survey, Tahoe Basin Area California and Nevada" by the U.S. Dept. of Agriculture, Soil Conservation Service; 1974.

2/ Acres - Excludes lands within Desolation Wilderness which are not available for timber management.

3/ Productivity - Based on Forest Survey Site Class; mean anual increment (growth) at culmination in cubic feet of wood per acre per year. Due to poor correlation between soil and vegetation mapping, the soil types were not used to delineate tenatively suitable timber land, nor to predict timber yields for the LTBMU.

4/ Site Quality - Growth potential of specified trees; a measure of productivity of soil for growing trees. It is measured by determining the height and age of dominant trees and relating these figures to a standard age. Species listed represent dominant type for soil type.

5/ Seedling Mortality - Potential mortality of naturally occurring or planted tree seedlings as influenced by the kind of soil and the topography.

6/ Erosion Hazard - Potential hazard of erosion based upon the length and steepness of slope; aspect; and texture of soil aggregates. Assumes the presence of protective soil cover of litter and duff.

7/ Insects and Diseases - Susceptability to insect and disease damage based upon such factors as rooting depth, soil texture, impeded drainage, and inherent fertility. Greatest hazard in the Lake Tahoe basin appears to be on shallow, rocky soils.

8/ This table reflects the tentative suitability of soils for timber management. Other criteria show that under current and expected market conditions no lands within the LTBMU are actually suited for producing regulated commercial timber products.

A list of candidate areas has been drawn-up, but it is not exhaustive and in many cases boundaries are not yet defined. Identification of SIA candidates is a dynamic process that will continue into the future. Those areas identified currently as having SIA potential are:

Tallac Historic Site - Three historic estates which are listed on the National Register of Historic Places, and the archaeological remains of the Tallac Hotel, a luxury resort which flourished on the shores of Lake Tahoe in the 1800's, on 225 acres in the south shore.

Osgood Bog - A boreal sphagnum bog near Highway 50 at the base of Flagpole Peak. The bog was artificially drained for about twenty years. The water level has now been restored.

Freel Peak Cushion Plant Community - A highly distinctive community of cushion plants and Krumholz Forest on a high and windswept ridge.

Grass Lake Moss Bog - A peatland in the vicinity of Luther Pass. (See subparagraph 15, Research Natural Areas for further details.)

Taylor Creek Wetlands - The spawning grounds for Kokanee salmon and bald eagle habitat on the south shore.

Hell Hole - A bog located in the headwaters of Trout Creek containing impressive geologic and biologic features.

Floating Island Lake - A small, shallow lake at the base of Mt. Tallac within Desolation Wilderness. Several small floating mats of grass, shrubs, and wood debris drift about on the lake's surface.

Pope and Baldwin Marshes - Large marsh communities inland of barrier beaches on Lake Tahoe.

Cave Rock - The eroded throat of an ancient volcano that erupted on the east shore in Tertiary times.

Glacial Moraine Deposits - Spectacular examples of morainal deposits in the vicinity of Fallen Leaf Lake, Cascade Lake, and Emerald Bay.

Ward and Blackwood Canyons - Areas of glaciated volcanic flowlands.

Additionally, Grass Lake Moss Bog, Freel Peak Cushion Plant Community, Osgood Bog, national forest land around Emerald Bay, and the entire Lake Tahoe area are being considered as potential National Natural Landmarks, a Department of the Interior program based on evaluation by the National Park Service after nomination by the Forest Supervisor.

20. Timber and Vegetation

The forests of the Tahoe Basin were cherished for their timber during the Comstock mining period (1861-1898). The annual harvest was as high as 72 million board feet in peak years. Old photographs show large areas of the basin nearly stripped of trees. Lake Tahoe reportedly was at its most polluted

condition from erosion during this period of intensive logging. Railroad grades, trestles, flumes, and other artifacts from this era enrich the historical heritage of the basin.

After the mines of the Comstock ran out and recreation became prominent, timber production declined in significance. The forests gradually grew back, producing the scenic backdrops to the lake, and the lake partially returned to its original state. Several problems that have emerged are that much of the forest is now 80 to 100 years old, lacks diversity or replacement stands of younger trees, and is susceptible to insect and disease attacks.

This history has left the LTBMU with a variety of silvicultural problems and opportunities. Some stands never regenerated fully and are understocked. Other areas grew back so overstocked that the competition between trees is limiting their growth. In other areas, the stands may be relatively healthy but the older trees are dying off from natural causes.

There are many thousands of acres that are tentatively suitable for timber treatment. However, in the basin, the cost of mitigation required to maintain water and air quality and to reduce fire hazard often makes commercial timber sales financially marginal. LTBMU administration costs are higher than on neighboring forests due to the complexity of coordinating with the many local governments and the more stringent standards associated with environmental concerns in the Lake Tahoe Basin.

Currently the LTBMU has no assigned target for regulated timber harvest. Direction calls for timber management activities aimed at maintaining healthy, diverse timber stands of high scenic quality for watershed protection, recreation use, and wildlife habitat rather than for wood fiber production. These activities result in an average annual harvest of 2.1 million board feet of live and 2.1 million board feet of salvage timber. Because of the high local demand for firewood, there is an equal emphasis placed upon harvesting firewood and saw logs. Over the past few years, the LTBMU has been harvesting one million board feet of saw logs and 3 million board feet of firewood a year. This is an insignificant percentage of the saw log volume produced in the market area. Less than 10% of the firewood consumed in the basin for home heating comes from the LTBMU.

The TRPA recognized the many values of the forest and established several environmental thresholds for vegetation. These include: perpetuating the existing plant associations, setting basinwide standards for abundance of various plant associations and seral stages, limiting the size and proximity of new forest openings, maintaining a minimum number of sensitive plant sites, and setting nondegradation standards to preserve uncommon plant communities, native deciduous trees, wetlands, and meadows. As discussed in other sections of this chapter, there are also thresholds established for water quality, soil conservation, wildlife, fisheries, and scenery that affect vegetation management.

While the goal of TRPA was that all of the thresholds would be compatible and achievable simultaneously, the interaction of one upon the other has not been fully tested. This is the case for vegetation. Of particular concern to the Forest Service is whether it would be possible to meet the threshold for minimum areas of immature mixed conifer and red fir forests, which would

require active timber management, without violating other thresholds and without greatly inflating the costs in order to mitigate effects.

The LTBMU has a total timber inventory of over two billion board feet, growing at a rate of about 32 million board feet per year. Lands (outside the Desolation Wilderness) which can produce at least 20 cubic feet per acre per year are considered capable of timber production. These lands are tentatively suitable for timber production unless they are committed to long term administrative or special use facilities, are within cultural resource or T & E species sites, or cannot be reforested in 5 years. The technology currently exists in the basin to insure against irreversible damage to soil productivity or watershed conditions.

Based on a 1980 timber inventory, 78,550 acres were classified as tentatively suitable for timber production. The 21,300 acres in Desolation Wilderness are not available, 32,509 acres are not capable of growing 20 cubic feet per year, and 5,952 acres are dedicated to skiing or other recreation facilites.

If no effort were made to manage, or even salvage timber on national forest land in the basin, the annual harvest would be reduced to the incidental volume resulting from unavoidable hazard tree removal. It is estimated that at the minimum level these activities would produce approximately 100,000 board feet per year. If production of timber in the basin were maximized, subject only to minimum standards of laws and regulations, the volume produced would approximate the biological potential of the land to produce wood fiber. Approximately, 38 million board feet per year could be produced on a sustained yield basis. Because of the extremely high costs of operating on steep, unaccessed land, timber harvest does not maximize present net value. In fact, from a economic standpoint, timber production in the basin is not efficient.

Total demand and consumption of wood products in California is projected to double by the year 2030. Harvest from the LTBMU, though restricted to small volumes of unregulated products, does contribute toward meeting this need for forest products. Output from the LTBMU is much too small to have an effect on prices.

The RPA target for programed sales offered in the Regional Guide calls for an increase to 8.5 million board feet in 1990, 10 million from 1991-2000, and 10.7 million thereafter. This is more than double the current output. The target for timber stand improvement is 320 acres per year.

Demand for firewood comes primarily from basin residents. An estimated 66,000 cords or 33 million board feet per year are utilized. This represents an annual consumption rate of 1.8 cords per home (36,000 homes). Twenty percent of the firewood is harvested in the basin, the rest is imported. The future consumption could increase to 88,000 cords if households increase to 52,000 as predicted and consumption rates remain stable except for expected reductions due to TRPA policies such as use of more efficient stoves.

21. Visual Resources

The lake that Mark Twain assessed as the "fairest picture the whole world affords" has for over a century been the subject of a tug-of-war between people whose principal motivation is to appreciate the lake and those with some kind of economic interest in it. And, indeed, there are a lot of people in between for whom both motivations apply.

The Tahoe Basin has a relatively simple bowl shape with the lake at its center. Most of the developed areas where people view the scenery occur on the land near the lake. The north shore's rounded, indistinct peaks are covered with dense stands of timber that screen the effects of the extensive network of logging roads and urban development. The east shore rises steeply from the water. This area is less densely vegetated so that management activities would tend to be clearly evident. The south and west sides of the basin are more complex. The large flat valley and canyon bottoms are well screened by forests. The canyon walls often curve, screening them from view from the Lake. The highest mountains, such as Freel Peak, reach above timberline, so any activities there would be highly visible. About 45% of the LTBMU is classified as Distinctive (Class A), meaning that it is exceptional even for the Sierra Nevada landscape character type. The other 55% is classified as common (Class B).

The forested lands of the basin are generally as attractive now as they ever were. The vast stands of timber which were clearcut in the late 1800's have been reestablished, and most timber stands are now in the 80 to 100 year age range. Most visible impacts on the national forest today involve recreation developments, roads, and utilities. In fact, 94% of the LTBMU shows no evidence of human disturbance, and another 3% has disturbances that are evident but do not dominate the natural landscape. Table 3.17 shows the existing visual conditions in the basin.

Some potential activities have the capacity to degrade scenic quality by increasing the contrast in natural line, form, color, and texture. The most common type of disturbance is vegetation removal, exposing a soil type of a contrasting color, as often occurs in clearcuts, ski run clearings, and utility lines in uniform timber stands.

Increased viewing opportunities of Lake Tahoe are needed. One vista point was recently improved near Logan Shoals on the Nevada side. In the same vein, entry corridors to the basin have been identified as a scenic resource needing protection and restoration.

Structural improvements usually have only an on-site impact, and they are usually evaluated on a project basis for their effects on visual quality. There may be an opportunity in the plan to establish standards that would lead to some uniformity in the appearance of Forest Service structures. On the LTBMU, most visual restoration occurs as part of the watershed restoration program or through facility maintenance and reconstruction.

Table 3.17a. Existing Visual Conditions
(based on 1982 national forest land status)

Type	I untouched	II unnoticed	III minor disturbances	IV disturbances	V major disturbances	VI drastic disturbances
Acres	20,874	115,510	4,067	2,903	406	1,474
Percent	14%	80%	3%	2%	0	1%

Table 3.17b. Existing Visual Conditions
(Current Visual Quality Objectives and Visual Quality Index)
(based on national forest status in 1985)

	Preservation	Retention	Partial Retention	Modification	VQI
1982 Acres	21,330	89,695	27,557	119	10.2
Percent	15%	65%	20%	0%	
1985 Acres	21,330	95,228	28,562	119	10.6
Percent	15%	66%	19%	0%	

22. Water

Lake Tahoe is the focus of international attention because of its remarkable clarity, size, and depth. Today, both the quality and quantity of water in the basin are of great concern. Since numerous technical studies have been published on these subjects, this section will only highlight the interrelationships of water quality and quantity with other national forest resources and activities.

Water Quality

Protection of the exceptional clarity of water in Lake Tahoe from further degradation and the eventual restoration of lost clarity is a high goal for managers of the land. Nearly every activity on the land has the potential of affecting water quality and thus must be planned, implemented or regulated with this in mind. In addition to analyzing the direct and indirect impacts of each activity, the combined impacts of numerous activities on the national forest along with those on adjoining private and other public lands must be considered. This is called assessing the cummulative watershed impacts occurring due to all activities within a watershed.

Historically, the quality of water in the lake and its tributaries has fluctuated depending on the activities of the period. The Comstock Mining Era in Nevada, for example, caused the basin to be virtually stripped of timber. Periods of extensive grazing also likely caused a significant decline in water quality. Recent urbanization has contributed to water quality degradation. Even though most development is now connected to sewage treatment and export facilities, there remains many decades of waste discharge in the soil that continues to leach into the ground water. Now the key factor impacting water quality from urbanization is disturbance, especially of sensitive lands (stream environment zones, steep slopes and unstable areas) and loss of vegetative cover causing increased surface erosion. Sediment particles carry nutrients with them as they are transported to Lake Tahoe. Algae increase as they feed on these nutrients, decreasing water quality and clarity. Reduction in water quality also affects beneficial uses of the water such as fish habitat, water related recreation, visual quality, and riparian habitat.

A more recent water quality concern has been increase algal supporting nutrients being deposited in Lake Tahoe from the air. Vast quantities of these nutrients are present from vehicle emissions, wood burning, and other combustion sources. The magnitude of the effect is still under study; but, substantial effort is directed at reducing or controlling these sources.

Activities on national forest lands can and have caused cumulative water quality impacts similar to those caused by urbanization.

The most common evidence of impacts is soil erosion and alteration of infiltration and runoff processes. Increased surface runoff can cause increased peak streamflows, which may lead to bank cutting, channel scour, and debris torrents in streams. All can result in adverse effects on water quality, fish habitat, and other beneficial uses to which the water resource is applied. The most direct means of preventing adverse cumulative impacts is through controls on location and concentration of development and land management activities.

Undisturbed, vegetated land, not only protects the soil, but also provides transpiring biomass (living plants and micro organisms). Plants and micro organisms have the ability to absorb both the nutrients present in the soils and those deposited from the atmosphere. The type of vegetation in stream environment zones (SEZ) is especially critical in this process; it prevents streambank erosion by slowing flows, increases absorption of water into soils, and takes up nutrients from surface and groundwater before they reach the lake. This is one reason why activities within stream environment zones are severely constrained. The thousands of acres of forest that are understocked could support a greater biomass through more intensive timber management. The net benefit to the lake (from the trade-off between more intensive timber management and the land disturbance which might occur) is unknown at this time.

Land Capability System

To assist planners and developers in controlling adverse impacts, a land capability system was devised in the early 1970's, by Dr. Robert Bailey, a Forest Service geomorphologist. The "Land Capability Classification of the Lake Tahoe Basin" (see Appendix F in the forest plan for further information)

is now used by planning and regulatory agencies in the basin. Though not viewed by all as the most accurate measurement of development impact upon the watershed and water quality, it has provided for a consistent approach.

Soil type and geomorphic setting were the two most important factors used in the land capability system. Tolerance of the land for disturbance was the principal measure of capability. Land was ranked into seven capability classes. Intensity of use that could be tolerated in each class was expressed in terms of a maximum percentage of impervious surface coverage (paving, buildings, highly compacted soils, etc.) that could be allowed. While control of impervious surfaces alone does not solve all environmental problems, it relates well with the water quality issue.

The primary Forest Service facilities that produce impervious coverage are permanent roads, trails, parking, buildings, and developed recreation sites.

Another expression of development impacts is total disturbance, which includes both impervious coverage and other soil and watershed disturbance. Disturbance may be either temporary or permanent, and is primarily associated with vegetation management activities such as timber harvest, prescribed burning, and ski-run clearing. Research on the extent and duration of the cumulative watershed impacts of forest management practices is quite limited for the Tahoe Basin. However, estimation of total disturbance does provide a useful means of estimating effects of management activities on water quality.

Table 3.18 shows the relative levels of impervious coverage and other land disturbance on national forest land in the basin. Impervious coverage relates to development or management activities which involve hard surfaces through which water would not usually penetrate. Areas occupied by road surfaces or buildings represent this type of coverage. Other land disturbance refers to management activities such as timber harvest where the soil and vegetation are disturbed. In these cases the soil surface is not impervious to water percolation and nutrient untake. "Minimum Level" reflects the amount resulting from State and county highways. "Current Level" reflects the amount from highways, forest roads and trails, developed recreation sites (including ski areas), timber, and other activities as of 1982. "Maximum Level" is the amount that would occur under the most intensive management program proposed by the Forest Service. "Maximum Allowable" is the amount that would be allowed under the "Bailey" system for impervious coverage, and Forest Service system for other land disturbance without regard to specific management activities.

Table 3.18. Acreage of Impervious Surface Coverage and Total Disturbance at Various Levels of Management

		Acres of Impervious Coverage 1/	Acres of Other Disturbance 2/
Minimum Level -	Represents lowest amount necessary to operate the national forest system	110	200
Current Level -	Reflects existing (1982)	880	2,231
Maximum Level -	Represents highest amount necessary to operate the national forest system. Includes most intensive recreation and timber development programs.	1,264	8,666
Maximum Allowable-	Allowed coverage based upon land capability system.	4,807	12,140

1/ Land coverage allowances (Bailey) applied to total acres by capability classes.
2/ Land disturbance allowances applied to total acres of high hazard land (class 1 and 2); moderate hazard land (class 3 and 4) and low hazard land (class 5, 6 and 7).

Table 3.18 indicates that the Forest Service is using very little of the coverage allowance determined to be available from national forest land based upon the Bailey system. The same is true for land disturbance based upon Forest Service standards developed for the lands it administers in the basin. In other words, impervious coverage and other disturbance limits should not be binding on national forest management activities. There may be situations where the rate of implementation of activities in a watershed could become limited by the total amount of disturbance. Activities may have to be rescheduled until temporary disturbance has undergone natural recovery processes.

A new system of rating the suitability of land for development is being developed. The Individual Parcel Evaluation System (IPES) is designed to rate and rank unbuilt parcels, primarily for residential building. A multitude of factors, including terrain and subdivision characteristics, are evaluated in the system. For some planning and regulating situations, the IPES system will

replace or supplement the Land Capability System. Ratings of parcels began in 1987 and will be completed and employed to select property for building in 1989. It is possible that IPES may result in changes in priority of land in the Santini/Burton acquisition program.

To address water quality impacts, the TRPA, State of California, and Forest Service have developed water quality management plans. These plans call for both protective measures called Best Management Practices (BMP) and remedial measures.

The Forest Service has actively restored sites disturbed by previous activities. Since 1974, the LTBMU has completed 2,400 acres of watershed restoration. Examples of watershed restoration work can be found in Blackwood Canyon, at the old Meyers Landfill (dump), at the former Jennings ("Tahoe Palace") casino site, Osgood Bog, Meeks Bay Marina, and the Celio pond site. These projects have made notable improvements in water quality at each site, as measured through the monitoring program, and have also benefited wildlife, fisheries, dispersed recreation, and scenic quality.

There are 2,140 acres of national forest land in need of watershed restoration as inventoried in the Watershed Improvement Needs (WIN) inventory. Much of the improvement is needed to correct water quality problems associated with recent land acquisition and with the road system. The cost of this program is estimated to be $25 million if completed by Forest Service crews and $46 million if done by contract. To meet TRPA and State of California water quality management goals, the restoration work would need to be treated in 20 years at a cost of $1,050,000 per year. About $4 million of this would be contributed by private users of the national forest.

The Santini/Burton Act land acquisition program will also contribute to protecting water quality at Lake Tahoe. Undeveloped, environmentally sensitive land is being acquired by the Forest Service. As many as 8,000 residential lots could be acquired and, therefore, prevent the impacts associated with urban development. Many of the parcels to be acquired will add to the WIN inventory. There is a provision in the Santini/Burton Act for funding erosion control work on national forest lands within the LTBMU.

Some management activities are monitored to determine the effects upon water quality. Overall, grazing and timber harvesting practices at existing intensities do not appear to degrade water quality. The monitoring program has shown that most tributary and surface runoff from national forest land is currently within the environmental thresholds. However, the threshold for suspended sediment is not being met at two locations: Blackwood Canyon and Heavenly Valley Ski Area. Substantial restoration work has been done at both sites, and more is scheduled.

Municipal Watersheds

Based on the large number of municipalities that utilize waters which originate in the Lake Tahoe Basin, all national forest lands in the LTBMU could be considered as a municipal watershed. There are, however, no formally designated municipal watersheds nor any formal agreements with water suppliers

which would classify any national forest lands in the LTBMU as municipal watersheds.

Municipal and domestic water quality in the Lake Tahoe Basin is generally good to excellent, with a minimum level of treatment (or for very small water systems, no treatment) required to meet public health standards. Water quantity for municipal and domestic use is also generally good to excellent as there are few, if any, users upstream of most sources except national forest resource management uses. The largest water suppliers in the basin are the South Tahoe Public Utility District (STPUD), North Tahoe Public Utility District (NTPUD), and Tahoe City Public Utility District (TCPUD) which utilize groundwater for the majority of their supplies. These PUD's also use water from Lake Tahoe and, in one case (STPUD), a stream source for auxiliary supplies. The stream is located on national forest land.

Over 50 privately owned, small, domestic water supply systems exist in the basin. These systems utilize both surface and ground water sources, some of which are located on or adjacent to national forest land. Special use permit summer home tracts, in particular, utilize waters from national forest land; these systems are generally very small, and designed for seasonal use only.

Numerous municipalities utilize water from the Truckee River downstream of Lake Tahoe.

Land management activities on the LTBMU are conducted in a manner consistent and compatible with the requirements of beneficial use of water for municipal and domestic supply. The "Water Resources Management" standards and guidelines in Chapter IV of the forest plan describe the methods by which this is achieved.

While the current level of most management activities does not degrade water quality, the potential for degradation increases as the amount or intensity of these activities increases. This has led to numerous requirements for managing activities. Included are limiting the size of forest openings, installing soil erosion protection and runoff infiltration structures on building sites and around other land disturbing projects, and preventing land coverage from exceeding established limits.

Water Quantity

Lake Tahoe is located within a 506 square mile drainage basin. The lake itself constitutes 40% or 192 square miles of this basin. Both Lake Tahoe and the Truckee River, the lake's only outlet, are interstate waters.

The volume of water in the lake is estimated to be 123 million acre feet. Despite the large volume, only the top six feet of the lake (about 720 thousand acre feet) are actually available for local and downstream use due to the shallow outlet and existing legal agreements governing the lake's level and flow rates in the Truckee River, which are both overseen by a Federal watermaster. Over 400 thousand acre feet of water evaporates from the lake's surface each year. Precipitation directly on the lake's surface is about half the amount which evaporates and is mostly in the form of snow. Precipitation on the rest of the basin varies significantly by elevation and aspect.

The average rate of runoff from national forest lands in the basin is about 26 inches per year for a total of 317 thousand acre feet per year (afa). This represents about 50% of all runoff into Lake Tahoe. Current consumptive water use on national forest lands is about to 900 afa or 0.3% of the total runoff from national forest lands. Table 3.19 further displays LTBMU water demand. California State Parks water use is about 600 afa, and water use on private lands in both California and Nevada is approximately 26 thousand afa. Water releases into the Truckee River average 187 thousand afa. Overall, there is a large demand for a relatively small amount of water.

Within the basin, water is needed for municipal supply, snowmaking, erosion control irrigation, and instream-flow maintenance. Down the Truckee River, water is needed for hydroelectric facilities, agricultural irrigation, municipal supply for Reno and towns along the river, and to maintain the water level in Pyramid Lake the terminus of the Truckee River. The battle for priority use of water is long standing and the source of extensive negotiation and litigation.

In an effort to resolve part of the conflict over water use, the California-Nevada Joint Interstate Compact Commission was created. In 1968 it issued the "California-Nevada Interstate Compact Concerning Waters of Lake Tahoe, Truckee River, Carson River and Walker River Basins". Both states have ratified this compact, although it was not approved by Congress.

As development, occupancy rates and recreational use in the basin have been increasing, several actions have been taken by the State Water Resources Control Board (SWRCB) to develop a policy for water allocation and use within the California portion of the Lake Tahoe Basin. In 1972 the SWRCB suspended action on all pending water applications until further analysis of the situation could be undertaken.

In July of 1984 the SWRCB issued the Draft "Policy for Water Allocation in the Lake Tahoe Basin" and environmental impact report which proposed a 2,938 afa allocation for current and future use on national forest lands and 600 afa for California State Parks land. This amount would meet projected needs of lands in public ownership for the "fair share" of recreation development, erosion control irrigation, snowmaking at ski areas, and other uses. A final decision on the allocation will be made by the SWRCB. A substantial change from the proposed allocation would affect the potential for future recreation development, watershed restoration, and other uses in the LTBMU.

The State of Nevada has initiated a similar review of water uses, but proposals have not yet been formalized for public review.

Land acquisition programs such as the Santini/Burton Act may reduce future water needs on private land, both in California and Nevada.

Table 3.19 LTBMU WATER DEMAND 1/
(acre feet per annum)

	Consumptive Use CALIF	Consumptive Use NEVADA	Total Use 2/ CALIF	Total Use 2/ NEVADA
I. Predicted Future Use				
A. Domestic	242	47	242	47
B. Erosion Control Irrigation	541	150	541	150
C. Wildlife Habitat Enhancement	0	0	180	0
D. Snowmaking	48	4	952	70
E. Agriculture (Stockwater)	1	0	1	0
F. Streamflow Enhancement	380	30	ND 3/	ND 3/
Total future water demand	1,212	231	1,916	267
Total present water use	759	122	8,788	122
Total present and future water demand	1,971	353	10,704	389
Total LTBMU water demand (CA. and NV.)	2,324		11,093	

1/ Figures are subject to change as new rights are acquired and/or modified.

2/ Water use is defined in two parts: 1) consumptive use which includes domestic, municipal, agricultural and industrial uses, and 2) non-consumptive use which includes instream flow demands for fish and wildlife habitat, hydroelectric power generation, aesthetics, boating, fishing, and swimming. "Total use" figures in this table are a summary of consumptive and non-consumptive uses.

3/ Not determined; volumes of lakes and marshes which will receive enhancement has not been determined.

Clearly, an increase in supply of water could help reduce the controversy. The only methods the Forest Service has available to increase runoff are through substantially reducing the biomass. An additional yield of 14,000 afa is potentially achievable. However such an increase in water yield would also increase erosion and nutrient loading in the lake. The Bureau of Reclamation has sponsored an experimental cloud seeding program in the vicinity of the Tahoe Basin that they hope will increase precipitation and, therefore, runoff by 10 to 15% in dry years. Preliminary findings of this program have not confirmed whether increases in this range are consistently possible to obtain.

23. Wilderness

Desolation Wilderness is one of the premier wilderness areas in the United States, both in terms of its qualities and its popularity. In fact, these two aspects conflict to the point that in 1976 the Forest Service imposed restrictions on the numbers of overnight visitors in order to protect the area from overuse. The results of this quota system have not been fully assessed, and the system may need adjustments.

Five roadless areas were identified in the basin during the RARE II study. The California Wilderness Act of 1984 reduced the area requiring analysis for wilderness and nonwilderness values to 22,265 acres from the original 46,495 acres. Dardanelles (#05982), Pyramid (#05023), and most of the basin portion of Granite Chief (#05621B) Roadless Areas were released to nonwilderness uses while Freel (#05271) and Lincoln Creek (#05983) remain for further planning in the forest plan. (See Appendix C for a detailed description of these two areas.) A portion of Granite Chief in Blackwood Canyon (30 acres) was included in the wilderness designation by Congress.

Mt. Rose roadless area was identified since the preparation of the DEIS. It had been previously identified as a roadless area on the Toiyabe National Forest, but did not abut the LTBMU. Land acquisition in both units created a continuous area of about 19,000 acres that was substantially unroaded and undeveloped. About 3,000 acres extends into the Lake Tahoe Basin.

Although wilderness acreage could double, wilderness use would not increase at the same rate. The reason for this is that Desolation has far more attractions for its size than Freel Peak and Lincoln Creek. Therefore, a high capital investment for trails in these areas would not generate the level of use that exists in Desolation Wilderness.

24. Wildlife

Over 250 species of wildlife inhabit the basin during all or part of the year (Osaki, 1980). Each of these species of mammals (64), birds (168), reptiles (16), and amphibians (7) occur here because certain habitats are available that meet their needs. The amount and quality of these habitats generally determine the abundance of any one species or animal population. (See also the diversity section in this chapter.)

Game species include mule deer, black bear, waterfowl (ducks, geese and coots) and blue grouse. Limited hunting of these species occurs in the basin due to the numerous firearm closures imposed by the different municipalities throughout the basin.

One of the public concerns raised during the planning process was how threatened and endangered species will be managed in the future. Bald eagle and Peregrine falcon are two of the Federally listed threatened and endangered species on the unit. Wildlife species (which the PSW Region of the national

forest system has designated as "sensitive species") occur or are believed to occur on the unit are spotted owl, goshawk, Sierra Nevada red fox, pine marten, fisher, and willow flycatcher. Non-game species of special interest to the public include golden eagle, osprey, pileated woodpecker, wolverine, and mountain lion.

The Forest Service is responsible for managing wildlife habitat on national forest land. The respective states are responsible for managing non-migrating wildlife populations. In the basin this responsibility falls to the California Department of Fish and Game (CDFG) and Nevada Department of Wildlife (NDW). Issues will therefore be addressed in terms of wildlife habitat management. Habitat (for the most part vegetation) can be managed for the benefit of some species and detriment of others; so coordination is essential to achieve a good mix of wildlife objectives.

Extensive clearcut logging, subsequent fires and natural regeneration of the forests in the basin have had a significant effect upon current wildlife habitat conditions. Urban and recreation developments (especially in riparian areas), intensive recreational uses, large human influx, water diversion for domestic and agricultural purposes, changes in wildfire patterns, and introduction of non-native species (like beaver) also have had effects on wildlife and their habitats.

Management Indicator Species

The Forest Service must manage habitats to maintain viable populations of existing native vertebrates. To ensure that viable populations of all such species are maintained, certain species called management indicator species (MIS) are selected to act as "barometers" for wildlife communities. MIS can be used to determine needed habitat management and for predicting species habitat capability responses to management activities.

Management indicator species are selected from groups of wildlife species with similar habitat requirements; thus, management of these species to at least maintain viable population levels indicates that viable population levels of all LTBMU native vertebrate species represented by the indicator species are also maintained.

Table 3.20 lists the ten wildlife management indicator species selected for the LTBMU. The rationale for their selection includes management priority/status and habitats or habitat elements with which they are associated and/or representative. These species are bald eagle, Peregrine falcon, goshawk, spotted owl, mule deer, pileated woodpecker, mallard, black bear, blue grouse, and willow flycatcher. Table 3.21 summarizes the population, trends, and current habitat capability for these species.

Table 3.20. Wildlife Management Indicator Species for the LTBMU

Species	Reason for Selection	Habitat Components and Ecosystems Indicated
1. Bald eagle	Recovery species (endangered)	Large bodies of water, some isolation from human disturbance, mature conifers with canopy closure less than 40% in a multilayered stand; snags.
2. Peregrine falcon	Recovery species (endangered)	Diverse range of vegetation types and seral stages; riparian areas; cliffs.
3. Goshawk	Sensitive species	Late successional stage (mature) conifers with canopy closure of at least 40%; meadows, openings, or riparian areas; snags; dead and downed logs.
4. Spotted owl	Sensitive species	Late successional stage (mature) conifers with at least 40% layered stand; snags; dead and downed logs.
5. Mule Deer	RPA Emphasis group	Interspersion of many seral stages (edges); riparian vegetation; meadows, early to mid-successional stage of most vegetation types.
6. Pileated wood-pecker	RPA Emphasis group (special interest, cavity nesters)	Large (> 24") snags; mature conifers with at least 40% canopy closure.
7. Mallard	Special interest and harvest species	Wetlands, large and small ponds and lakes; emergent vegetation; open water; invertebrates, submerged aquatics, and grasses.
8. Black bear	Special interest and harvest species	Mature conifer forest interspersed with brush patches and meadows; abundant dead and downed logs.
9. Blue grouse	Harvest species	Medium to large (mature) sized conifers with less than 40% canopy closure interspersed with brush patches and wet meadows.
10. Willow fly-catcher	Sensitive species	Dense shrubby, riparian deciduous vegetation in large meadow areas.

Table 3.21. Status of Wildlife Management Indicator Species

Species	Population Information	Trend	Current Habitat Capability (acres) High	Medium	Low	Remarks
Bald Eagle	No current nesting; Last Nest in 1971; 4-10 in winter.	Stable		460 (winter) 450 (nesting)		Winter area from Emerald Bay to Pope, Upper Truckee Marsh. Numbers depend upon Kokanee salmon spawning runs and freezing of lakes and reservoirs.
Peregrine Falcon	Historically nested in the basin before 1940.	NA	3 cliff areas designated in Peregrine Falcon Mgmt. Plan (1982)			Reintroducton started in 1985.
Goshawk	Nine territories currently identified in the basin.	Decreasing	6110	46633	52869	Potential in the Basin for 12-16 nesting pair.
Spotted Owl	No nesting pairs known to date; 3 individuals observed and/or heard over last several years.	Probably Increasing	679	7503	48739	Habitat potential marginal: basin is at eastern edge of range; elevation is extreme. Habitat should improve as mid-aged timber matures.
Mule Deer	Low numbers; Approximately 1300 in basin; summer range only.	Stable to slight decline		Cover		Part of Loyalton/Truckee and Carson River deer herds. Primarily summer ranges. Trend affected by human disturbance in fawning and foraging areas.
			42985	70370	3880	
				Forage		
			7623	53078	55286	
Pileated Woodpecker	Regularly observed in preferred habitats; no estimate of population.	Probably stable	8180	5700	63410	Populations should increase in the future future as mid-age timber stands mature.
Mallard	Readily observed, but numbers lower than past due to lost wetland in basin.	Stable or increasing	0	2865	1360	Nesting improvements at Pope Marsh improved habitat. Most impact from private land development and domestic dogs.
Black Bear	Low	Increasing	18090	52470	19420	Urbanization limits present numbers. Habitat capability should improve as forest matures.
Blue Grouse	Uncommon nesting species in high elevation conifer stands.	Stable	13190	63125	27315	Habitat capability should improve as forest matures.
Willow Fly-catcher	Unknown; prefers large meadow areas.	Stable or slight decline	0	1360	0	Riparian restortion and improvements should benefit species in the future.

Bald eagle: The LTBMU provides wintering habitat for bald eagles. These areas consists of mid and late-successional stages of montane riparian forest and mixed conifer vegetation series. A 450 acre wintering area is currently managed near Taylor Creek. Current winter populations are estimated at four to ten birds. Viewing bald eagles in winter is a popular recreation activity in the basin.

The Pacific Northwest Bald Eagle Recovery Plan identifies four pair of nesting bald eagles as a goal for the Lake Tahoe area. In conjunction with this goal, the draft LTBMU bald eagle nesting habitat management plan has identified 300 to 450 acres of existing high quality potential nesting habitat for bald eagles. Additional habitat is available if needed.

Historically (until the early 1970's) bald eagles nested in the Lake Tahoe Basin. Potential nesting habitat still occurs on the LTBMU, but there have been no recent nesting attempts.

The limiting factor to future bald eagle reestablishment as a nesting species is intensive human disturbance, especially boating and development in feeding areas. The LTBMU has little control over these factors because most of this activity is not on national forest land. A portion of the local economy is dependent upon these established activities. The only opportunity the LTBMU has to maintain or improve bald eagle nesting habitat is to maintain identified potential high quality nesting habitat on national forest land.

Peregrine Falcon: There is potential Peregrine nesting habitat (large rock cliffs) in the basin, but currently there are no nesting pairs. Falcons are occasionally observed in the basin during seasonal migrations. Historically there were two nesting pairs in the basin, one on national forest land. Eggshell thinning (as a result of DDT residues and modification of habitats) are probable reasons for declines in local historical nesting populations.

The LTBMU has prepared a Peregrine Falcon Management Plan for potential nesting habitats. The LTBMU in conjunction with the Peregrine falcon recovery team has completed a three year hacking program to reintroduce falcons into the area. The LTBMU goal is one nesting pair.

Goshawk: Goshawk habitat is mature mixed conifer forest near riparian areas with some openings in the stand. There are nine nesting territories identified on the LTBMU. Based upon current available habitat capability, there appears to be potential habitat for 12 to 16 nesting pairs on national forest lands in the basin. Environmental thresholds identify 12 nesting territories as a minimum for goshawk in the basin.

Current management provides protection from disturbance around known nest sites during the nesting season and maintenance of the integrity of nest sites as a goal of any vegetation management occurring within or adjacent to all known nest site locations. Stringent water quality limitations on vegetation management and emphasis on riparian area protection and restoration, coupled

with natural maturation of most of the basin forest stands in the next 30 to 50 years, should easily maintain and/or improve goshawk habitat capability.

Spotted Owl: Currently there are no spotted owl nesting territories in the basin. Owl habitat in the basin is marginal. The basin is at the eastern edge of the spotted owl range. Clearcut logging in the late 1800's probably contributed to the limited owl densities in the basin.

Forest Service, State of California and national emphasis on spotted owl management is expected to continue. Management direction is to survey for owl occurrence and maintain the integrity of potential owl habitat as part of the timber sale planning process.

Habitat capability for the species should improve as current mid-age forest continue to mature. However there are no records indicating appreciable numbers of owls in the basin in the original virgin forest. Factors other than habitat may have always restricted numbers here.

Mule Deer: Deer habitat on the LTBMU consists of summer range only. Primary habitats are meadow areas and early to mid-successional stages of most vegetation where brush can be utilized for forage and cover.

Deer populations for the two deer herds identified in the basin (the Carson River and Loyalton-Truckee deer herds) are 26 to 40% of historical levels. The estimate of Tahoe Basin deer numbers (based on available habitat and estimates of deer numbers/square mile in these habitats) is approximately 1300 deer.

Demand for LTBMU deer in the basin is estimated to increase by 14 to 20% in the future. Most of this demand for deer produced in the basin is outside of the basin. The demand for deer hunting in the basin is estimated at 2500 WFUD (see Appendix B for explanation of WFUD and the method used to calculate them).

The California Department of Fish and Game (in conjunction with the Nevada Department of Wildlife, Forest Service and Bureau of Land Management) has prepared plans for the two deer herds in the basin. These plans call for a 40 to 100% increase in deer numbers by 1990. The RPA target for mule deer habitat capability is an increase of 20% in habitat capability by 1990.

Several major factors which have resulted in deer population decline are identified in these plans. Recreational and residential development have resulted in habitat conversion and/or alteration. Lack of fire combined with very little vegetation management has contributed to the lack of early successional stage habitats. Human disturbances associated with increasing recreational uses in fawning and foraging areas has also contributed to steadily declining deer numbers.

There are opportunities to increase deer habitat capability by an estimated 10% over 1980 base year levels by 1990, but it would require a more intensive vegetation management program than currently exists. Such a program could increase deer numbers by 40% over current levels after 30 to 50 years of intensive management. Increasing the amount of early and mid successional stages of vegetation throughout the deer range would partially meet the

opportunity to increase habitat capability by 10 to 40%. This could be accomplished through a combination of increasing the levels of direct habitat improvement through prescribed burning, brush manipulation, a continued program of meadow restoration and enhancement, and through a high level of wildlife coordination with timber and watershed management activities to induce improved habitat for deer. Stringent TRPA and Forest Service air and water quality standards for vegetation management may make attainment of these goals and opportunities expensive and difficult to achieve.

The RPA target for improvement of mule deer habitat capability is an increase of 20% in habitat capability by 1990.

Management to prevent further human encroachment on key deer use areas would continue by high levels of wildlife management coordination with recreation management activities.

Pileated Woodpecker: Habitat for pileated woodpeckers is mature conifer forests with high densities of large sized snags. There is little population information available for this species in the basin. However, birds are regularly observed in preferred habitats. Current management of forest stands includes guidelines aimed at maintaining preferred habitats. Habitat capability for this species should increase in the future as large acreages of mid-age timber stands mature.

Mallard: Habitat for this species is marsh and wet meadows. Current waterfowl habitat is only 30 to 40% of historical acreages in the basin. Recent habitat improvements in wetlands for waterfowl along with protection from habitat alterations have resulted in a stable to slightly increasing population of nesting mallards. Free-roaming dogs are an increasing impact on nesting waterfowl in the basin.

Demand for waterfowl hunting in the basin is low because shooting regulations limit activity. However, waterfowl produced in the basin are hunted outside the basin and overall demand for waterfowl hunting is high. Estimates of nonconsumptive uses of wildlife including wildlife viewing on the unit are 2500 WFUD. Viewing waterfowl is a major part of that use. Nonconsumptive uses of wildlife are expected to increase in the future as dispersed recreation use increases.

The LTBMU has prepared a management plan for the Pope Marsh to enhance waterfowl production. Habitat management planning for other wetland areas is under way in conjunction with the California Department of Fish and Game. Waterfowl habitat improvement is a major emphasis of the wildlife management program on the LTBMU.

Waterfowl, particularly geese defecate on the docks and in the yards of residents in the Tahoe Keys area. This situation has promoted a policy between the Forest Service and California Department of Fish and Game, which states that the Forest Service will not increase the number of Canada Geese nesting platforms in Pope marsh, but may replace one type of structure with another (ie.,arrel structures with rock structures). This will probably have little

effect on the geese in the Keys. Some Keys residents continue to feed the geese and the grass areas (lawns, etc.) provide good grazing.
There are opportunities to improve mallard habitat capability, mainly through direct habitat improvements such as nesting islands, devices to maintain or increase the water tables in existing or potential wetlands, and through a high level of coordination with watershed restoration programs. The free-roaming dog situation is beyond the control of the Forest Service, other than through signing and law enforcement measures.

Black Bear: Bear habitat is composed of conifer forest near meadows, riparian areas, and montane shrub communities. Forested habitats with large amounts of dead and down woody material are preferred.

Bear population estimates based upon habitat capability information range from 35 to 40 animals. Current bear numbers are thought to be substantially less than historical populations due to habitat alterations, especially of meadows and riparian areas.

There is little demand for black bear hunting in the basin. However, bear observations are a highly valued part of dispersed recreation experiences.

California Department of Fish and Game in the recent past has been active in management of depredating bears in the basin especially on the West Shore of Lake Tahoe.

Bear habitat capability is expected to improve as forested areas continue to mature in the absence of intensive vegetation management and with the reduced role of natural fires. Maintenance of dead and down woody vegetation as part of vegetation management activities also helps to maintain bear habitat. However, increased urbanization and recreational use within and adjacent to preferred habitats could prevent bear numbers from increasing.

Blue Grouse: Grouse habitat consists of high elevation conifer stands and meadows. There are no estimates of grouse numbers for the basin. However, based on sitings it would appear that they are uncommon residents. There is some demand for grouse hunting in the basin, especially in the Nevada portion. Basin populations are among the only grouse available for hunting in Nevada.

Grouse benefit from management direction aimed at minimizing disturbance and maintaining or improving fragile areas including meadows. Future habitat capability should improve as high elevation vegetation stands mature in the absence of intensive vegetation management and natural fire.

Willow Flycatcher: Willow flycatcher is considered a rare nesting species on the LTBMU. Preferred habitat includes dense willow areas in large wet meadows. Present population trends appear to be stable to increasing based on habitat trends as riparian areas are being protected and improved. Populations estimates are needed to confirm the presents or absence of the species in large basin meadows.

(End Chapter 3)

CONTENTS

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

A. Introduction 4-1
B. Direct, Indirect, and Cumulative Economic Consequences 4-1
C. Direct, Indirect, and Cumulative Social Consequences 4-5
D. Direct, Indirect, and Cumulative Resource Consequences 4-8
1. Air Quality and Noise 4-8
2. Adjacent Ownership 4-13
3. Diversity 4-14
4. Facilities 4-20
a. Roads
b. Trails
c. Dams and Diversions
d. Administrative Facilities
5. Fire and Fuels 4-25
6. Fish (including threatened, endangered, & sensitive species) 4-29
7. Forest Pests 4-30
8. Geology and Groundwater 4-32
9. Historical and Cultural Resources 4-33
10. Lands 4-38
a. Landownership Adjustments
b. Landline Surveys
c. Nonrecreational Special Uses and Utility Corridors
d. Withdrawals
e. Rights-of-Way Acquisition
11. Minerals (including energy minerals) 4-39
12. Prime Agricultural Lands, Wetlands, and Floodplains..... 4-41
13. Range 4-41
14. Recreation 4-42
a. Developed Recreation
b. Dispersed Recreation
c. Off-Highway Vehicle (OHV) Use
d. Winter Sports
e. Recreation Opportunity Spectrum
15. Research Natural Areas 4-56
16. Riparian Areas and Stream Environment Zones..... 4-57
17. Sensitive Plants 4-59
18. Soils 4-59
19. Special Interest Areas 4-62
20. Timber and Vegetation 4-63
21. Visual Resources 4-66
22. Water 4-73
23. Wilderness (and Roadless Areas)..... 4-86
24. Wildlife (including threatened, endangered, and sensitive species) 4-89
E. Means to Mitigate Adverse Impacts 4-95
F. Adverse Environmental Effects Which Cannot Be Avoided 4-95
G. Relationship Between Short Term Use and Long Term Productivity of the Environment..... 4-96
H. Irreversible and Irretrievable Commitments of Resources 4-97
I. Possible Conflicts With Federal, State, and Local Land Use Plans 4-98
J. Energy Requirements and Conservation Potential 4-99

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

A. Introduction

This chapter forms the scientific and analytic basis for the comparisons of alternatives described in Chapter 2.

It discusses the impact of each alternative on the economic, social, and resource environment. It also discusses ways to alleviate adverse impacts; adverse environmental impacts which can't be avoided; the relationship between short term use and long term productivity; the irreversible and irretrievable commitment of resources; possible conflicts with Federal, State, and local level use plans; and the energy requirements and conservation potential of each alternative.

Consequences are defined, and an explanation of their estimation is given.

B. Direct, Indirect, and Cumulative Economic Consequences

The economic consequences of implementing the alternatives are measured by two indicators (1) the income and employment resulting from LTBMU activities and the (2) economic efficiency (costs and benefits) or tradeoffs and opportunity costs associated with implementation.

Income and Employment

Activities on national forest lands in the past have generated only 1.6% of the average annual employment in the Lake Tahoe Basin. The primary effects of these activities on the local economy are from recreation and not from timber and other resources. Therefore the variation between alternatives in the number of new jobs created, is largely a result of variation in the recreation development programs.

Income and employment effects are estimated with the use of multipliers derived from input-output models. (See Appendix B part IIc.) An income multiplier, for example, means that spending generated by each skier in the basin creates $61.33 of income in the local economy. Multipliers are not absolute and are used for displaying the relative differences between alternatives.

National forest management not only has environmental effects on national forest land and economic effects on the Federal government, it has spin-off effects on the private and local government sectors as well. Tourists spend money in the local market for food, sporting goods, gasoline, lodging, and so on. This in turn affects employment, housing, tax revenues, and public services. Table 4.1 displays some of these secondary effects. Most jobs would be created as a result of spending by an increasing number of visitors. Some jobs could be created on a short term basis for new recreation facility construction. Some increased costs to the counties would result with growth in recreation, and employment. The differences between alternatives are not

significant, and the increased funds returned to the counties will probably cover the additional costs. The following is a summary of some of these effects.

One thousand new recreation visitor days of use will produce about:

2 cubic yards of solid waste
20,000 gallons of sewage per peak summer day
.3 person years of employment for developed recreation
4.5 person years employment for alpine skiing

A new person-year of employment results in about:
1.92 people increase in population
51.3 square feet of new commercial floor space
.62 housing demand
2.88 cubic yards of solid waste per year
192 gallons of sewage per day
.001 hospital beds
.2 school enrollment.

Table 4.1. Economic Consequences of Alternatives
(Average Annual Increase for 50 Years)

Factor	Units	A	B	C	D	E	F	G	H	I
1.Employment from:										
a.Dev.Recreation	jobs	3	0	2	3	3	1	-1	2	3
b.Dispersed Rec.	jobs	1	1	1	1	1	1	1	1	1
c.Alpine Ski	jobs	33	24	30	48	48	0	20	43	48
d.Total	jobs	37	25	33	52	52	2	20	46	52
2.Population	people	72	47	68	102	101	5	38	88	101
3.Housing	units	23	15	22	32	32	2	12	28	33
4.Solid Wastes	cu.yrds.	172	97	160	223	223	43	72	189	223
5.Sewage Flow (peak day)	M gals.	12	6	10	16	16	1	5	12	16
6.Electric Use	Mgv/yr	255	168	250	357	357	16	135	311	357
7.Hospital Care	beds	.2	.2	.2	.3	.3	0	0	.2	.3
8.Schools	students	8	5	7	11	11	1	4	10	11

The highest level of new jobs are created by Alternatives D, E, and I. Since this increase is related to meeting recreation and skiing demand, those alternatives construct few new facilities; Alternatives B, F, and G, create the lowest number of new jobs.

New jobs created generate income for other sources such as the U.S. Treasury, timber yield taxes, and the Forest Service budget.

The following components comprise the majority of receipts used to formulate the return to the treasury:

- Value of timber harvested
- Land use permits
- Grazing fees
- Recreation permits and user fees.

On the LTBMU most of the revenue for the U.S. Treasury comes from recreation and special use permit fees. Alternatives E, H, and I generate the most in returns to the U.S. Treasury.

Forest Service Budget

Each alternative has different costs to carry out the planned programs. Much of the cost comes from employing permanent and temporary employees, for contracting services, and for purchasing supplies. There are also capital investment costs for road and trail construction, for developed recreation sites, for other facilities, for reforestation or timber stand improvement, and for purchase of land. Estimates of these costs were obtained from FORPLAN analysis (see Appendix B) and are summarized in Table 2.27 Summary Comparison of Economic Effects, in Chapter 2.

Economic Efficiency

The economic efficiency of each alternative, as measured by its present net value (PNV), is calculated by the discounted dollar value of outputs (benefits) minus the discounted dollar value of the costs. (See Chapter 2 Table 2.27-2.31 PNV by Alternative.) The higher the PNV, the greater the net benefits to the public in terms of benefits that can be assigned a dollar value. Nonpriced benefits, such as scenic quality and mature forest habitat, are evaluated through other methods. See Appendices B and D for a more in depth discussion of economic benefits.

Total benefits from national forest land at Lake Tahoe increase over the plan period primarily in relation to the amount of recreation expansion that occurs. When recreation expansion is limited as a result of budget or policy limitations, the value of benefits is likewise limited. Capital investment costs are primarily for watershed restoration and recreation construction. Therefore the cost associated with each alternative is related to the size of the watershed restoration program and the emphasis placed on developed recreation. The fire management budget is also quite variable between alternatives.

Alternative A (Selected) - This alternative includes a high watershed program and a fire budget at the current level. Recreation use is higher than current but not as high as in Alternatives D or E. The PNV of $650 million includes benefits valued at $755 million and cost of $105 million.

Alternative B (Current) - The low level watershed program and current fire budget keep the cost of this alternative down. The low PNV is primarily attributable to the alternatives theme of not increasing recreation opportunities. The PNV ($499 million) includes benefits valued at $554 million and cost of $55 million.

Alternative C (Conservation) - A high watershed and fire program and emphasis on dispersed recreation increase the budget over current. The PNV ($638 million) includes benefits valued at $742 million and costs of $104 million.

Alternative D (Efficiency) - By expanding recreation to meet demand, reducing the fire budget by 40% from current, and including the low level watershed program this alternative maximizes PNV and keeps cost very low. The alternative has the highest PNV ($683 million) including benefits valued at $762 million and cost of $79 million.

Alternative E (Market) - This alternative includes the high levels of recreation and the low watershed program. The fire budget is 20% above current. The most significant factor affecting PNV in this alternative is the reduction caused by meeting the timber targets. PNV is $605 million including benefits valued at $764 million and cost of $159 million.

Alternative F (Amenity) - No new recreation or ski area development was allowed in this alternative. The most expensive watershed program was included as well as the current fire budget. The result is a $569 million PNV including benefits valued at $667 million and cost of $98 million.

Alternative G (Low Budget) - The theme of this alternative was to reduce costs. This resulted in recreation benefits below current level. This was partly offset by ski area development through private investment. The least expensive watershed program was included and the fire budget was reduced 40% from current. The PNV is $454 million including benefits worth $494 million and cost at $39 million.

Alternative H (RPA) - This alternative examines the consequences of meeting the 1980 RPA targets without using clearcutting practices. This increased logging cost and reduced PNV by $27 million. The resulting PNV was $616 million including benefits valued at $732 million and cost of $116 million.

Alternative I (Wilderness) - The cost and benefits of this alternative are very similar to Alternative D. The fire budget is reduced 20% from current, and the least expensive watershed program is included. PNV is $679 million including benefits valued at $765 million and cost of $86 million.

C. Direct, Indirect, and Cumulative Social Consequences

This section examines the consequences of the alternatives on the social variables as they relate to the social groups described in Chapter 3. The social variables most significant to activities on the LTBMU are lifestyles; attitudes, beliefs and values; community stability; and community services. Social groups include minorities, women, the handicapped, the elderly, those for whom English is a second language, and those of different ethnic origins.

Minority groups are not affected differently by the alternatives than other social group members. The LTBMU is committed to affirmative action in its hiring and contracting activities. None of the alternatives have discriminating effects, or adversly affect anyone's civil rights.

The alternatives, however, do raise social issues. When two or more groups within the sphere of influence differ significantly in their expectations for a forest resource use, or when the alternatives have different effects on the social groups, there is potential conflict between social groups. For example, alternatives which emphasize developed recreation are most beneficial to the recreation business community. Recreationists are most likely to derive benefit from alternatives which protect natural values yet provide ample dispersed and developed recreation opportunities. Many regional recreationists would prefer one class of recreation over another, for example, expanded ski areas, or alternatives with expanded wilderness. There are usually ways to resolve or reduce the conflict if adequate social information is available.

The effects of alternatives on social groups are the focus of the discussion that follows. It would be confusing because of the detail involved to show all the resource effects on all the social groups and variables. Only the most important ones are included in the following narrative.

Alternatives A (Selected) and C (Conservation) -

(1) Recreation-Dependent Business Community and Recreation Visitors.
These alternatives provide for modest expansion of developed recreation facilities including ski areas. The lifestyles of these two social groups will be enhanced by the increased recreational opportunities.

(2) Lifestyle Oriented Residents, Old Tahoe Enclaves, and Environmental Groups.
The level of resource outputs produced under these alternatives will not conflict with the attitudes and values of these social groups. The environmental thresholds are met. None of the resource program emphasis or intensities are modified to the extent that lifestyles would be affected.

(3) Owners of Undeveloped Lots.
The attitudes and values of this group support properly mitigated development such as is included in this alternative.

Alternative B (Current) -

(1) Recreation-Dependent Business Community, Lifestyle Oriented Residents, and Owners of Undeveloped Lots.
This alternative includes no expansion of developed recreation facilities. The values and attitudes of these groups are not in conflict with this level of management but their lifestyles are not enhanced by it.

(2) Old Tahoe Enclaves, and Environmental Groups.
The moderate intensity of wildlife, fisheries, and fire control programs included in this alternative will maintain but not enhance the lifestyles of these groups. Their values and beliefs would support a stronger emphasis in these resources.

(3) Recreational Visitors.
The attitudes of this social group are likely to change over time as demand for developed recreation increases relative to the fixed capacity. A decline in the quality of the recreational experience will conflict with their values and beliefs. A change in lifestyles may result for individuals who elect to seek alternate leisure activities.

Alternative D (Efficiency) -

(1) Recreation-Dependent Business Community, Recreation Visitors.
Under this alternative developed recreation keeps pace with demand. This will benefit the lifestyle of these groups. The effect of low levels of timber harvest and the absence of a grazing program will have little impact on lifestyles or values.

(2) Lifestyle Oriented Residents, Old Tahoe Enclaves, Environmental Groups, Owners of Undeveloped Lots.
The low level of emphasis this alternative places on wildlife, fish, and watershed programs would conflict with the values and beliefs of these groups. The fire management program would receive a 40% reduction in its budget. This money would fund a suppression organization with little emphasis on fire prevention. This would result in feelings of insecurity for residents and property owners and would be detrimental to their lifestyles. Their beliefs and values would support the Wilderness recommendations for Freel and Lincoln roadless areas. The net effect of this alternative would be a reduction in community stability.

Alternatives E (Market) and H (RPA) -

(1) Recreation-Dependent Business Community, and Recreation Visitors.
The lifestyles of these groups will benefit from the increased business and opportunities associated with commodity production and increased recreation capacity and use. The effects of these alternatives on visual and water quality will conflict with the values of many individuals. Community stability may be shaken as a result of the growth which will accompany either of these alternatives. Community services will be hard pressed to keep pace with the increased population. The lifestyles of these groups would benefit from the security associated with enlarging the fire management budget by 20%.

(2) Lifestyle Oriented Residents, Old Tahoe Enclaves, Environmental Groups.
These alternatives conflict with the attitudes, beliefs, and values of these groups. It will be difficult for them to maintain their lifestyles in the face of increased activity in almost every area of the basin. The wilderness recommendation for Freel and Mt. Rose and the emphasis on wildlife and fish are consistent with the values of these groups. The values of these groups would challenge the low priority placed on wildlife, fish and watershed in these alternatives. Their beliefs would likewise be in conflict with permitting timber harvest on 20% of the Freel Roadless area in the Market Alternative.

(3) Owners of Undeveloped Lots.
The effect of these alternatives on this group is hard to assess. The attitude of many individuals in this group is that growth is appropriate for the basin and need not negatively effect the lifestyles of basin residents and visitors. Others believe that the disturbance and coverage associated with these alternatives reduce the probability of their receiving approval to build on their lots. If this is true then the lifestyles of this group would not be enhanced.

Alternative F (Amenity) -

(1) Recreation-Dependent Business Community, Recreation Visitors, Owners of Undeveloped Lots.
The attitudes and beliefs of these groups would conflict with this alternative because it doesn't permit new development.

(2) Lifestyle Oriented Residents, Old Tahoe Enclaves, and Environmental Groups.
This alternative, more than any other, would reflect the attitudes, beliefs, and values of these social groups. Their lifestyles would be preserved with a minimum of risk from growth or intrusion. Their attitude and values coincide with the emphasis placed on wildlife, fish, and watershed programs as well as the wilderness recommendations.

Alternative G (Low Budget) -

(1) Recreation-Dependent Business Community, Lifestyle Oriented Residents, Old Tahoe Enclaves, Owners of Undeveloped Lots.
The 40% reduction in the fire management budget would cause a loss of security for Tahoe residents and property owners which could be interpreted as a negative effect on lifestyles. The Enclaves attitude toward, and appreciation for, solitude would partially offset this negative effect on lifestyles, but their values would not agree with the low level resource programs in this alternative. The lifestyles of lot owners could benefit if the low level of activity on national forest land resulted in threshold capacity being allocated to building permits in the private sector.

(2) Recreation Visitors, Environmental Groups.
The values, attitudes, and beliefs of these groups would be in conflict with the low priority given to the resource programs in this alternative. The lack of wilderness recommendations would be an additional concern. Under this alternative community stability would decline through lack of support from

Forest Service programs. Likewise this alternative would contribute little to maintaining or enhancing community services.

Alternative I (Wilderness) -

This alternative has many characteristics in common with the previous alternatives. The effect of the social variables on each group resulting from these factors will be the same as already discussed. The fire management budget is reduced 20% which will cause added anxiety amoung basin residents, businesses, and property owners. Recreation demand is met, and both Freel and Lincoln are recommended for wilderness. Otherwise, this is a conservative alternative which, like Alternative B, should not conflict with the values and attitudes of any social group.

D. Direct, Indirect, and Cumulative Resource Consequences

1. Air Quality and Noise

Air Quality

Effects on air quality would vary between alternatives primarily as a result of automobile traffic generated by recreation users and by the volume of slash burned following timber management activities. Other sources of air pollution would be present but were considered to be of very low magnitude and fairly uniform between alternatives. Included were vehicle travel for administration of the forest, dust generated by travel on unimproved roads and campfire smoke.

Vehicle miles traveled (VMT) is one of the measurements of traffic volume used in the basin. Changes in VMT can be determined through traffic predicting models such as those currently in use by TRPA. Chemical and particulate effects upon air quality can be determined from estimates of VMT. Therefore, measurements of VMT becomes a fairly good means to determine change in air quality.

Emission components vary by the average speed of a vehicle, the season of the year, and the altitude for which the vehicle is tuned. However, a reasonable average per mile of travel is 2.9 grams oxides of nitrogen, 54.0 grams carbon monoxide, and 9.4 grams of particulates (source - TRPA, April 1985).

Table 4.3 displays the estimated effects of recreation use on air quality. Total metric tons of nitrogen oxides (NOx), carbon monoxide (CO), and particulates are predicted as a result of vehicle miles traveled by recreationists visiting the national forest. Predictions are based upon six VMT per recreation visitor day from summer use and 14 VMT per recreation visitor day from skiing, using the emission components described above and the recreation use predictions shown in tables 4.13 and 4.14. Only 25% of dispersed recreation use is used to predict the effects upon air quality of implementing an alternative plan. It is that portion (25%) which is induced by Forest Service improvements such as trails, outfitter guide permits, and similar activities. The other 75% of dispersed recreation use results because

of the great accessibility of the forest to residents and visitors to the area. It is a use that would occur rather spontaneously and is not under the control of the Forest Service.

Table 4.3 also displays the average annual new vehicle miles of travel that are expected from recreation growth. To meet the air quality thresholds established for the basin, there needs to be a reduction in the total VMT. Assistance in accomplishing the reductions would be required of every project that increases VMT through the many mitigation measures described in the TRPA Air Quality Plan and further in the TRPA Regional Transportation Plan. Probably the most effective mitigation technique available for recreation on the national forest is the continued use and expansion of transit and shuttle systems to transport skiers from their lodging. Similar systems are being used to transport residents and visitors to beaches and other sites of concentrated use. These too would be expanded. Since the table presents a relatively rough estimate of new VMT, a traffic analysis specific to each major proposal would be used to determine the amount and kind of offsetting mitigation required.

Ozone is not presented since it is not directly emitted by exhaust gases. Rather ozone is the result of a complex chemical action involving hydrocarbons and oxides of nitrogen reacting with sunlight. Ozone will occur, but only through monitoring can the amount be determined. It is assumed that if other emission components increase, so also will ozone. Conversely, if mitigation occurs to reduce emissions, ozone will also be reduced in relatively comparable amounts.

Table 4.2 displays the estimated short term effects predicted for prescribed burning of slash. Principle emission components from burning one ton of slash are particulates (33 pounds/ton), carbon monoxide (150 pounds/ton), nitrogen oxides (4 pounds/ton), and hydrocarbons (20 pounds/ton). Impacts of the emissions are described in Chapter 3. Briefly, particulates impair visibility; carbon monoxide effects human health; hydrocarbons form ozone; and nitrogen oxides fertilize algal growth in Lake Tahoe. Amount of particulates are based upon data published by the U.S. Environmental Protection Agency, "Compilation of Air Pollutant Emission Factors (Third Edition) - 1977." This publication states that burning a ton of slash generates about 15 pounds of particulate matter, 150 lbs. CO, 20 lbs. hydrocarbons, and 4 lbs. nitrogen.

Average slash to be generated per acre in group selection harvest openings is estimated at 35 tons per acre. Average slash to be generated per MBF of other types of timber management is estimated at 25 tons per acre. Slash disposal is estimated at 75% for alternatives where amenity values are high, 25% for alternatives where amenity values are low, and 50% where amenity values are moderate.

Table 4.2. Air Quality Effects from Prescribed Burning of Timber Management Slash

Decade	Emission Component	Alternatives A	B	C	D	E	F	G	H	I
1	Particulates(Tons/Yr)	70	90	68	12	190	12	25	100	70
	Hydrocarbons(Tons/Yr)	90	110	82	15	230	15	30	120	80
	Nitrogen Oxides(T/Yr)	17	22	16	3	46	3	6	24	16
	Carbon Monoxide(T/Yr)	645	825	620	110	1725	110	220	900	600
2 to 5	No change predicted from annual average in first decade.									

Alternative A - Expansion of recreation use through development of facilities has the potential for increasing the amount of CO, NOx, ozone, articulates, and other air pollutants through automobile emissions. Over the 50-year plan period, the amount of pollutants would be 75% greater than the amount produced by current national forest recreation use, and about 1.5% greater than that estimated from all auto emissions in the basin each year. Implementation of those measures required of the Forest Service in the Air Quality and Regional Transportation Plan would mitigate the adverse impacts and cause an overall improvement in air quality.

Emissions generated by timber management slash burning would be reduced by 22% from current estimated levels through more efficient burning practices and the leaving of more residue for natural decomposition. This would occur even though a slight increase is planned in the timber harvest.

Alternative B - Expansion of recreation use has the potential to increase air pollution through auto emissions the same as Alternative A, except the increase would be about 36% above current levels from national forest recreation use over 50 years, and less than 1% greater than the total of the basin. Most of the increase would occur in the winter from ski area expansion. If this increase is mitigated then total VMT's in the basin would not be increased as a result of new recreation construction. Emissions from timber management slash burning would remain about the same as currently produced.

Alternative C - Expansion of recreation use has the potential to increase air pollution through auto emissions. Much of the effect would be deferred until after the first decade since low priority is placed upon new recreation construction until the current traffic and air quality problems are corrected. Actions would be taken to offset the effects of any increased traffic resulting from new recreation activities. Further, the greater emphasis upon resolving existing air and traffic problems should provide beneficial effect at an earlier date as in Alternative A. Emissions generated by timber management slash burning would be reduced by 22% from current estimated levels through more efficient burning practices and the leaving of more residue for natural decomposition.

Table 4.3 Effects of Recreation Use on Air Quality

	Decade	Alternatives A	B	C	D	E	F	G	H	I
I. Total Auto Emissions from Recreation Use:										
Tons of Nitrogen Oxides	1	42	40	40	42	42	40	36	42	42
(NO_x)/Year	3	55	48	50	55	55	43	43	52	55
(1982 level = 37 Tons)	5	65	49	65	72	72	44	44	67	72
Tons of Carbon Monoxide	1	776	740	740	776	776	746	668	775	873
(CO) / Year	3	1033	887	900	1033	1033	805	822	977	1033
(1982 level = 696 Tons)	5	1219	912	1219	1347	1347	824	831	1251	1347
Tons of Particulate	1	135	129	129	135	135	113	116	135	135
Matter / Year	3	181	155	165	181	181	140	143	171	181
(1982 level = 121 Tons)	5	212	159	212	235	235	143	144	210	235
II. Average Annual Increase in Auto Emissions from Recreation Use:										
Tons of NO_x/ Year	1	0.3	0.2	0.1	0.2	0.2	0.1	-0.4	0.2	0.2
	3	0.7	0.4	0.7	0.7	0.7	0.1	0.4	0.5	0.7
	5	0.3	0.1	0.9	0.9	0.9	0.1	0.0	0.7	0.9
Tons of CO / Year	1	11.7	2.4	1.5	11.4	11.4	1.5	-1.3	11.4	11.4
	3	12.9	7.2	12.9	12.5	12.5	1.0	7.8	9.2	12.9
	5	5.8	1.0	17.3	17.3	17.3	1.0	.4	8.9	17.2
Tons of Particulate	1	0.4	0.5	0.2	0.3	0.3	0.2	-1.7	0.3	0.3
Matter / Year	3	2.2	1.3	2.2	2.2	2.2	0.2	1.4	1.6	2.2
	5	1.0	0.2	3.0	3.0	3.0	0.2	0.1	2.1	3.0
III. Average Annual Vehicle Miles of Travel to be Mitigated as Part of New Recreation Construction. (Thousand Miles):										
Summer Developed	1	7	0	0	0	0	0	0	0	0
Recreation	2	19	0	19	19	19	0	0	0	19
	3	68	0	36	68	68	0	0	0	68
	4	67	0	68	67	67	0	0	36	67
	5	59	0	69	69	69	0	0	0	69
Downhill Skiing	1	56	56	0	56	56	0	56	56	56
	2	127	127	127	127	127	0	127	127	127
	3	153	125	153	153	153	0	137	153	153
	4	154	20	188	188	188	0	0	188	188
	5	31	10	232	232	232	0	0	147	232

Alternatives D, E and I - Expansion of recreation use has the potential to increase air pollutant levels through auto emissions the same as in Alternative A. Over the 50 years of the plan, the amount of pollutants would be nearly double the current level produced from national forest recreation use and about 2% greater than that estimated from all auto emissions in the basin each year. Mitigation measures would be required as in Alternative A resulting in an overall improvement in air quality. Emissions generated by timber management slash burning would more than double from current level in Alternative E as a result of a greatly increased timber harvesting program. Alternative I, with a timber harvesting program at about current level, would have a slightly lower slash burning program because more would be allowed to deteriorate naturally. Alternative D would produce the least amount of emissions since the timber harvest program is small and for cost efficiency most of the slash would be allowed to deteriorate naturally.

Alternative F - Since only dispersed recreation use is expanded in this alternative, the increase in air pollutants is limited. Over the 50 year planning period the amount is about 18 % greater than currently produced from national forest recreation use, and only a fraction of a percent greater than that estimated from all auto emissions in the basin each year. Mitigation would occur only on about 20,000 VMT per year resulting from dispersed recreation facility construction. Emissions generated from timber management slash burning would be substantially lower than current levels.

Alternative G - Expansion of recreation use would be very small in this alternative and therefore the expected increase in pollutants from auto emissions would be about 19% over the 50 year span of the plan. However, in the first decade there would be a 5% decrease in air pollutants due to the closing of Forest Service operated recreation sites. This reduction would be replaced by the second decade with expanded skiing facilities. Mitigation would offset the adverse impacts and result in an overall improvement in air quality. Emissions from timber management slash burning would be substantially less than current levels since most would be left to deteriorate naturally as a cost saving mechanism.

Alternatives H - Expansion of recreation use has the potential to increase air pollutant levels through auto emissions the same as Alternative A. Over the 50 years of the proposed plan the amount would be about 73% greater than the current level produced from national forest recreation use and about 1.5% greater than that estimated from all auto emissions in the basin each year. Mitigation through offsetting measures of the 141,400 average annual VMT increase from new recreation construction, along with implementation of other mitigation measures would reduce total VMT's and improve air quality. Emissions generated by timber management slash burning would increase from current level. The increase is the result of a greatly increased timber harvesting program. Since harvesting would be spread over a large land area each year, more slash would be allowed to deteriorate naturally.

Noise

Noise levels will vary between alternatives due primarily to the effects of motorized vehicles and equipment. Alternative E and, to a lesser extent, Alternative H emphasize timber management and would be the noisiest. Noise from chain saws, tractors, logging trucks, and helicopters employed to log on steep lands would periodically interrupt the natural sounds of the forest. Addition of roads for management purposes would also offer greater opportunities for OHV activities which usually have associated high noise levels. Alternatives A, D, E, H, and I all add developed recreation facilities which would add to the noise of vehicle traffic on forest highways. Although these trips would be mitigated through measures stated in the TRPA Regional Plan, much of the mitigation would occur in the urbanized rather than the rural forest setting. Ski area development in these alternatives would also add noise from ski lift operation, snowmaking and grooming equipment, and occasionally from the emergency use of helicopters.

Alternatives B, C, F, and G would not add major new sources of noise.

Meeting the environmental thresholds for single noise event levels should not vary by alternatives, although those alternatives allowing or requiring higher levels of motorized use may have a higher potential for unacceptable noise events. Under the low budget Alternatives B and G, ability to control noise events that exceed the threshold would be diminished.

Cumulative noise event level (CNEL) thresholds are expected to be achievable in all alternatives. However, there is greater risk of exceeding the thresholds in those alternatives that require or allow more motorized equipment. This is especially true in the vicinity of areas already having high noise levels, such as along highways and in industrial areas. Meeting CNEL would also be increasingly difficult in critical wildlife habitat or wilderness that interface areas with considerable amounts of human activity.

No attempt was made to translate noise sources into predictions of CNEL levels by alternatives.

2. Adjacent Ownership

Effects of national forest management upon adjacent landowners would be primarily the result of recreation expansion that would disperse people throughout the forested land. Some of the use would probably occur on private land. Forest Service capability for wildland fire suppression would also have affects where it is the responsible agency. Other resource management activities would not greatly affect other lands.

Alternatives A, C, D, E, F, H, and I all have expanded dispersed recreation which would result in a large potential for the public to use lands adjacent to the national forest. As dispersed recreation is expanded there would be a greater need for rights-of-way to access all of the national forest.

Alternatives B and G have less expansion of dispersed recreation and, therefore, the impacts upon adjacent landowners could be less.

Alternatives C, E, and H would offer better fire protection for adjacent land because of a larger fire management organization. Alternatives A, B, and F would continue the fire protection at about the same level as current. Alternatives D, G, and I would offer less capability to protect the lands of adjacent ownerships.

3. Diversity

For purposes of this discussion, increases in the amount and distribution of plant and animal diversity are considered improvements. Wetland habitat improvement and watershed restoration in riparian areas are also intended to express improvements in diversity. One mile of stream improvement is the equivalent of one acre of improvement. The changes or consequences described are anticipated to occur by the end of the 50-year planning period.

Management of plant and animal diversity would vary in all alternatives. Vegetation diversity on the LTBMU would be affected by natural processes such as wildfire, insect and disease attacks, and plant succession. Climatic variation would maintain an eastside/westside difference based on precipitation, and elevation would maintain distributional differences between alpine, true fir, and mixed conifer vegetation types. Timber, wildlife and watershed management, and grazing activities would also cause changes in plant and animal species' richness, abundance, and distribution patterns.

Table 4.4 depicts the effects of planned management and plant succession on successional stages of red fir and mixed conifer vegetation, the predominant vegetation types on the LTBMU.

All alternatives would provide more early successional stage mixed conifer and red fir than currently exists. The present shortage of early successional stages would develop into a shortage of mid-successional conifer forest as the current size class 3 (small sawtimber; 11-24 inches in diameter) conifer types become size class 4 (medium to large sawtimber; >24 inches in diameter) with virtually no replacement of size class 3 due to the current lack of early successional stages. The majority of lodgepole pine stands will continue to mature in all alternatives.

Wildlife diversity should not be similarly affected as size class 4 conifers are as high quality of habitat as size class 3 for those wildlife species dependent upon moderate-large size conifer forest types. Maintenance or enhancement of specific wildlife habitat diversity elements such as snags and down logs would be guided by standard and guidelines in the alternatives.

Planned reforestation efforts would not significantly change plant species composition or genetic diversity because seedlings derived from seed collected locally would be used.

Standards and guidelines would protect existing riparian vegetation from any major modifications. Existing riparian vegetation will mature through natural processes in all alternatives.

Meadow vegetation (wet meadow and perennial grasslands) would be maintained by implementation of standards and guidelines in all alternatives and enhanced by watershed restoration and wildlife management programs in most alternatives.

Alternative A (Selected) - Acreages of the different successional stages of red fir and mixed conifer would vary from current as follows (see Table 4.4 for specific acreage totals):

	Red Fir	Mixed Conifer
early 1/	(+620 ac)	(1696 ac)
mid	- 95%	- 96%
late	+ 235%	+ 310%

Approximately 250 acres of wetland habitat improvement and 360 acres of watershed restoration in riparian areas would be completed. Approximately 50% (1,100 acres) of meadow acreage would be enhanced by improvement of water tables and/or lodgepole pine thinnings by both watershed restoration and wildlife habitat improvement programs.

Diversity on 31% of existing brushlands would be improved as a result of wildlife management activities to increase early successional brush stages.

Acreage of early successional stages of lodgepole pine stands would increase by 10% (approximately 1,300 acres) from current conditions due to planned timber and wildlife management activities.

Approximately 130 miles of stream habitat diversity would be improved. Forty percent of this improvement would come as induced benefits of planned watershed improvement projects and the remainder as direct benefits of a moderate level fisheries management program.

Alternative B (Current) - Acreages of the different successional stages of red fir and mixed conifer would vary from current as follows:

	Red Fir	Mixed Conifer
early	(+190 ac)	(+1,140 ac)
mid	- 98%	- 97%
late	+ 246%	+ 317%

Approximately 250 acres of wetland habitat improvement and 200 acres of watershed restoration in riparian areas would be done.

Approximately 50% (1,050 acres) of meadow acreage would be enhanced by improvement of water tables and/or lodgepole pine thinnings by both watershed restoration and wildlife habitat improvement programs.

1/ The current distribution of seral stages includes so few acres of early conifer stages that % changes from current in this category have no meaning. Numbers shown are acres of increase above current.

Diversity on 31% of the brushlands would be improved as a result of wildlife management activities to increase early successional brush stages.

Acreage of early successional stages of lodgepole pine stands would increase by 10% (approximately 1,300 acres) from current conditions due to planned timber and wildlife management activities.

Approximately 100 miles of stream habitat diversity would be improved. Twenty percent of this improvement would come as induced benefits of planned watershed improvement projects and the remainder as direct benefits of a moderate level fisheries management program.

Alternative C (Conservation) - Acreages of the different successional stages of red fir and mixed conifer would vary from current as follows:

	Red Fir	Mixed Conifer
early	0	0
mid	- 99%	- 98%
late	+ 246%	+ 320%

Approximately 250 acres of wetland habitat improvement and 360 acres of watershed restoration in riparian areas would be done.

Approximately 50% (1,200 acres) of meadow acreage would be enhanced by improvement of water tables and/or lodgepole pine thinnings by both watershed restoration and wildlife habitat improvement programs.

Diversity on 51% of existing acreages of brushlands would be improved as a result of wildlife management activities to increase early successional brush stages.

Acreage of early successional stages of lodgepole pine stands would increase by 10% (approximately 1,300 acres) from current conditions due to planned timber and wildlife management activities.

Approximately 165 miles of stream habitat diversity would be improved. Thirty percent of this improvement would come as induced benefits of planned watershed improvement projects and the remainder as direct benefits of a high level fisheries management program.

Alternative D (Efficiency) - Acreages of the different successional stages of red fir and mixed conifer would vary from current as follows:

	Red Fir	Mixed Conifer
early	(+149 ac)	(+818 ac)
mid	- 99%	- 98%
late	+ 245%	+ 320%

Approximately 200 acres of watershed restoration in riparian areas would be done.

Approximately 2% (50 acres) of meadow acreage would be enhanced by improvement of water tables by watershed restoration programs.

Table 4.4. Forest Diversity

Acres of Red Fir and Mixed Conifer Timber Types by Alternatives

Vegetation Type	1982 Base	A Selected		B Current		C Conservation		D Efficiency		E Market		F Amenity		G Low Budget		H RPA		I Wilderness	
		10yrs	50yrs	10yrs	50yrs	10yrs	50yrs	10yrs	50yrs	10yrs	50yrs	10yrs	50yrs	10yrs	50yrs	10yrs	50yrs	10y	50yrs
Red Fir <30 years old	0	250	620	60	190	0	0	60	149	3327	2764	250	620	60	149	60	476	168	384
Red Fir 30-125 years old	11830	11580	630	11830	188	11890	378	11828	151	9649	3430	11580	630	11670	151	11830	453	11830	392
Red Fir >125 years old	7863	7863	18443	7803	19317	7803	19317	7805	19391	6717	13977	7863	18443	7863	19397	7803	18764	7695	18917
Mixed Conifer <30 years old	40	790	1734	640	1179	0	0	380	858	7792	11601	789	1660	380	859	1197	2301	431	1546
Mixed Conifer 30-125 years old	39688	38938	1784	39688	1237	40328	2416	39348	880	36140	12498	38941	1715	39348	880	39688	2401	39688	1527
Mixed Conifer >125 years old	17193	17193	53403	16593	54505	16593	54505	17193	55183	13169	32761	17193	53546	17193	55182	16036	52219	16802	53848

Brushland acreage would continue to mature.

Approximately 30 miles of stream habitat diversity would be improved. This improvement would come as induced benefits of planned watershed improvement projects.

Alternative E (Market) - Acreages of the different successional stages of red fir and mixed conifer would vary from current as follows:

	Red Fir	Mixed Conifer
early	(+2,760 ac)	(+11,560 ac)
mid	- 71%	- 69%
late	+ 178%	+ 191%

As a result of an intensive timber management program the environmental threshold of maintaining 15-25% of mixed conifer and red fir vegetation in successional stages other than mature would be achieved.

Approximately 200 acres of watershed restoration in riparian areas would be done.

Approximately 2% (50 acres) of meadow acreage would be enhanced by improvement of water tables by watershed restoration programs.

Brushland acreage would continue to mature.

Acreage of early successional stages of lodgepole pine stands would increase by 20% (approximately 2,500 acres) from current conditions due to planned timber management activities.

Approximately 30 miles of stream habitat diversity would be improved. This improvement would come as induced benefits of planned watershed improvement projects.

Alternative F (Amenity) - Acreages of the different successional stages of red fir and mixed conifer would vary from current as follows :

	Red Fir	Mixed Conifer
early	(+620 ac)	(+1,620 ac)
mid	- 95%	- 96%
late	+ 234%	+ 311%

250 acres of wetland habitat improvement and 360 acres of watershed restoration in riparian areas are planned.

Approximately 50% (1,200 acres) of meadow acreage would be enhanced by improvement of water tables and/or lodgepole pine thinnings by both watershed restoration and wildlife habitat improvement programs.

Diversity on 51% of brushlands acreages would be improved as a result of wildlife management activities to increase early successional brush stages.

Acreage of early successional stages of lodgepole pine stands would increase by 10% (approximately 1,300 acres) from current conditions due to planned timber and wildlife management activities.

Approximately 165 miles of stream habitat diversity would be improved. Forty percent of this improvement would come as induced benefits of planned watershed improvement projects and the remainder as direct benefits of a high level fisheries management program.

Alternative G (Low Budget) - Acreages of the different successional stages of red fir and mixed conifer would vary from current as follows:

	Red Fir	Mixed Conifer
early	(+149 ac)	(+819 ac)
mid	- 99%	- 98%
late	+ 247%	+ 321%

250 acres of wetland habitat improvement and 200 acres of watershed restoration in riparian areas are planned.

Approximately 30% (800 acres) of meadow acreage would be enhanced by improvement of water tables and/or lodgepole pine thinnings by both watershed restoration and wildlife habitat improvement programs.

Brush stands would continue to mature.

Acreage of early successional stages of lodgepole pine stands would increase by 6% (approximately 750 acres) from current conditions due to planned timber and wildlife management activities.

Approximately 80 miles of stream habitat diversity would be improved. Twenty percent of this improvement would come as induced benefits of planned watershed improvement projects and the remainder as direct benefits of a moderate level fisheries management program.

Alternative H (RPA) - Acreages of the different successional stages of red fir and mixed conifer would vary from current as follows:

	Red Fir	Mixed Conifer
early	(+476 ac)	(+2,401 ac)
mid	- 96%	- 94%
late	+ 239%	+ 304%

Approximately 250 acres of wetland habitat improvement and 360 acres of watershed restoration in riparian areas would be completed.

Approximately 50% (1,100 acres) of meadow acreage would be enhanced by improvement of water tables and/or lodgepole pine thinnings by both watershed restoration and wildlife habitat improvement programs.

Diversity on 31% of existing acreages of brushlands would be improved as a result of wildlife management activities to increase early successional brush stages.

Acreage of early successional stages of lodgepole pine stands would increase by 11% (approximately 1,400 acres) from current conditions due to planned timber and wildlife management activities.

Approximately 165 miles of stream habitat diversity would be improved. Thirty percent of this improvement would come as induced benefits of planned watershed improvement projects and the remainder as direct benefits of a high level fisheries management program.

Alternative I (Wilderness) - Acreages of the different successional stages of red fir and mixed conifer would vary from current as follows:

	Red Fir	Mixed Conifer
early	(+384 ac)	(+1,506 ac)
mid	- 97%	- 96%
late	+ 241%	+ 313%

Approximately 250 acres of wetland habitat improvement and 200 acres of watershed restoration in riparian areas would be done.

Approximately 50% (1,050 acres) of meadow acreage would be enhanced by improvement of water tables and/or lodgepole pine thinnings by both watershed restoration and wildlife habitat improvement programs.

Diversity on 31% of existing acreages of brushlands would be improved as a result of wildlife management activities to increase early successional brush stages.

Acreage of early successional stages of lodgepole pine stands would increase by 10% (approximately 1,300 acres) from current conditions due to planned timber and wildlife management activities.

Stream habitat diversity would be improved 60% (approximately 100 miles) over current conditions. Twenty percent of this improvement would come as induced benefits of planned watershed improvement projects and the remainder as direct benefits of a moderate level fisheries management program.

4. Facilities

a. Roads

Most of the alternatives do not add many miles to the existing 240 mile system in the next 50 years. Road building was necessary to achieve a timber harvest in excess of about 8 to 10 million board feet annually. Alternative E results in the most road construction to reach unaccessed timbered areas. Even in this alternative, construction would not begin until the third decade. A total of 20 miles of new road would be constructed through the fifth decade. Alternative G results in the permanent closure of about 34 miles of the unneeded roads in the existing system. Mileage in the road system of each alternative is displayed in Table 2.23 in Chapter 2.

Distribution of the road system by maintenance levels would change by alternative. Differences are the result of the services that would be

necessary from the roads. Alternative F would have the largest portion of the system in level 1 maintenance to allow road surfaces to be stabilized against soil movement and to reduce activities disturbing to wildlife. Alternative G would place roads in the least expensive maintenance levels that provide the reduced services of that alternative.

All other alternatives keep roads open at service levels that provide suitable access for resource management and recreation use. Table 4.5 displays the miles of road by maintenance levels in the first decade of each alternative.

Table 4.5. Road Maintenance Levels
(Miles of Road)

Maintenance Level 1/	Alternatives A	B	C	D	E	F	G	H	I
1	20	9	120	53	20	120	97	20	53
2	155	169	55	125	155	55	55	155	125
3	3	25	3	25	3	3	15	3	25
4	35	10	35	10	35	35	25	35	10
5	29	27	27	27	27	27	15	27	27
Total Miles	242	240	240	240	240	240	207	240	240

1/ Maintenance levels of roads are described in glossary.

No difference would be expected to occur in the State and county road system as a result of alternative forest plans. The Regional Transportation Plan (1988) for the Lake Tahoe Basin identifies improvements needed in State and county roads and other aspects of the area transportation system.

Secondary effects of road construction associated with each alternative are increased access to national forest lands and increased land disturbance.

Since the land area accessed by the road system varies little between alternatives, the indirect effect of distributing forest recreation visitors would not be expected to vary substantially. Those alternatives, such as E and H, that expand the road system somewhat would better serve the public interested in motorized forms of recreation. Alternatives B, C, F, and G would best serve the public that is interested in nonmotorized recreation.

Effects of land disturbance are discussed in detail under the water, soils and geology sections of this chapter and are not repeated here. Standards and guidelines for road construction, reconstruction, and maintenance would be applied in all alternatives to cause roads to have the least possible impact

upon water quality. However, the width of roads, the level of maintenance, and the amount of traffic each receives would also affect the contribution to adverse water quality effects. These same factors also determine the amount of dust that may be forced into the air by vehicle travel and wind.

b. Trails

The effects of implementing each alternative are assessed by the miles of trail to be constructed and reconstructed, and the total trail system to be maintained (see Table 4.6).

Table 4.6. Trail System by Alternatives
(Miles)

	Alternatives								
	A	B	C	D	E	F	G	H	I
DECADE 1									
total maintained1/	278	254	257	254	254	254	254	254	257
reconstructed	20	20	75	20	20	75	20	20	40
constructed	70	56	69	56	56	56	56	56	59
DECADE 2									
total maintained	322	291	322	316	295	313	291	306	312
reconstructed	20	20	75	20	20	75	20	20	30
constructed	54	37	30	62	41	59	37	51	65
DECADE 3									
total maintained	340	291	352	339	314	339	291	326	342
reconstructed	30	20	0	20	30	0	20	30	20
constructed	18	0	30	23	19	26	0	20	30
DECADE 4									
total maintained	354	291	352	346	319	352	291	334	342
reconstructed	40	20	0	20	40	0	20	40	10
constructed	14	0	0	7	5	13	0	7	0
DECADE 5									
total maintained	362	291	352	349	332	352	291	347	342
reconstructed	40	20	0	20	40	0	20	40	0
constructed	15	0	0	3	13	0	0	13	0

1/ Existing trails = 198 miles
total maintained = miles per year, reconstructed = miles per decade
constructed = miles per decade

In all alternatives the trail system expands rapidly in the first two decades because it is assumed that the entire Tahoe Rim Trail will be completed within

that time by volunteers. Construction of the Rim Trail is scheduled at 56 miles in the first decade and 37 miles in the second. It is the goal of the Tahoe Rim Trail Foundation to maintain the completed trail. Thus there is no impact on the trail maintenance budget.

The greatest effect of the trail system is to provide access for dispersed recreation. This is discussed under dispersed recreation.

Trails also have a potential adverse effect on water quality because of erosion associated with runoff from the trail tread. This is controlled by installation and maintenance of water bars and other drainage devices. Since few existing trails currently meet the erosion control standards, the degree to which trails are reconstructed to meet those standards and the timing of that work are reasonable indications of their relative effect on water quality. Alternatives A, C and F would have the least effect because all substandard trails (150 miles) are reconstructed during the first two decades. Alternatives H would have more effect because, while all substandard trails are reconstructed, the work is scheduled over four decades. Alternative A expands the Forest Service bikeways/pedestrian system an average of one mile per year as part of the Regional Transportation Plan for the Lake Tahoe Basin. The remaining alternatives, B,D,E,G, and I, reconstruct only the worst trails (100 miles) during the first five decades and generally spread the work evenly over time. Alternative I, however, while reconstructing only the worst trails, completes the work in four decades and finishes 70% by the end of the second decade. In this alternative, trails have a higher priority because of the Wilderness and Semi-Primitive Non-Motorized emphasis. Much of the difference in reconstruction between alternatives is related directly to the degree to which the watershed program places priority on trail related water quality problems.

All alternatives allow for the flexibility of interpreting the routes of the California and Pony Express Trails should they be designated National Historic Trails. Even if they are not so designated, the option remains for identifying and interpreting these routes through the LTBMU in cooperation with volunteer trail organizations.

Alternatives also differ in the number of trails that are open to motorized use. This is discussed in the recreation section under Dispersed Recreation.

c. Dams and Diversions

There will be few new dams on the LTBMU in the future because of environmental conditions and restraints. This includes new hydroelectric projects over which the Federal Energy Regulatory Commission has licensing authority. Changes with regard to existing Forest Service owned and operated dams will result principally from the amount of maintenance carried out as a function of the emphasis placed upon fisheries management in each alternative. There may be changes in management responsibility, particularly for operation and maintenance of the streamflow enhancement and lake level regulating dams originally constructed by the California Department of Fish and Game. Table 2.23 compares the number of and responsibility for dams by alternative.

Existing legal agreements would prevent variation in operation and maintenance of the Fallen Leaf Lake dam by the Forest Service, hence it will remain unchanged in all alternatives. The same is true for Heavenly Valley Creek Dam which would continue to be operated by the ski area permittee in all alternatives.

Alternatives A, C, F, and H - All eleven Forest Service owned dams would be maintained and operated at levels to assure high fisheries, water quality and recreation values. Consistent streamflow releases would ensure high quality aquatic and riparian habitat in both the lakes and streams associated with the dams. This would assure that associated thresholds would be met. Minor reconstruction would be necessary to keep the dams operational.

Alternatives B and I - The eleven Forest Service owned dams would be maintained and operated. One dam would be allowed to deteriorate because of the high cost to maintain it. Protection of fisheries and riparian habitat and recreation values would be at a fairly high level. There would be some loss of value upon discontinued operation of the one dam. Water rights associated with that dam would also no longer be needed.

Alternatives D and G - Under these alternatives one of the nine streamflow enhancement dams would be removed or allowed to deteriorate in a safe manner each decade. This would start about the year 2000, and at the end of the plan period in 2030 only five streamflow enhancement dams would remain. Operation would be less frequent than currently occurs and, therefore, there would be less consistency in streamflows. Some reduction in the quality of fish and riparian habitat and recreation would result and, therefore, the thresholds for these factors would not be met. Water rights associated with the dams that are removed would no longer be required.

Alternative E - Operation and maintenance of the streamflow enhancement dams would be a low priority. They would be removed or allowed to deteriorate in a safe manner on the following schedule: one dam by 1990; five by 2000; and three by 2010. Fisheries, aquatic and riparian habitat would decline. Water quality would also be effected by larger fluctuations in the flow of streams without the regulating dams. The cumulative impacts would be widespread and most evident in dry years. Associated thresholds in the basin would not be met. Water rights would no longer be required for these impoundments.

d. Administrative Facilities

The number of administrative sites are not expected to differ much by alternatives. Table 2.23 compares the number of sites by alternative. Alternatives with larger programs than current would require a larger work force and therefore, more office and work space. Those emphasizing recreation development probably would have the largest requirement for administrative space. All alternatives will make full utilization of all employee housing units. Studies are needed to determine if cost efficiencies can be realized from replacement of leased office space with government owned facilities. Ability to maintain the facilities would be more difficult in alternatives

having low program levels. Lack of repair would accelerate deterioration of the facilities to an unserviceable condition. This in turn would require leasing of replacement space or crowding of more activity into existing space, usually an unsafe practice. In the long term allowing facilities to deteriorate would result in larger replacement costs through leasing, or reconstruction.

5. Fire and Fuels

The effect of implementing each alternative on fire and fuels was evaluated using the following indicators:

1) The average annual acres predicted to be burned by wildfire in each alternative as determined by the Level II National Fire Management Analysis (NFMAS) established for use on national forest land. There was no change determined to exist decade by decade. Table 4.7 is a comparison of expected average annual acres burned.

Table 4.7. Expected Average Annual Acres Burned
(acres by intensity class)

	Alternative			
Fire Intensity Level	A,B,F	C,E,H	I	D,G
1	6	5	10	19
2	18	11	24	35
3	16	12	17	17
4	3	2	3	4
5	1	1	0	1
TOTAL	44	31	54	76

2) Changes in fuel models (vegetative cover types) can be influenced by regeneration cutting involving the conversion of existing timber stands to plantations. In general, alternatives emphasizing timber management would have an effect on fuel model changes over time by increasing plantation acreage. Additional acres of plantations could affect the fire management effectiveness as flammability would increase and, also, the net losses would be greater when plantations are burned as opposed to merchantable timber which could be salvaged. However, only Alternative E proposes increased plantation acreage large enough to significantly change or affect the fuel modeling unit-wide. Nontimber fuel models such as brush and grass would not change significantly over time by alternative.

Fuel treatment would be influenced primarily by acreage of timber management activities and the amount of slash disposal required by the theme of each alternative. Acres of other management activities, such as for wildlife habitat improvement, would also influence the amount of fuel

treatment, but to a lesser extent. Table 4.8 displays the acres of proposed treatment by alternative for the first five decades.

Table 4.8. Proposed Average Annual Fuel Treatment by Alternative (Acres)

	Alternative								
Decade	A	B	C	D	E	F	G	H	I
1	300	410	300	40	830	410	90	420	290
2	300	410	300	40	750	410	90	500	300
3	300	400	300	40	850	410	90	460	290
4	300	400	300	40	810	410	90	450	270
5	300	400	300	40	940	410	90	480	260

3) Alternatives utilizing strategies other than control will produce small increases over current wildfire acreage. Alternatives retaining only the current strategy of wildfire control will produce near current wildfire acreage loss.

4) Different fire program budget levels would have varying consequences on fire-related resources for which dollar values cannot be constructed. The following elements were determined to exhibit the greatest potential negative impact from fire:

   Wildfire smoke emissions - The quantity of wildfire smoke would remain a sensitive issue regardless of the selected fire protection program. Increases in burned acreage could adversely effect visibility and threaten attainment of the environmental thresholds.

   Other agency impacts, shared suppression resources, and availability from cooperator agencies - A lesser presence as a fire management agency resulting from decreased budget levels could erode cooperative support of local fire department agencies. Shared initial attack support from these agencies has been effective in minimizing acreage loss on lands adjacent to urban development.

   Public concern and safety - High property values at risk require a level of wildfire suppression commensurate with public expectations and demonstrated need. A lesser Forest Service presence would present a higher risk that an escaped fire would burn homes or other improvements. Rapid initial attack and control in urbanized areas is expected by critical publics.

Alternative A - Under this alternative, 44 acres per year are predicted to be burned by wildfire. This average would increase slightly by implementing a wildfire response strategy of containment on forested lands outside of urbanized areas and confinement on high elevation alpine areas.

Activity fuels would be treated to the level specified in the stand management prescriptions for the area being treated while providing adequate slash for wildlife and watershed protection cover.

Timber management activities would not result in significant fuel model changes over time.

Air quality impacts from wildfire smoke, cooperative support of other agencies, and public concern regarding safety would remain at acceptable levels.

Alternative B - Under this alternative, 44 acres per year are predicted to be burned by wildfire.

Activity fuels would continue to receive 100% disposal to approximate a natural appearance.

Timber management activities would not result in significant fuel model changes over time.

Air quality impacts from wildfire smoke, cooperative support of other agencies, and public concern regarding safety would remain at acceptable levels.

Alternative C - Under this alternative, 31 acres per year are predicted to be burned by wildfire.

Activity fuel treatment would emphasize maintenance of air, water and visual quality.

Timber management activities would not result in significant fuel model changes over time.

Air quality impacts from wildfire smoke, cooperative support of other agencies, and public concern regarding safety would remain at acceptable levels.

Alternative D and G - Under these alternatives, 76 acres per year are predicted to be burned by wildfire.

Activity fuel treatment would meet minimum fire hazard reduction needs.

Decreases in timber management activities would result in no fuel model changes over time.

A lesser Forest Service fire protection and prevention presence coupled with a significant increase in expected annual acreage burned would result in a greater risk of air quality impacts from wildfire smoke. Cooperative support of local fire departments would weaken. Public concern regarding safety could result from an increase in burned acreage. Loss of more structures would be anticipated.

Alternative E - Under this alternative, 31 acres per year are predicted to be burned by wildfire, although this average would increase slightly by

implementing a wildfire response strategy of confinement on high elevation alpine areas.

Activity fuel treatment would emphasize protection of timber and recreation investments.

A large increase in regeneration cutting would change fuel models over time by increasing plantation acreage.

An increase in the prescribed fire workload would result in a greater risk of unacceptable air quality impacts. Cooperative support of local fire departments and public concern regarding safety would remain at acceptable levels.

Alternative F - Under this alternative, 44 acres per year are predicted to be burned by wildfire.

Amenity values would emphasize complete disposal of activity fuels.

Timber management activities would not result in significant fuel model changes over time.

Air quality impacts from wildfire smoke, cooperative support of other agencies, and public concern regarding safety would remain at acceptable levels.

Alternative H - Under this alternative, 31 acres per year are predicted to be burned by wildfire.

Activity fuel treatment would emphasize fire hazard reduction.

Timber management activities would not result in significant fuel model changes over time.

Air quality impacts from wildfire smoke, cooperative support of other agencies, and public concern regarding safety would remain at acceptable levels.

Alternative I - Under this alternative, 54 acres per year are predicted to be burned by wildfire, although this average would increase slightly by implementing a wildfire response strategy of containment on forested lands outside of urbanized areas and confinement on high elevation alpine areas.

Activity fuel treatment would emphasize fire hazard reduction while providing adequate slash for wildlife and watershed protection cover.

Timber management activities would not result in significant fuel model changes over time.

Air quality impacts from wildfire smoke, cooperative support of other agencies, and public concern regarding safety would remain at acceptable levels.

6. Fish

The major impacts on fisheries resources would come from fisheries habitat improvements and indirect effects on habitat from watershed restoration programs. Both would have positive effects on the resource. Timber and grazing management activities would also have indirect effects. The possibility of increased sedimentation from timber and road building activities and loss of stream bank cover from livestock grazing would have negative effects.

Standards and guidelines have been developed for fish habitat, riparian areas, stream environment zones, and water quality management and would be included in all alternatives. These standards and guidelines and planned habitat improvements should effectively mitigate any negative impacts to fisheries and ensure adequate habitat to support viable populations of all fish management indicator species (MIS).

Ninety-five percent of the planned improvements would take place in streams. All three fish MIS would benefit from planned improvements. In resident trout streams, brook trout would benefit the most, whereas in migratory trout streams, rainbow trout would benefit the most. Improvements in lakes would be limited by accessibility, wilderness designation, and water quality standards.

Reintroduction of Lahontan cutthroat trout may occur in all alternatives in accordance with the recovery plan.

Fish stocking of lakes and streams by California and Nevada fish and wildlife agencies would continue to attempt to meet demand for fishing in all alternatives.

Table 2.23 in Chapter 2 compares the projected outputs for resident fish in pounds of fish and Wildlife and Fish User Days (WFUD).

Alternatives B and I - Under these alternatives, two to three acres of resident fish habitat would be improved each year (approximately 100-130 acres by the end of the planning period). This represents a 60-80% increase in fish habitat capability in streams. Habitat capability would be improved in both resident and migratory streams. Twenty to forty percent of this increase would result from the watershed restoration program. It is estimated that annual fish production would increase approximately 3% over current levels.

Alternatives A, C, F, and H - Under these alternatives the highest levels of fisheries habitat capability would be achieved. However, even in these alternatives RPA targets for resident fish habitat improvement could not be met. Approximately three to eight acres of resident fish habitat improvement would be accomplished each year. Alternatives C and H include more direct fish habitat improvement in the first period than does Alternatives A and F. The long term benefits for these alternatives would be the same, however, because the fish program associated with Alternatives C and H produces long term benefits equal to the early period benefits from the watershed program included in Alternatives A and F. It is estimated that annual fish production would increase approximately 2% in the first decade and 6% by 2030.

Alternatives D and E - Under these alternatives, 0.6 acres of resident fish habitat improvement would be accomplished each year. This represents a 20% increase in stream habitat capability. Habitat capability would be improved in migratory streams only. This increase would result from the watershed restoration program. It is estimated that annual fish production would increase 1% over current levels.

Alternative G - Under this alternative, 1.6 acres of resident fish habitat improvement would be accomplished each year (approximately 80 acres by the end of the planning period). This represents a 50% increase in stream habitat capability. Habitat capability would be improved in both resident and migratory streams. Twenty percent of this increase would be from the watershed restoration program. It is estimated that annual fish production would increase 1.5% over current levels.

7. Forest Pest

Under Integrated Pest Management (IPM), the level or intensity of pest management practices will vary to meet the needs of each alternative and may result in different levels of pest related damage on the forest. Indicators of pest activity include tree mortality, reduced growth, top killing, defoliation, reduced tree quality, and reduced quantity and quality of seed production. Such damage could result in understocking, failure and delay of regeneration, reduced site productivity, degradation of recreation sites, more hazardous trees, and other undesirable vegetation changes. Depending on management goals and objectives, pest-related damage could have quantitative and qualitative effects on outputs and services. The likelihood of unacceptable damage occurring depends, in part, on climatic and environmental conditions and the effectiveness of preventive and mitigating actions.

Vegetation management, by creating and maintaining healthy, vigorously growing trees and stands, provides the best opportunity to prevent and reduce the amount and impact of pest related damage, although other direct preventive and control actions against pests may be necessary in specific situations. In general, increased opportunities to bring stands under management, including control of stocking levels, species composition and the timely removal of stressed and/or diseased trees, should reduce insect and disease damage. The appropriate use of regeneration timber harvest provides the means to remove stands particularly susceptible to (or currently experiencing) unacceptably high levels of pest damage. Examples include stands heavily infected with dwarf mistletoe and/or with high levels of mortality from the bark beetles-root disease or other pest complexes. Reforestation creates the potential need to control weeds and gophers and also creates the opportunity to prevent and maintain insect and disease damage at acceptable levels throughout the rotation of the stand. Intermediate and selection harvest can also reduce and prevent insect and disease damage (through the removal of stressed individuals or groups of trees and the reduction of stocking to biologically appropriate levels) .

On the LTBMU, the number of acres scheduled for vegetation management under each alternative was used as one indicator of both the opportunity and need to reduce/prevent pest damage. It provides an estimate of the relative damage, basinwide, that could be expected under each alternative. Table 4.9 compares

acres of developed recreation by service level and acres of vegetative management by alternative. Under all alternatives, pest management in developed recreation areas will be conducted to protect public health through hazard tree and plague control programs.

Table 4.9. Forest Pest Management
Amount of Developed Recreation and Vegetation Management Activity
by alternatives

Activity	Alternatives A	B	C	D	E	F	G	H	I
Firewood (thousand cords)	4	4	4	0	8	4	2	8	4
Regeneration Harvest(acres)	100	40	0	40	180	100	40	100	60
Existing Recreation Dev. Standard service (acres)	636	0	636	636	636	636	0	636	636
Low Standard Service (acres)	0	386	0	0	0	0	159	0	0
New Recreation Const. (acres)	394	0	??	399	399	0	0	67	399

Alternatives A, E, F, and H - These alternatives should have the least amount of tree mortality and growth loss because they offer the greatest opportunity to manage vegetation and implement pest prevention practices. Where intensive management would occur, pest-caused mortality and growth loss should decline from current levels. During stress periods, such as drought, the chance of large scale pest-caused losses should be reduced. Vegetation management in developed recreation areas should result in improved vegetation health, decreased tree mortality, and fewer hazard trees. Areas receiving low levels of vegetation management and pest prevention practices should experience tree mortality and growth losses at or above current levels.

Alternative D - Tree mortality and growth loss would be greater than for the preceding alternatives because of the reduced number of acres receiving vegetative treatments. Vegetation management in developed recreation areas should result in improved vegetation health, decreased tree mortality, and fewer hazard trees. In those areas receiving moderate levels of pest management, pest caused losses should remain at current levels, although large scale losses should decline. Areas receiving low levels of vegetation management and pest prevention activities could experience tree mortality and growth loss at or above current levels.

Alternative I - Tree mortality and growth loss under this alternative would be less than the Current Alternative because of the opportunities for prevention associated with constructing new developed recreation sites. The level of

vegetative management is also higher in this alternative, though not as high as in Alternatives C, E, and H.

Alternatives B, C and G - These alternatives could result in the greatest pest-caused losses of any of the alternatives. Timber management activities included in these alternatives are at the minimum level required to meet the MMR for diversity. The effect of this minimum timber program will be partially offset by the prevention opportunities associated with developed recreation sites in Alternative B. However, vegetation management in developed sites may not be adequate to prevent losses caused by pests from adjacent unmanaged stands.

8. Geology and Groundwater

Hazards

The potential for incidents resulting from geologic hazards should not differ greatly between alternatives. The most significant geologic hazard which could result from implementation of several alternatives is an increased possibility of landslide activity associated with the amount and location of new road construction and mechanical site preparation and intense burning for timber management purposes. The greatest risk occurs when new roads are constructed on high hazard lands.

Use of appropriate measures for protection from landslide hazards should result in minimal impact in each alternative. If appropriate measures are not used, however, then those alternatives producing the most disturbance on high hazard land would be most likely to experience resource damage. Productivity would diminish, and sedimentation, costs of mitigation and repair, and hazards to humans and wildlife would increase.

Resources

The potential for earthquake and volcanic activity damage to Forest Service structures exists in all alternatives. Those alternatives with the greatest amount of capital investment in structural improvements and the most miles of road would likely be most affected by geologic disturbances. Alternatives A, D, E, H, and I would have the greatest potential for damage, and Alternatives B, C, F, and G, (which have the least amount of improvement) would have the least potential for damage. Forest Service management activities are not expected to have an effect on volcanic nor seismic/earthquake occurances.

Snow avalanche hazard potential increases in relation to ski area expansion and the amount of dispersed recreation. Although there is variation between alternatives, no measure has been made of the relative increase that may occur.

Groundwater use would increase at varying rates in all alternatives due to the trend toward increased use of groundwater over surface water. The amount of groundwater withdrawn would in all cases be chargeable to the volume allocated under water rights to the Forest Service by the States (see subsection 22, Water, in this chapter). Groundwater would be tapped for domestic use when it is the most cost effective method and would not adversely affect riparian vegetation and instream flows.

Alternative A (Selected) - This alternative does not require timber management on high hazard lands, hence would not cause an increase in landslide hazard associated with location of new roads on high hazard lands. Groundwater use would likely increase (although the rate of increase is not known) due to the increase in developed recreation facility construction. Expansion of four ski areas would increase public exposure to avalanche hazard.

Alternative B (Current) - Similar to Alternative A, timber management would not occur on high hazard lands. Groundwater usage would likely not increase as much as under Alternative A due to lower levels of developed recreation and expansion of three ski areas. Public exposure to avalanche hazard would increase due to expansion of the ski areas, but less than Alternative A.

Alternative C (Conservation) - Similar to Alternative A except that increased avalanche hazard due to ski area expansion would be deferred at least through the first decade.

Alternative D (Efficiency) - See discussion under Alternative A.

Alternative E (Market) - This alternative does require timber management activities to occur on high hazard land which would increase the possibility of landslides. Groundwater use and exposure to avalanche hazard would be similar to that under Alternative A.

Alternative F (Amenity) - This alternative does not allow expansion of any ski areas and has a low level of developed recreation; hence it would use the least amount of groundwater for domestic purposes, although probably slightly more than 1982 levels. Public exposure to avalanche hazard would also not increase beyond 1982 levels. No high hazard land is harvested in this alternative, preventing an increase in landslide hazard.

Alternative G (Low Budget) - The low level timber management program under this alternative would not cause access to high hazard land, preventing an increase in landslide hazard. Groundwater use for domestic purposes would likely decrease from 1982 levels due to the decreased recreation program. Three ski areas would be allowed to expand, thereby increasing public exposure to avalanche hazard.

Alternative H (RPA) - This alternative does require timber management activities to occur on high hazard land, thus increasing the possibility of landslides. Groundwater use and exposure to avalanche hazard would be similar to that under Alternative A.

Alternative I (Wilderness) - This alternative is similar to Alternative A.

9. Historical and Cultural Resources

Although it is not possible to place exact numerical values when assessing the environmental consequences of the varying alternatives on cultural resources, it is possible to evaluate them in the context of degrees of risk relative to each other. Table 4.10 includes an element which indicates the increased or

decreased possibility of disturbing or destroying cultural resources. Factors used in that evaluation include the number of acres disturbed by project activities, whether access to cultural sites would be increased or decreased, and whether visitor use would increase or decrease.

Elements on Table 4.10 reflect what are expected to be the major impacts on cultural resources within the unique framework of the Lake Tahoe Basin environment. An example of this would be the emphasis on trail building as opposed to road building. The potential for ground disturbing activities generated through certain timber harvesting activities continues to be one of the greatest single impacts affecting cultural resources. While having the potential for causing irreversible losses of cultural values, those projects may result in the benefits of increased knowledge and understanding of the local resource.

Table 4.10 also illustrates how each alternative would compare in the individual land disturbing activities such as timber harvesting, construction of new hiking trails, ski area expansion, and other new recreation construction (such as new camping facilities). Expected increase in visitor use is an indicator of the risk of site disturbance from recreation use. Change in access measures accessibility to cultural sites. Increased accessibility is presumed to result in an increased chance of disturbance or damage to sites.

Table 4.10 also indicates the amount of additional annual inventory needed to meet the RPA goals, which is 100% of the forest by 1995. While inventories are a required part of cultural resource management, the amount completed is directly related to project activities. When project activities increase (as with more timber sales) the amount of additional nonproject acreage required to meet the RPA goal decreases.

As suggested above, there are benefits which may occur with the selection of individual alternatives and the implementation of certain project activities. Construction of roads and trails may result in the discovery of previously unknown cultural resources. The inventories required for activities such as timber sales or ski area expansion frequently result in evaluation and protection of cultural sites, which might not otherwise occur.

A rating for each alternative is also shown in Table 4.10, based on the potential for disturbance to cultural resources and a program level indicator which is used to reflect the intensity of cultural resource management activities accompanying each alternative. A program level of "Low" is assumed to meet full legal requirements of cultural resource management. At this level a large backlog of unevaluated cultural sites continues through the 50-year planning period, few national register nominations are completed, and the main emphasis is on project inventory. Total forest inventory would not occur until 2035. At the "Medium" level one-half of the backlog of unevaluated sites would be completed and additional register nominations would be made. There would be an increased emphasis on interpretation, enhancement, and protection of cultural resources. A program level of "High" would result in evaluation of most known sites, nomination of most register-eligible properties, and an active program of interpretation, with selected cultural sites being restored or rehabilitated. The RPA goal for completion of the forestwide inventory would be met by 1995.

Table 4.10. Activities Affecting Cultural Resources
(Total Effect Over 50-year Planning Period)

Activity	A Selected	B Current	C Conservation	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
Timber Harvest (average annual MMBF)	5	4	4	1	20	5	2	10	5
Recreation Use (% increase RVD's)	69	27	65	75	75	38	14	52	75
Trail Construction (total miles)	151	93	151	151	131	154	93	148	154
Change in Access vs. 1982 1/ (miles of roads and trails)	+143	+104	+143	+121	+151	+54	-6	+138	+124
Ski Area Expansion (total new acreage)	3380	3000	3000	4907	4907	0	2084	4352	4907
Other New Recreation Construction (acres)	394	0	394	399	399	0	0	67	399
Potential for Cultural Resource Disturbance	Mod/High	Mod	Mod/High	Mod/High	High	Mod	Low	Mod/High	Mod/High
Additional Annual Inventory Needed for RPA Targets (M acres)	12.6	12.9	12.8	13.4	11.6	12.8	13.0	12.3	12.7
Cultural Resource Program Level 2/	High	Low	High	Low	Low	High	Low	Medium	Medium

1/ Combined totals forest roads and trails compared to 1982 base year total

2/ LOW meets legal requirements for project evaluation; MEDIUM accomplishes 50% of the backlog of site evaluation; HIGH would accomplish 100% evaluation of known sites and include an active program of interpretation.

The following narrative discusses the probable effects of each alternative on cultural resources.

Alternative A - Additional cultural resource inventory would be required compared to the present situation. Timber harvest volume would increase by 20 percent and recreation use would more than double to present the largest risks of damage to cultural resources. Public access to sites would also increase as most new trails are constructed. Due to increased public use of the forest, and the more active timber harvest program, the risk to cultural resources would be moderate to high. A program level of high would result in a generally beneficial effect on the resources. Slightly fewer nonproject acres would be required to meet the 1995 completion goal.

Alternative B - Current management would continue under this alternative, resulting in an overall moderate risk to cultural resources. The RPA goal for completion of forestwide inventory would not be met until the end of the 50-year planning period. Program level remains low, with the main emphasis being project-related inventory and evaluation. The backlog of unevaluated sites continues with only a small number of national register nominations being completed. The cumulative effects on cultural resources could be negative.

Alternative C - Consequences would be similar to Alternative A.

Alternative D - The least potential impacts from timber harvest activities would occur under this alternative. The main risks to cultural resources would result from a 75 percent increase in visitor use and construction of most trail segments. With few inventories needed for timber activities, the greatest amount of acreage is required to meet the 1995 inventory completion goal. Overall risk to cultural resources would be moderate to high because of the increased visitor use. Program level would be similar to the present situation, with the RPA goal probably not being met until 2035.

Alternative E - This alternative would result in a high risk to cultural resources because of its overall emphasis on commodity production. All but one of the elements causing potentially adverse effects would be at their maximum value suggested over the 50-year period. Because of the high number of acres inventoried each year in support of projects, this alternative requires the fewest number of nonproject acres to meet the 1995 inventory goal. A cumulative negative effect could occur with cultural resource management emphasis placed on project inventory and mitigation needs.

Alternative F - The timber harvest and recreational use would increase only slightly compared to Alternative B with no ski area or other recreational expansion. Although there would be a 20% increase in the timber harvest volume, effects on cultural resources would tend to be offset by a marked reduction in the accessibility of sites based on a high number of road closures. Overall risks to cultural resources would be moderate with a high program level completing RPA inventory needs by 1995. The emphasis placed on interpretation, enhancement, evaluation, and protection in this alternative would result in a cumulative beneficial effect on cultural resources, similar to Alternative A.

Alternative G - The timber harvest would be reduced to one-half of present levels with less than half of potential ski area expansion actually occurring. Recreation use in the developed sites drops below present levels although rising slightly in dispersed areas. New trail construction is limited to the Rim Trail, resulting in a lesser combined risk than Alternative B. Acreage needed to meet the 1995 goal needs would be greater than the current situation as more nonproject acreage would be required. The program level would remain similar to the current situation.

Alternative H - Timber volume and visitor use would double over the 50-year period with a 59 percent increase in trail construction also occurring compared to present levels. Increased visitor use and access would increase the threat of vandalism for an overall moderately high risk to cultural resources. The program level would be similar to Alternative C, with the timber harvest generating the largest amount of project inventory. Fewer nonproject acres would be have to be surveyed each year than in Alternative B, to meet the RPA goal of a complete inventory by 1995.

Alternative I - The commitment of land as wilderness acres under this alternative would result in increased commodity production on remaining portions of the basin. Recreational use, ski area expansion, and trail and recreation site construction would be at their maximum levels presenting an overall moderately high risk to cultural resources. Slightly less non-project acreage would be required annually to meet the 1995 goal. The program level would be medium.

Additional Effects: There are a number of different situations which may result as cultural resource management practices are applied to each alternative. There may be long or short-term effects and/or direct or indirect effects. Under low program levels, the number of unevaluated cultural sites continues to grow with an increasing number of acres being unavailable for project activities. This is an example of a long-term effect. A short-term effect would be the increased access and likelihood of vandalism occurring to the sites in conjunction with small firewood sales which would only last for a relatively short period of time. Direct effects would include opening areas with cultural resources to the potential adverse effects of project activities, while indirect effects would include the increased interpretive possibilities resulting from the information gained through project inventories or the increased access to sites mentioned above.

Of concern in any discussion of the consequences of cultural resource management are the potential effects on other resources. The alternatives discussed above are affected to different degrees as a result of the number of unevaluated but protected cultural sites. Unevaluated cultural sites must be treated as significant and protected until an evaluation shows them unworthy of protection. Savings in both time and money can be realized by evaluating sites at the earliest practical time. Protection of these sites is sometimes a significant issue for project planners. The cost associated with protecting these sites during project planning and implementation can be minimized by a systematic program of site evaluations. Alternatives which include the high level cultural resource programs (A Selected, C Conservation, and F Amenity) allow for completion of site evaluations in a timely manner reducing the backlog of existing unevaluated sites and keeping up with the evaluation of new sites as they are discovered. These are the only alternatives which reduce the

current backlog of unevaluated sites. The backlog continues to increase under the other alternatives which include the low or moderate program levels. Under these alternatives projects may be delayed by the need to protect and monitor sites which may not actually warrant protection based upon their significance.

10. Lands

a. Adjustments

The amount of land considered for acquisition would vary only slightly, if at all, among alternatives. An estimated 500 acres would be acquired each year for the first three years and about 200 acres annually for the next 17 years in all alternatives. About 20 acres would be acquired each year in subsequent decades. Most acquisitions would be through the authority of the Santini/Burton Act and other special acquisitions. Although most acquisitions are planned and implemented by the Forest Service, they would continue to depend upon Congressional interest in the Lake Tahoe area.

b. Landline Survey

Landline marking and posting would differ among alternatives in accordance with the amount of project level work. Alternatives which require entry into previously unaccessed areas will require larger amounts or more timely completion of boundary locations. Table 4.11 displays the average annual miles of landline to mark and post by alternative and decade.

Table 4.11. Landline to Mark and Post by Alternative
(Average Annual Miles)

	Alternatives								
DECADE	A	B	C	D	E	F	G	H	I
1	18	6	18	18	7	18	2	7	7
2	5	6	5	5	7	5	2	7	7
3	0	6	0	0	7	0	2	7	7
4	0	6	0	0	0	0	2	0	0
5	0	0	0	0	0	0	2	0	0

c. Nonrecreational Special Uses and Utility Corridors

Effects of alternatives upon special uses and utility rights-of-way are affected primarily by the amount of land that is available for such uses and the policies of the plan. These uses would generally be denied in wilderness. They may not be compatable with recreation development sites and other areas of intensive recreation use or with unroaded areas and wetlands.

Alternative A - The amount of land available for special uses is reduced by the plans to increase recreation development. No utility corridors or windows are designated, but individual right-of-ways would be considered.

Alternative E - There would be an increase in developed recreation sites; this would slightly decrease the amount of land available for special uses. A utility corridor from Echo Summit to Luther Pass is would be designated.

Alternatives B and G - There would be little change from the present in the amount of land available for special uses. No utility corridors are designated, but windows are recognized.

Alternatives H - Land available for special uses would decrease because of the increase in developed recreation and the recommendation of Freel roadless area for wilderness. Windows for utility rights-of-way are recognized.

Alternatives C, D, F, and I - These alternatives have the largest reduction in land area available for special uses since both Freel and Lincoln Creek (and in the case of Alternative C, Dardanelles) roadless areas are recommended for wilderness. There is also a large increase in developed recreation sites in Alternatives D and I. Alternative C and F emphasize high quality dispersed recreation and scenic quality that may affect some types of special uses. Alternative D would designate utility corridor from Echo Summit to Dagget Pass. Alternative I designates no corridor, though windows are recognized. Alternatives C and F prohibit any major utility right-of-ways.

d. Withdrawals

Withdrawal of land in all alternatives is expected only from mineral activity. Acres of potential withdrawal are displayed in Table 4.12. There are no environmental effects from a withdrawal since it is an administrative action only.

e. Rights-of-Way Acquisition

Acquisition of 13.5 miles of road and 17.4 miles of trail rights-of-way, necessary in all alternatives, would improve access to national forest land. Timing of acquisition, and thus the benefits, may vary slightly between alternatives with the greatest urgency occurring in Alternative E to gain access for timber management.

11. Minerals

The impact of most concern on mineral resources occurs when management practices or the law requires withdrawing the area from mineral entry. Once an area is withdrawn, any mineral potential is lost from development at least temporarily. Differences between alternatives are in the number of acres with high, medium, or low mineral potential that would be proposed for withdrawal. Withdrawals include existing and proposed wilderness, research natural areas, and existing developed recreation areas, wetlands, and administrative sites. Effects on mineral resources by alternative are displayed in Table 4.12.

Table 4.12. Effects on Mineral Resources by Alternative
(Acres Restricted)

Existing or Proposed Withdrawals	Mineral Potential 1/	Alternatives A Selected	B Current	C Conservation	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
Existing or Proposed Wilderness Areas	Very High/High	965	965	2765	1725	965	1725	965	1725	965
	Medium/Low	9755	9755	11975	11975	9755	11975	9755	11975	9831
	Low/Unknown	13235	19610	36600	25795	10610	25795	10610	25795	19695
Research Natural Area Candidate	Very High/High	0	0	0	0	0	0	0	0	0
	Medium/Low	0	0	0	0	0	0	0	0	0
	Low/Unknown	360	0	360	0	0	360	0	0	0
Existing or Proposed Developed Recreation	Very High/High	0	0	0	0	0	0	0	0	0
	Medium/Low	300	0	300	300	300	0	0	0	300
	Low/Unknown	1979	1468	1683	1960	1350	1468	793	1468	1940
Wetlands	Very High/High	0	0	0	0	0	0	0	0	0
	Medium/Low	0	0	0	0	0	0	0	0	
	Low/Unknown	670	0	670	670	670	670	670	670	670
Administration Sites	Very High/High	0	0	0	0	0	0	0	0	0
	Medium/Low	10	10	10	10	10	10	10	10	10
	Low/Unknown	8	8	8	8	8	8	8	8	8
Total Acreage Withdrawn	Very High/High	965	965	2765	1725	965	1725	965	1725	965
	Medium/Low	10065	9765	12285	12285	10065	11985	9765	11985	10141
	Low/Unknown	16252	21086	39321	28433	12638	28301	12081	27941	22313

1/ Low/Unknown: Unknown but probably low probability for mineral resource occurrences.

Total Forest Acreage of Very High/High Mineral Potential:	2,300
Medium/Low Mineral Potential:	27,360
Low/Unknown Mineral Potential:	118,073
Total Forest Acreage within the Basin:	147,733

The demand for mineral exploration and development is not expected to be influenced by the alternative adopted. Access to areas that have approved operating plans could be enhanced by road construction required for timber management in Alternatives E and H.

Concern for the effects of mineral material extraction upon water and air quality would probably limit the amount of earth and rock excavated in the basin. Therefore, it is expected that the amount extracted for either Forest Service usage or for sale to private or other public users would not vary significantly from current levels in any alternative. Large rocks and other clean material that is spoil from road work or other activities requiring excavation would be constructively utilized or stockpiled within the basin rather than exported as required for all waste material. Some uses would be as rip rap, barriers to vehicle travel, and as backfill in some types of restoration projects.

12. Prime Agricultural Lands, Wetlands, and Floodplains

No prime agricultural land was identified. Wetland and floodplains are part of the stream environment zones of the basin. These are all protected as part of the minimum management requirement for all alternatives (see subsection 16, Riparian, below).

13. Range

The effects of implementing each alternative on range were evaluated using the following five range indicators: 1)grazing capacity; 2) forage production; 3) opportunity for increased animal unit months (AUM); 4) range condition and trend; and 5) suitable range acres. Grazing capacity varies by suitable range acres and how intensively those acres are managed for forage production. The opportunities to increase AUM are determined by analyzing which range practice could be implemented to facilitate the management of the range resource in accordance with alternative emphasis. The resulting range condition and trend of each alternative is the best professional estimate using range allotment data. Lands determined as tentatively capable and available for range production were evaluated against alternative emphasis to provide net suitable range acres. A summary of permitted grazing use is provided in Table 2.23 in Chapter 2.

The range benchmark shows a grazing potential of 3,800 AUM. Economically, livestock grazing fails to break even. The cost of administering the grazing program including the portion of the fixed cost, water quality monitoring, and facility maintenance cost that are needed to support the range program exceeds the grazing benefit value.

Alternatives A, B, C, and I. These alternatives include grazing the current level. Under these alternatives grazing would continue on existing allotments. The condition of the range resource under these alternatives would remain fair to good with a stable trend.

Alternatives D, F, and G. These alternatives eliminate grazing. Wildlife, watershed, and dispersed recreation conditions were given priority in Alternative F. Grazing was replaced by other uses based on economics in

Alternatives D and G. Watershed, riparian area protection, and dispersed recreation emphasis eliminate grazing in Alternative C.

Alternatives E, and H. These alternatives emphasize grazing. In order to realize these increases in AUM, new allotments would be created at Rabe Meadow, Meeks Bay, and Slaughterhouse Canyon and possibly other key forage areas. The range condition and trend in these areas would decline initially but would stabilize to a good condition after a few years. Alternative H meets the 46% increase goal stated in the Regional Forester's range production goals. Alternative E includes most of the suitable lands available from the range benchmark. Only the smallest, most difficult to manage, tentatively suitable areas were excluded.

14. Recreation

a. Developed Recreation

Quality and quantity of developed recreation opportunities would vary depending on the capacity and type of facilities developed and the time of construction. So long as construction of facilities for camping, picnicking, beach use, visitor information and the like occurred at a rate sufficient to keep up with demand for those activities, users could expect a high quality experience. Should demand exceed available capacity, recreationists would be adversely affected as prices and crowding increase.

Table 4.13 shows the expected capacity of developed recreation facilities, acres developed, and expected use for each alternative over time. These projections are based on increased participation at a constant rate in the future, and the assumption that recreation facilities would be used to full capacity throughout the season. In reality, use rates will vary considerably depending on weather, holidays and days of the week. The projections in the table are intended as general indicators of the probable future extent and degree of use of developed recreation facilities. The real rate and extent of development could vary greatly depending on actual funding levels and the actual use will depend on local and regional demand and pricing.

Acquisition of private land by Federal and State agencies will make more sites available for potential recreation development. In all alternatives, the cumulative long term effects on developed recreation opportunities will depend on the location and types of facilities provided by states, counties, cities, public utility districts, and the private sector since all compete for the same recreationists.

Alternative A - This alternative would result in an average annual output of 1.6 million RVD in developed recreation by the fifth decade. This represents an increase of 60% over the 1982 levels and would result in higher density levels in all facilities. While almost half of the additional capacity would be built on the south shore to alleviate the crowding that would occur there as existing facilities fill up, 62% would be constructed on the west, north and east shores to provide new opportunities where none exist presently. This would also help to distribute use more evenly around the basin. A mix of day and overnight facilities would be provided in locations emphasizing Lake Tahoe's natural attractions. Developed site users will experience greater

Table 4.13. Developed Recreation by Alternative

		Existing Situation	A Selected	B Currrent	C Conserv'n	D Effic'ncy	E Market	F Amenity	G LowBudget	H RPA	I Wild'ness
Decade 1	PAOT 1/	16843	17593	16843	16843	16843	16843	16843	11120	16843	16843
	MRVD-USE	1024	1136	1024	1136	1136	1136	1136	820	1132	1136
	ACRES	2569	2600	2569	2569	2569	2569	2569	2092	2569	2569
Decade 2	PAOT		18243	16843	17251	17251	17251	16843	11120	16843	17251
	MRVD-USE		1280	1024	1280	1280	1280	1249	820	1142	1280
	ACRES		2650	2569	2604	2604	2604	2569	2092	2569	2604
Decade 3	PAOT		18763	16843	18763	18763	18763	16843	11120	16843	18763
	MRVD-USE		1393	1024	1393	1393	1393	1249	820	1218	1393
	ACRES		2730	2569	2730	2730	2730	2569	2092	2569	2730
Decade 4	PAOT		20119	16843	20119	20119	20119	16843	11120	17647	20119
	MRVD-USE		1505	1024	1495	1495	1495	1249	820	1308	1495
	ACRES		2843	2569	2843	2843	2843	2569	2092	2636	2843
Decade 5	PAOT		21571	16843	21571	21571	21571	16843	11120	17647	21571
	MRVD-USE		1603	1024	1603	1608	1608	1249	820	1308	1608
	ACRES		2964	2569	2964	2968	2968	2569	2092	2636	2968

1/ PAOT - People at one time - a measure of capacity.
MRVD - Thousand Recreation Visitor Days - Projected Use.
ACRES - Acres Developed (This is the actual acres of development and differs from the acres assigned to the developed prescription).

crowding than at present because capacity will generally be developed only as needed to meet projected participation. Construction of major new facilities will intensify during the second decade as excess capacity in existing facilities is used. Sites will be managed at standard levels. Public information and interpretive facilities would be developed at all developed sites and programs would be emphasized to inform visitors of the unique qualities of Lake Tahoe, and of the management of national forest land.

Alternative B - This alternative represents continuation of current recreation management budgets through the fifth decade. No increases in use beyond present levels would be accommodated and some facilities would be closed. Sites would be managed at low standard levels. Developed site users would encounter crowded conditions and many would be turned away from full or closed sites. Managing for this situation would require public information programs to discourage use of facilities in the Tahoe Basin.

Alternative C - The rate and extent of developed recreation facilities would be dependent on the successful meeting of environmental thresholds. Major development would be deferred ten years until environmental trends become more apparent. Assuming that thresholds are successfully met, the affect of this alternative would be similar to Alternative A.

Alternative D - Alternative D provides cost-effective developed recreation opportunities. This translates into constructing almost 400 acres of new facilities to accomodate 1.6 million RVD by the fifth decade, or an increase of 60%. Like Alternative A, the new opportunities would be distributed around the lake, and managed at standard levels. Since revenue producing facilities are more cost effective, this alternative would emphasize campgrounds and day-use facilities for which fees can be charged. Public information programs and interpretive sites would not be emphasized. Users would generally find well managed facilities that were often crowded but seldom full.

Alternative E - This alternative emphasizes cost-effective developed recreation opportunities where not in conflict with commodity production. Since there is adequate developable land that does not have high commodity values to meet demand, Alternative E would result in developed recreation opportunities very similar to Alternative D. Overnight facilities, managed at standard levels, would be emphasized. Users of developed sites would view a landscape altered significantly by resource management activities such as timber harvesting, range management, and road building. Public information and interpretive programs would make visitors and residents more aware of renewable resource management and its long term environmental effects.

Alternative F - Developed recreation opportunities are provided in this alternative only where consistent with high levels of environmental protection. No new sites are developed and existing sites are redeveloped where necessary to protect environmental values. All sites are managed at standard levels to provide a quality experience and to prevent resource damage. For visitors who are fortunate enough to get into a site, the quality of the recreation experience will be high; unfortunately by the second decade existing capacity will be fully used. Many users will be turned away. Interpretation of the natural and human history of Lake Tahoe and the management activities undertaken to preserve its unique water quality will be emphasized in the public information and interpretive programs.

Alternative G - The emphasis for developed recreation is to provide as many opportunities as possible with a 25% reduction in budget. Implementation of this alternative would result in the removal of 477 acres of recreation facilities and a 20% reduction in RVD by the end of the first decade. Management of remaining sites would be at low standard levels. Recreational visitors would experience crowded or full facilities, with minimum services provided. No interpretive services would be provided except public information programs to suggest alternative locations for recreation.

Alternative H - This alternative will result in an increase of almost 300,000 RVD, 27% over present levels, to meet RPA goals. While this will not meet demand, it will require development of 67 acres of new facilities by the fourth decade. As in any alternative that does not fully meet demand, crowding at some sites will be experienced; however, management at standard levels will provide adequate information and enforcement programs. New facilities will be developed on the east shore to help distribute use to areas not presently highly utilized.

Alternative I - Alternative I represents implementation of management direction which would emphasize both wilderness values and efficient production of market goods. Since it would result in producing developed recreation opportunities to meet demand similar to Alternative D, the effects would also be similar. Four hundred acres would be developed, accommodating 60% more use to a total of 1.6 million RVD. Interpretation in developed sites would emphasize a balance of resource management, environmental protection, and recreation opportunities in Roaded Natural and Semi-Primitive Non-Motorized ROS classes.

b. Dispersed Recreation

Recreational activities occurring in areas outside developed facilities will be affected by the intensity of development and use, administrative restrictions (indicated by ROS class changes), and by the demand for such activities over time. In some cases other resource management activities will directly affect recreation as well. Similarly, certain recreation activities may impact other recreation activities to the point that conflict occurs. These effects vary by alternative.

Refer to Table 2.23a for a comparison of dispersed recreation opportunities available by alternatives.

Off-highway vehicle effects are not discussed in this section, but are covered separately in this chapter.

Alternative A - This alternative emphasizes a balance of activities similar to that currently provided. Access to undeveloped portions of the basin is improved through construction of trails, trailheads, and other minor facilities allowing use to meet demand for a total of 1.7 million RVD by the end of the fifth decade.

Day use, such as hiking, sightseeing, picnicking, and bicycling will be encouraged in the flatter, low hazard lands close to Lake Tahoe and other water attractions. These areas are normally Rural ROS class and have adequate

capacity to accomodate the use. As a result of increased use, the quality of the recreation experience will shift toward the urbanized end of the opportunity spectrum. While acres in the Semi-Primitive classes decrease only a small amount (2%), access and use levels will increase. Isolation from other visitors will be increasingly difficult to find especially in unroaded areas where demand will exceed capacity.

Much of the increased use will occur in the currently poorly accessed and lightly used portions of the basin: the north, east, and west shore areas. Recreationists who have used these areas in the past will find them more crowded.

Alternative B - This alternative continues the existing mix and management of recreation activities. With no additional funds for development of facilities to accomodate use, dispersed recreation would increase 40% to 1.4 million RVD. Management of dispersed recreation would be at low levels which would result in more unresolved conflict and more resource damage due to less enforcement of regulations.

Construction of the Rim Trail by volunteers will open up previously poorly accessed areas on the north and east shores to hikers and equestrians and provide new opportunities and distributing use over a broader area.

Alternative C - This alternative affects dispersed recreation opportunities essentially the same as Alternative A, except that four new wilderness areas are recommended.

Alternative D - This alternative affects dispersed recreation significantly because it recommends three new wilderness areas, reduces the timber program and concentrates it in fewer acres, and closes 30 miles of road for efficiency reasons. It produces 1.7 million RVD to meet demand but reduces the portion on Roaded Natural areas and increases that produced on rural areas.

Trail building is emphasized in the first two decades to provide access to the proposed Freel, Mt. Rose, and Lincoln Creek Wilderness areas. This, combined with construction of the Rim Trail, would provide high quality SPNM experiences as capacity exceeds demand through the fifth decade.

Reduction of timber management activities on the south and west shores would not change the recreation setting greatly since these activities are not very apparent. In these areas recreationists will have the roads to themselves and would experience greater solitude except that their own numbers will increase. On the north shore, more intensive timber activities and the use of 20 acre clearcuts will make management activities more apparent to recreationists.

Elimination of grazing from existing allotments will be perceived as a minor benefit in the SPNM areas where cows are viewed by some as a problem. The absence of fences and the greater abundance of vegetation will provide a more natural environment in the Freel area.

Alternative E - This alternative has a market emphasis which will result in timber management activities five times the current level in the first decade and ten times the current level in the fifth decade. Roads and more intensive timber cutting will dramatically increase the acreage of Roaded Natural ROS

class by the fifth decade. Construction of developed recreation and ski areas will increase the acreage of Rural class. Corresponding decreases in both SPNM and RN acres will affect the types and distribution of dispersed recreation activities.

With demand far exceeding capacity in SPNM, intensification of existing quota systems for Desolation Wilderness will be necessary to preserve the quality of the recreation experience.

Rural and Roaded Natural areas will be used heavily for a variety of activities. Timber management, especially 20 acre clearcuts, will make the visual setting one of a managed forest rather than a natural area. Although some visitors may find this objectionable, the effect will be on such a small scale that most visitors will not take particular notice. The effect will be particularly noticeable to those who leave the main highways and drive on forest system roads. They will encounter active and previous timber sales in a setting of a healthy, managed forest.

More intensive grazing management would require new fences and range improvements in existing allotments and introduce livestock into areas presently ungrazed. Some recreationists would consider the animals a detraction from their experience, and the fences and other improvements a hindrance to their free travel and aesthetic appreciation. This reaction would be most apparent in Semi-Primitive areas where users are often seeking a natural environment and relative solitude.

Alternative F - Dispersed recreation use would increase to meet demand in this alternative which emphasizes amenity values. Nonmotorized forms of recreation would be encouraged and motorized forms, particularly OHV use, would be discouraged. Total dispersed use would increase to 1.7 million RVD, meeting demand.

High quality SPNM recreation experiences would be provided by recommending the Freel and Lincoln Creek areas for Wilderness designation and by converting SPM to SPNM where possible. The Stanford Rock/Twin Peaks ridge would be managed for its SPNM potential, all roads would be obliterated, and the entire area closed to motorized use. By the fourth decade, existing roads will have essentially disappeared and the area will provide high quality experiences. New trails would provide access to most parts of the basin, creating new opportunities for hiking, horseback riding, backpacking, and other nonmotorized recreation activities.

Dispersed use in rural areas near the shore of Lake Tahoe would increase and trails, parking areas, vistas, and interpretive displays would facilitate enjoyment of Lake Tahoe's special environmental qualities. These visitors would view the Lake Tahoe Basin as a large natural preserve. Resource management activities would be largely unnoticed.

Alternative G - This alternative is constrained by a reduced budget and would result in low levels of both developed and dispersed recreation. Implementing this alternative will result in 1.4 million RVD of dispersed recreation by the fifth decade, which is an increase of 500,000 RVD over present use. Management of dispersed use would be a low priority; little effort would be made to control litter or OHV use. New trails and facilities to support

recreation use would be limited to that built by volunteers such as the Tahoe Rim Trail Foundation.

Little change would be made in ROS classes, and the mix of dispersed activities would not change. Existing popular areas would receive more use and experience levels would suffer due to crowding. SPNM and SPM areas would remain largely unaccessed, except for the Rim Trail which would help to distribute use. Access would be further reduced by closure of 66 miles of road in the first decade.

Alternative H - In attempting to meet RPA goals this alternative would result in fully meeting demand for dispersed recreation of 1.7 million RVD by the fifth decade. The effects on dispersed recreation would be similar to Alternative A since both emphasize a mix of motorized and nonmotorized activities; however, the more intense timber program, higher levels of grazing, and recommended designation of the Freel Wilderness area would cause some differences.

More intensive timber management practices on the north and south shores would change the visual setting for recreationists using roads and trails in those areas. Twenty acre clearcuts, and the fact that more timber activities would be apparent, would make it obvious that those areas were part of a managed forest. Creation of skid trails and construction of new OHV routes would create new opportunities, especially for motorcyclists. Except for background views of harvested areas, recreationists in the Rural areas around the lake would not be affected by timber management.

More intensive grazing management would require new fences and range improvements in existing allotments and introduce cows into areas presently ungrazed. Some recreationists would consider the animals a detraction from their experience, and the fences and other improvements a hindrance to their free travel and aesthetic appreciation. This reaction would be most apparent in Semi-Primitive areas where users are often seeking a natural environment and relative solitude. Other recreationists would consider grazing cows an acceptable and desirable element in the landscape; a symbol of the old west and a reminder that they are in a relatively rural setting.

Construction of trails and related trailhead facilities in the new Wilderness will create new opportunities for hiking, backpacking, mountain climbing, and horseback riding. The projected demand for dispersed recreation in the SPNM ROS class is met in this alternative.

Alternative I - Designating all potential unroaded areas as wilderness and emphasizing SPNM recreation, this alternative also emphasizes efficient use of other areas for production of market outputs. Most recreation activities are affected positively as demand is easily accommodated in the fifth decade with 1.7 million RVD. Users of SPNM areas will find it easy to achieve solitude and that a minimum of administrative controls are imposed. Users of Roaded Natural and Rural areas will find facilities adequate and well maintained. Those valuing the natural landscape will not find management activities apparent.

The north shore will remain much as at present, except that dispersed recreation is better accommodated by trails and trailheads. Similarly the east shore will be better accessed, more heavily used, and have a portion designated

wilderness, yet still appear much as it does at present. The west shore will be significantly different, with less OHV use and better trail access and approximately 3,000 acres devoted to developed ski areas. The south shore will continue to be heavily used for dispersed recreation by visitors and residents alike.

c. Off-Highway Vehicle (OHV) Use

Existing regulations regarding operation of vehicles on nonpaved forest roads and trails would not change significantly. Vehicles will continue to be restricted to designated roads and trails in all alternatives. The emphasis that enforcement, user education, and signing receive will be effected by the theme of each alternative. Similarly the number and length of designated routes and their locations will differ in each alternative.

The effects of proposed actions on off-highway vehicle use will vary for each type of vehicle and for the type of experience users are seeking. Generally the upgrading of existing roads will reduce the quality of recreation opportunities for motorcycles, all-terrain vehicles and 4X4 vehicles because of the loss of challenge. At the same time those seeking simple access to remote locations will benefit from the relative comfort and ease of access over new or reconstructed roads. Over-the-snow vehicle use will not normally be affected by the quality of roads and trails, but are most affected by area wide closures such as those resulting from Wilderness designation. Summer OHV users seeking challenging routes will be effected most by the length of road and trail systems, the location of designated routes and the quality of the riding experience. For these users, primitive, difficult to traverse routes would be preferred over improved routes.

These effects vary by alternative. Refer to Table 2.23a for a comparison of dispersed recreation opportunities available by alternatives.

Alternative A - Existing levels of summer OHV use would decrease slightly, however many undesignated routes presently being used would be closed so OHV use would be concentrated on fewer roads and trails. Motorcycle use will be redistributed away from residential areas and stream environment zones by creation of new trails and by closing and rehabilitating many existing use areas. Relatively few new OHV opportunities would be created and as designated routes are reconstructed to meet environmental standards OHV enthusiasts would continue to find few routes offering a high degree of challenge.

Snowmobilers and other winter OHV users would find many opportunities, though some areas traditionally used could be closed in the future due to the proposed creation of the Mt. Rose Wilderness and development of recreation facilities and ski areas.

Alternative B - OHV management will continue as at present. As use intensifies, residents and users alike will experience more conflict due to the concentration of the activity on the residential fringe. Many summer routes will be closed to use and revegetated because of environmental damage. Winter OHV opportunities will remain essentially unchanged.

Alternative C - Nonmotorized forms of recreation would be encouraged and motorized forms, particularly summer OHV use, would be discouraged.

OHV users will be adversely affected by this alternative, as all existing OHV trails are closed, and roads providing a quality OHV experience are reduced to 15 miles. The McKinney Creek and Genoa Peak areas would be the only areas which include long enough routes of sufficient challenge to provide a quality summer OHV experience.

Winter OHV users would find that potential creation of recommended Wilderness areas would restrict them from traditionally used areas near Freel Peak and Mount Rose.

Alternative D - Closing the proposed Freel Wilderness to motorized use would eliminate some existing opportunities, but construction of new OHV routes outside the wilderness would offset the loss and provide high quality experiences though in a Roaded Natural setting.

The closing of 30 miles of road to public use will add to the vehicles using remaining roads. It will be harder to find solitude. The closed roads will be attractive to OHV enthusiasts, creating a management problem of enforcing the closures. Winter OHV users will be adversely affected by creation of the recommended Wilderness areas and construction of recreation facilities.

Alternative E - Most OHV opportunities will be provided in Roaded Natural settings as timber management activities and improvement of existing roads to accomodate log trucks change the existing Semi-Primitive Motorized setting. This will be most apparent in the McKinney Creek, Blackwood Canyon, and Genoa Peak areas which are presently popular for OHV use. This will be mitigated by creation of new OHV trails which will provide new high quality summer and winter OHV recreation opportunities.

Alternative F - Nonmotorized forms of recreation would be encouraged and motorized forms, particularly OHV use, would be discouraged.

OHV users will be adversely affected by this alternative, as all existing OHV trails are closed, and roads providing a quality OHV experience are reduced to 15 miles. The McKinney Creek area would be the only area which provides a quality experience.

Alternative G - Management of dispersed use would be a low priority; little effort would be made to control litter or OHV use. Access would be further reduced by closure of 66 miles of road in the first decade. OHV users would find fewer legal routes and little emphasis on providing new high quality routes; however, there would be little effective enforcement of restrictions.

Alternative H - The effects on dispersed recreation would be similar to Alternative A since both emphasize a mix of motorized and nonmotorized activities; however, the more intense timber program, higher levels of grazing, and recommended designation of the Freel Wilderness area would cause some differences.

Creation of skid trails and construction of new OHV routes would create new opportunities, especially for motorcyclists. OHV users will be displaced by the recommended designation of the Freel Wilderness. Four miles of motorcycle trail and a traditional, though lightly used, snowmobile route will be closed.

Nonwilderness management and development of new OHV routes in the Lincoln Creek roadless area will add new opportunities for motorcycle riders.

Alternative I - Summer and Winter OHV users will be affected. No new OHV routes are designated and many existing routes are closed. Despite discouragement of OHV use and strict enforcement, conflict will continue between homeowners and OHV enthusiasts near residential areas.

d. Winter Sports

Privately developed downhill skiing on the national forest provides a major social benefit. It is one of the most economically efficient forms of developed recreation that can be provided since most of the cost is borne by private industry. Operation and maintenance of existing developed ski facilities is continued in all alternatives. Table 4.14 displays the capacity and projected use of ski areas and the acres developed for each alternative over five decades. Winter motorized vehicle use is discussed in the Dispersed Recreation section of this chapter.

Effects on downhill skiing opportunities and quality will be a function of the available hill capacity and the number of skiers on the slopes. Providing that skier numbers do not exceed the capacity of lifts and runs, resulting in long lines, crowding or unsafe conditions, a high quality skiing experience will be maintained. As demand for skiing exceeds available capacity in the Tahoe Basin, users will be displaced to other areas in the region where capacity is available. Higher demand and increased competition for skiing at Lake Tahoe will result in higher prices and in larger crowds during traditionally slow periods. Alternatives that meet demand will generally help the Tahoe Basin ski resorts maintain their present share of the total market, assuming that skiing quality can be maintained or improved relative to other regional opportunities and that costs remain competitive.

Alternative A - Capacity for skiing is doubled by the fifth decade resulting in 744,000 RVD use. Demand is not met after the first four decades. New development is limited in the 5th decade to protect the watershed.

Alternative B - This alternative provides for a 65% increase in skiing by the fifth decade.

Alternative C - Skiing capacity is increased up to 65% providing environmental thresholds are met.

Alternative D - This alternative, emphasizing only economic efficiency with minimum management requirements, results in increasing skiing 250% to 912,000 RVD, and fully meeting demand.

Alternative E - As in Alternative D, skiing capacity is expanded to meet demand.

Alternative F - Ski area expansion is prohibited. Skiers would experience crowding. Demand would be met outside the Tahoe Basin.

Alternative G - Despite budget constraints, skiing would increase 60% under this alternative.

Table 4.14. Winter Sports - Downhill Skiing by Alternative

	Exisiting Situation	A Selected	B Current	C Conserv'n	D Effic'ncy	E Market	F Amenity	G LowBudget	H RPA	I Wild'ness
Decade 1										
PAOT 1/	10000	11085	11085	10000	11085	11085	10000	11085	11085	11085
MRVD	372	412	412	372	412	412	372	412	412	412
ACRES	3383	3745	3745	3383	3745	3745	3383	3745	3745	3745
Decade 2										
PAOT		13533	13533	11085	13533	13533	10000	13533	13533	13533
MRVD		503	503	412	503	503	372	503	503	503
ACRES		4572	4572	3745	4572	4572	3383	4572	4572	4572
Decade 3										
PAOT		16464	15285	13533	16464	16464	10000	16182	16464	16464
MRVD		612	592	503	612	612	372	601	612	612
ACRES		5562	5164	4572	5562	5562	3383	5467	5562	5562
Decade 4										
PAOT		19415	17079	16464	20068	20068	10000	16182	20068	20068
MRVD		722	606	612	746	746	372	601	746	746
ACRES		6559	5770	5562	6780	6780	3383	5467	6780	6780
Decade 5										
PAOT		20018	18894	16500	24538	24538	10000	16182	22896	24538
MRVD		744	613	613	912	912	372	601	851	912
ACRES		6763	6383	5574	8290	8290	3383	5467	7735	8290

1/ PAOT - People at one time - a measure of capacity
M RVD - Thousand Recreation Visitor Days - Projected Use
ACRES - Acres Developed

Alternative H - Despite a 225% increase in skiing RVD to meet RPA goals, demand is not met.

Alternative I - Effects on skiing would be identical to Alternative D.

d. Recreation Opportunity Spectrum

Developed and dispersed recreation opportunities would vary depending upon the Recreation Opportunity Spectrum (ROS) class in which they occur. Indicators of the consequences of the alternatives were measured by the acres and estimated Recreation Visitor Day (RVD) use for each ROS class. This data is displayed in able 4.15. The ROS classes are Urban (U), Rural (R), Roaded Natural (RN), Semi-Primitive Motorized (SPM), Semi-Primitive Non-Motorized (SPNM), and Primitive (P). Definitions for the ROS classes are found in the glossary. There is no existing or potential Primitive ROS class in the Lake Tahoe Basin. Though national forest lands may exist within an urban context in the form of scattered undeveloped parcels, they are classified as rural and offer visual and recreational relief from the adjacent urban development.

Changes in ROS occur as a result of:

- -- Developed recreation facilities and alpine ski areas are classified as Rural.
- -- Acres accessed by new road construction are classified as Roaded Natural.
- -- Wilderness areas are classified as Semi-Primitive Non-Motorized or Primitive unless influences from outside their boundaries change them to a different class.
- -- Adjacent SPM and SPNM areas having combined acreage meeting minimum size criteria to meet requirement for Semi-Primitive.

Certain consequences are common to all the alternatives. Changes in ROS class indicate that land uses affecting recreation in the Lake Tahoe Basin are becoming relatively stable. Acres by ROS class in each alternative are shown in Table 2.24. Percentage distribution by ROS class is shown in Table 4.15 and Figure 4.1. Today, approximately half of the national forest lands in the basin provide a semi-primitive environment (SPM and SPNM), and half provide a more developed environment. The Market Alternative (E) is the only alternative that changes this proportion significantly. In every alternative, acres of SPM decreases while acres of Rural increase.

Virtually all ROS class changes occur on the west shore between General Creek and the Truckee River or in the Freel Roadless Area.

This indicates that the existing land uses are consistent with the resources present. For example, the north shore between Martis Peak and the Truckee River has large areas of low and moderate erosion potential with well stocked timber stands and is already accessed by an extensive road system. It is classified Roaded Natural in all alternatives. Thus, except for the west shore and Freel Roadless Area, and small areas affected by proposed recreation facility development, little significant change in the types and distribution of recreation opportunities is forseen.

Table 4.15. Recreation Opportunity System
Distribution of Classes
(Percentage in each alternative)

Alternative	SPNM	SPM	RN	R
Existing	39	13	40	8
A	43	8	37	13
B	42	8	39	11
C	45	8	38	9
D	43	7	37	13
E	31	6	51	13
F	45	8	38	9
G	39	11	40	10
H	43	7	39	12
I	44	6	37	13

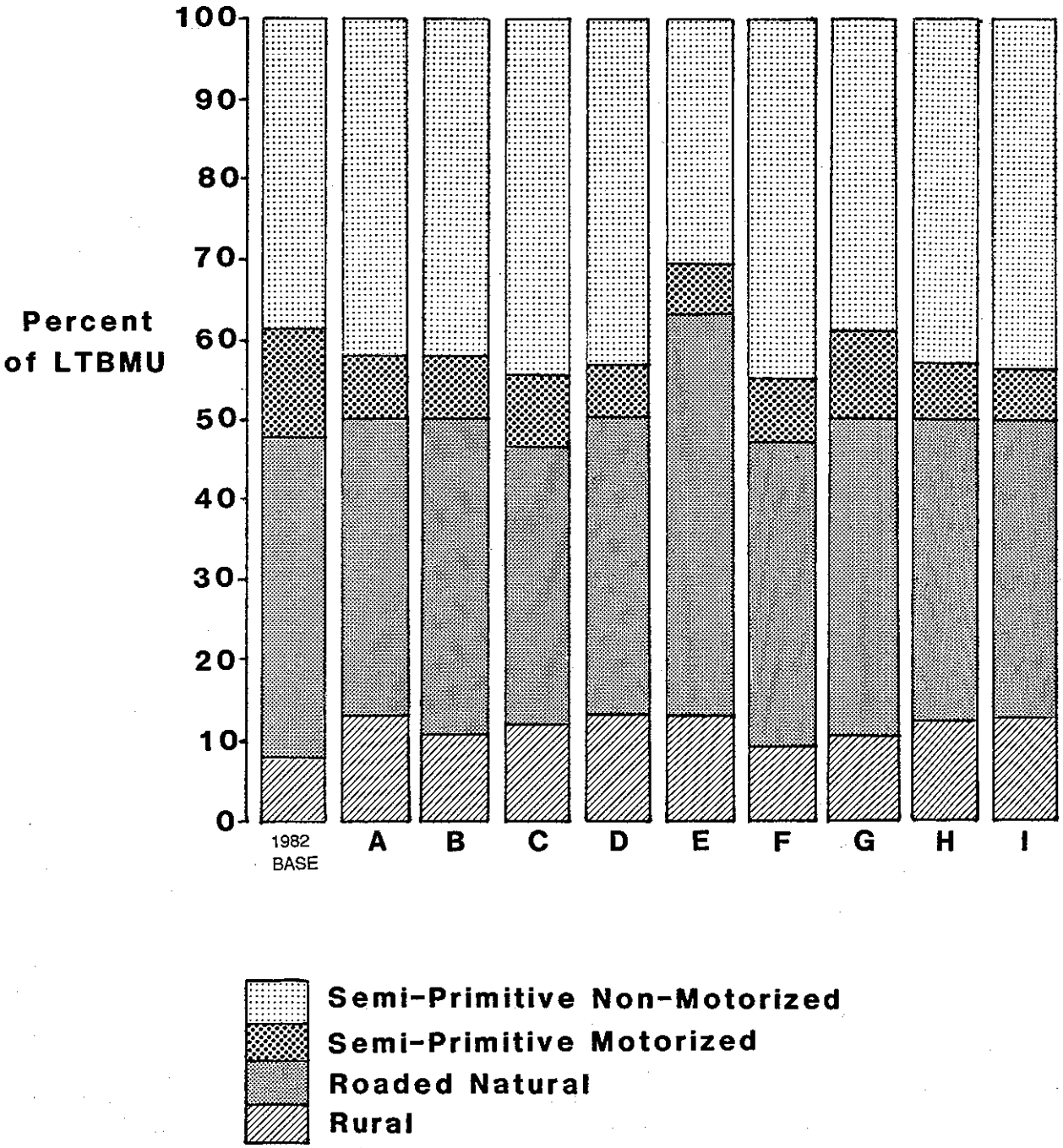
Alternative A - Rural ROS class would increase 48% (5,680 acres) by the fifth decade due to construction of ski areas and developed recreation facilities; and SPM and RN classes contribute about equal acreage. SPNM ROS class would increase slightly (8%, 4,090 acres) by the fifth decade as environmentally fragile areas classed as SPM recover their natural appearance. Projected dispersed use of both SPNM and RN classes will exceed capacity by the fifth decade, indicating that users will experience crowding and some will be displaced to other locations.

Alternative B - Rural ROS class would increase 25% (2760 acres) due to expansion of ski areas and SPNM and SPM contribute two thirds of the acreage. SPNM would be affected as in Alternative A, with projected dispersed use exceeding capacity. Despite a decrease of 35% in SPM, projected dispersed use is still well below capacity.

Alternative C - Protection of the natural environment and a high level of dispersed recreation are the themes of this alternative. Moderate expansion of recreation and ski areas are anticipated, Roaded Natural and Semi-Primitive Motorized is converted to Semi-Primitive Non-Motorized ROS class. Four new wilderness areas are recommended. The result is that SPNM increases 16% (8,340 acres) and SPM and RN decrease 35% (6,120 acres) and 4% (2,220 acres) respectively. Projected dispersed recreation use is accommodated easily in SPNM, SPM, and R classes; however, in RN, use would slightly exceed capacity. Thus, crowding in the Roaded Natural areas would lead to competition between users and would be a management concern.

Alternative D - Semi-Primitive Non-Motorized and Rural recreation is emphasized in this alternative: all potential ski areas and developed recreation facilities are constructed, and two new wilderness areas are recommended. This results in an ROS class distribution similar to Alternative A, except that additional acres of SPM and RN are converted to SPNM which increases by 5,770 acres.

Figure 4.1
Percent Distribution of Recreation Opportunity Spectrum Class by Alternative



Alternative E - Roaded Natural and Rural recreation are emphasized in this alternative: all potential ski areas and developed recreation facilities are constructed, and the road system is increased to provide increased access into many SPM areas. Rural ROS class would increase 48% and Roaded Natural would increase 28%. SPNM and SPM acres would decrease respectively 20% and 56%. More of the total dispersed use would shift to the RN and R classes but, even though acres of SPM class would decrease substantially, the use of those areas would intensify because of the ease of access. Recreationists seeking a SPNM environment would far exceed the capacity of remaining SPNM areas and would have to be accommodated elsewhere.

Alternative F - Protection of the natural environment is the theme of this alternative. No new developed recreation or ski areas are developed and where possible, Roaded Natural and Semi-Primitive Motorized is converted to Semi-Primitive Non-Motorized ROS class. Two new wilderness areas are recommended. The result is that SPNM increases 16% (8,340 acres) and SPM and RN decrease 35% (6,120 acres) and 4% (2,220 acres) respectively. Projected dispersed recreation use is accommodated easily in SPNM, SPM, and R classes; however, in RN, use would slightly exceed capacity. Thus, crowding in the Roaded Natural areas would lead to competition between users and would be a management concern.

Alternative G - This alternative makes no significant changes in ROS classification. SPNM increases 2%, SPM decreases 14%, RN increases less than 1%, and Rural increases 10%. These changes result from expansion of two ski areas and natural revegetation of roads changing the setting of 880 acres of SPM to SPNM.

Alternative H - In this alternative all potential ski areas are built, but few recreation facilities are constructed. Rural ROS class would increase 33% (3,960 acres) with two-thirds coming from SPM. The recommended creation of the Freel Wilderness Area would convert 2,600 acres of SPM to SPNM, significantly reducing OHV opportunities near South Lake Tahoe, but providing important opportunities for hiking and equestrian use. A total increase of 5,770 acres in SPNM creates adequate capacity to accommodate projected dispersed recreation use in that class through the fifth decade. Roaded Natural projected use slightly exceeds capacity.

Alternative I - Semi-Primitive Non-Motorized and Rural recreation opportunities are emphasized. All potential wilderness areas are recommended, all potential developed recreation facilities and ski areas are built, and all possible areas are closed to motorized vehicles. SPNM would increase 15% (7,910 acres), R would increase 48% (5,680 acres) and SPM and RN would decrease 51% (8,910 acres) and 9% (4,900 acres) respectively.

15. Research Natural Areas

Alternatives A, C, and F - Grass Lake Moss Bog (peatland) would be recommended as a Research Natural Area (RNA). If designated, or until a decision is made not to designate it as an RNA, management direction would prevent changes in the natural characteristics of the area. No activities are planned within the area that would alter the natural conditions. Increasing levels of cross

country skiing could be expected to occur in the area, but this recreation use is not expected to have an adverse effect upon the natural conditions. Designating the area as an RNA would provide long term benefits to science and would assure that the area remains a natural part of the visual setting.

Alternatives B, D, E, G, H, and I - No areas are recommended for designation as Research Natural Areas. The themes of these alternatives would emphasis other management direction for the Grass Lake Moss Bog. None of these alternatives would cause the bog to be substantially changed from its natural condition. However, no special effort would be made over the long term to preserve the natural conditions for scientific study and as a measure of an unchanged ecosystem.

16. Riparian Areas and Stream Environment Zones

Because of the emphasis on water quality in the Lake Tahoe Basin, stringent standards and guidelines to protect water quality, mainly through protection of riparian habitats and stream environment zones (SEZ), would be adopted in all alternatives. These will result in maintenance and/or improvement of the present quality of riparian areas and SEZ.

All alternatives include watershed restoration programs of varying sizes and would have positive effects on riparian areas and SEZ by enhancing water quality and riparian vegetation.

Fish and wildlife habitat improvements (such as stream bank revegetation and wetland habitat improvement planned as part of fish and wildlife programs) would also improve riparian areas and SEZ. The amount of improvement would increase with the size of the program.

Planned timber management activities, road building, and grazing would have slight negative impacts on riparian areas, SEZ, and riparian fish and wildlife habitats due to direct or indirect modification of vegetation within or adjacent to these areas. These activities would result in only minor negative effects on water quality and riparian vegetation, most of which would be mitigated by standards and guidelines.

Riparian wildlife habitats would also be impacted by increases in dispersed recreational use in all alternatives because these areas are preferred recreational attractions. These impacts would be in the form of human disturbance and intrusion into prime wildlife habitats altering normal animal breeding, feeding, and nesting activities.

Alternative A - Here 250 acres of wetland habitat improvement would occur as part of the wildlife program, 100 acres of fisheries habitat improvement as part of the fisheries program, and 2,140 acres of watershed restoration (approximately 33% of this would be in SEZ) would be done by the end of the 2nd decade. This would result in a 21% improvement of SEZ and 19% improvement in riparian areas over current conditions. These improvements would occur evenly (small amounts each year) during the planning period.

Riparian areas and SEZ would be impacted by the 175% increase in dispersed recreation use which would occur in this alternative.

Alternatives B, G, & I - Here 250 acres of wetland habitat improvement would occur as part of the wildlife program, 50 to 80 acres of fisheries habitat improvement as part of the fisheries program and 1,090 acres of watershed restoration (approximately 33% of this would be in SEZ) would be done over five decades. These would result in a 13% improvement of SEZ and 14% improvement in riparian areas. These improvements would occur evenly (small amounts each year) during the entire planning period in all three alternatives.

A 140 to 170% increase in dispersed recreation use over current levels (Alternative I includes the largest increase and G the least) would occur in these alternatives. The impacts would be greatest in areas which include or are adjacent to roads and trails.

Alternatives C and F - In these alternatives 250 acres of wetland habitat improvement would occur as part of the wildlife program, 140 acres of fisheries habitat improvement as part of the fisheries program, and 2,140 acres of watershed restoration (33% in SEZ) would be done. This would result in a 21% improvement of SEZ and 20% improvement in riparian areas by the end of 20 years. Fish and wildlife improvements would occur evenly (small amounts each year) during the entire planning period. All of the watershed restoration work would occur in the two decades.

A 170% increase in dispersed recreation use over current levels would occur in this alternative. Riparian wildlife habitats which include or are adjacent to roads and trails would be the most directly affected.

Alternatives D and E - These alternatives include no direct fish and wildlife habitat improvement. About 1,000 acres of watershed restoration work (33% in SEZ) would be done. This would result in a 9% improvement of SEZ and 5% improvement in riparian areas. These improvements would occur evenly (small amounts each year) during the entire planning period in both alternatives.

A 170 to 175% increase in dispersed recreation use over current levels (Alternative E includes the largest increase) would occur in these alternatives. Riparian wildlife habitats which include or are adjacent to roads and trails would be most directly affected.

Alternative H - Again, 250 acres of wetland habitat improvement would occur as part of the wildlife program, 115 to 140 acres of fisheries habitat improvement as part of the fisheries program, and 2,140 acres of watershed restoration (approximately 33% in SEZ) would be done. These would result in a 41% improvement of SEZ and 20% improvement in riparian areas. Watershed and wildlife improvements would occur evenly (small amounts each year) during the entire planning period in both alternatives. Most of the fisheries improvement would occur in the first planning period.

A 165% increase in dispersed recreation use over current levels would occur in this alternative. Riparian wildlife habitats, which include or are adjacent to roads and trails, will be most heavily affected.

17. Sensitive Plants

Impacts on four of the LTBMU's sensitive plants would occur in most alternatives. However, all alternatives would incorporate forestwide standards and guidelines for these sensitive plant species. These should protect existing populations of these plants on the LTBMU and/or help to mitigate any negative impacts from planned actions in alternatives.

Increased recreational use of forest beach areas in all alternatives, except for G, would adversely effect existing and potential habitat for Rorippa subumbellata (Tahoe yellow cress) by trampling of plants and/or modifications of its habitat. Potential beach habitats for reintroduction of the species would be affected similarly. Mitigation measures such as additional protective fencing, propagation, and replanting in less disturbed sites in both existing and potential habitats would be necessary in these alternatives to reduce impacts on the species.

Increased dispersed recreational use in wilderness areas and current unroaded areas on the unit would result in minor trampling and habitat disturbance impacts for existing populations of Lewisia pygmaea ssp. longipetala, Draba asterophora, and Draba asterophora var. macrocarpa. The affects would be slight. In this respect Alternative G would have the least impact on these species of all the alternatives. Regular monitoring of existing populations of these species would be employed in all other alternatives to guard against the occurrence of substantial.

18. Soils

The potential effects of each alternative upon the soil resource vary with the amount and intensity of management practices applied. CFR 219.27(a) requires that soil productivity be maintained over the long term. Therefore, the effects of the alternatives upon soil productivity have been estimated. Where productivity was determined to be adversely impacted, mitigation measures are recommended. Some of the same factors that effect soil productivity may also be a major contributor to water quality degradation in Lake Tahoe. Water quality impacts are discussed in that section of this chapter. Other potential secondary impacts of decreased soil productivity would be decreased quality of wildlife and fisheries habitat and scenic values.

Impacts upon Soil Productivity

Table 4.16 compares the relative level of activity in each alternative that would, or as the potential, to effect soil productivity.

Ski run clearing can have a major impact on soil productivity. Monitoring of Heavenly Valley ski area has provided some background information on the effects but, at this time, only supports general assumptions. Clearing of trees removes their protective effect on soils. The adverse effect is less noticeable if a good understory of vegetation, especially shrubs, exists. When further clearing of vegetation and grading of the run occurs to enhance skiing on marginal natural or manmade snow, the adverse effects are substantially greater. Not only are the soil binding and protective properties of living plants and roots lost, but the thin topsoil may be displaced.

Table 4.16. Activities Which Effect Soil Productivity by Alternative

Activity	Alternative A Selected	B Current	C Conserv.	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
1. Ski Area Development- Total Acres 1/	8157	5977	7397	7993	8157	3675	4735	7857	8157
2. Timber Harvest- Acres of Openings/yr	40	48	0	40	236	100	40	170	91
Harvest Method 2/	GS	GS		CC	CC	GS	GS	GS	GS
Other acres harvested 3/	360	475	560	0	1849	190	95	488	190
3. Timber Access Road Construction (new miles by end of 5th decade)	2	0	0	0	20	0	0	4	0
4. Recreation Site Development (acres developed by 5th decade)	400	0	400	400	400	0	<477>	67	400
5. Prescribed Burning Associated with Timber Management (acres/year)	300	404	300	40	836	410	90	462	282
6. Wildfire - Estimated acres/decade)	440	440	440	760	310	440	760	310	540
7. Watershed Restoration (acres treated per year)	110	22	110	22	22	110	22	55	22

1/ Usually about 2% of the land within a ski area has impervious coverage or permanent soil disturbance.

2/ Key to harvest methods listed: CC = Clearcut; GS = Group Selection.

3/ Other acres harvested refers to those lands on which Individual Tree Selection and/or Intermediate Harvest methods are used; impacts on soils from these methods are lower. The numbers in () are not used in determination of percent change from 1982 level.

Clearing trees without disturbing the ground cover and topsoil is by far the preferred protection measure for ski area development. Where more extensive clearing and grading are approved, mitigation of the impacts consists of erosion control measures and revegetation of ski runs. Both are expensive and difficult and may require years to establish an acceptable protective cover. Recovery to nearly natural conditions, if possible at all on many soils in the Basin, may take decades. Irrigation and fertilization would aid the recovery process, but unless carefully regulated, nutrient levels in both surface and ground water could be elevated.

Alternative A, D, E, and I would be about equal in the potential impacts upon soil productivity from ski area development since they provide opportunity at a level to meet demand. Alternative B and H would be somewhat less impacting since they expand skiing at less than demand. Alternative C, F and G would have the least effect since they either do not expand skiing or defer the development.

Road construction would cause a permanent loss of soil productivity due to the heavy disturbance of the soil profile and compaction necessary for road construction. Accelerated surface runoff would cause a temporary increase in soil erosion on the cut and fill slopes and at culvert outlets. Application of BMP could mitigate most of these short term adverse soils impacts, however the disturbance of the soil profile would not be mitigated.

Alternatives E and H are the only ones that require new road construction other than roads associated with recreation site development. Thus these two alternatives would reduce soil productivity on the land area used for the roads.

Road reconstruction would impact soil productivity only where the road prism is expanded. Since the goal in reconstruction is to reduce the existing soil erosion occurring from a road, expansion of the road prism would be restrained. All alternatives reconstruct equal miles of road and thus the benefits and the impacts should be similar. The exception is with Alternative G where the road mileage is reduced. Alternatives A, C, and F accomplish the reconstruction in the first 2 decades whereas a longer period is scheduled in the others.

Timber harvest and site preparation would occur on more acres than any other land management activity, but, except for access roads, the effects on the soil resource could be readily mitigated. The potential effects on soil productivity include: soil compaction, topsoil displacement, loss of surface organic matter, and erosion. Whether these potential effects would become actual effects depends on: soil type, slope steepness, harvest technique, silvicultural practice, and type of site preparation. Soils with potential for compaction can be avoided in all alternatives. Treatment of slash generated by timber harvest and preparing harvested areas for reforestation is usually done by broadcast burning or by some form of mechanical treatment. Mechanical treatment has the potential to displace topsoil, especially if brush must be removed. Broadcast burning has the potential to consume surface litter and soil organic matter. The impacts of both types of site preparation on long-term soil productivity are minimal when implemented according to standard and guildlines. The potential for soil loss by surface erosion is greatest on steeper slopes, especially where protective ground cover is removed. Only Alternatives E and H would require timber harvest on slopes over 30%. Aerial

harvest techniques would be used on slopes over 30%, thus avoiding the impacts of ground skidding. An exception may be on ski runs where over the snow skidding is an option and ground cover could be maintained. Alternatives D and E would produce 20 acre clearcuts. Initially the impacts of clearcutting on the soil resource are greater than with other slivicultural systems. However, over the long term, the periodic entries of other silvicultural systems can have larger impacts upon the soil.

All alternatives, except E and H, have a low level of timber harvest and site preparation, and timber management is confined to land on which adverse effects can be readily implemented. Application of best management practices and mitigation measures will assure that long-term soil productivity is maintained.

Recreation site development would cause a permanent loss in soil productivity where covered by improvements. Acreage involved is modest in Alternatives A, B, D, E, H and I, and quite small in G and F. Alternative C could be modest also, unless construction is deferred indefinitely.

Wildfire acreages on the LTBMU are historically small (about 44 acres per year) and are of low intensity. Occassionally, small areas with high intensity burns could temporarily impact soil productivity, but overall soil productivity is not expected to be impaired by wildfire. Likewise, prescribed fire should have little effect upon productivity.

Other activities, such as grazing and OHV use, have the potential to affect the soil resource, but these effects would be relatively minor as long as standards and guidelines are followed.

19. Special Interest Areas

Special Interest Areas are established to classify areas that possess special recreational or scientific values. Examples are unique scenic, historical, geological, botanical, zoological, or paleontological characteristics. These areas will then be available for public study, use, or enjoyment as appropriate.

Alternatives A, C, and F propose classifying the Tallac Historic Site as a SIA, and studying several other areas for possible future designation. The current management plan for the Tallac Historic Site emphasizes interpreting and preserving the significant historic resources for public enjoyment. Thus, SIA classification would not greatly affect the management or use of the site. Areas to be evaluated during this planning period include Emerald Bay, Osgood Bog, Freel Peak Cushion Plant Community, and Taylor Creek Wetlands. The inventory and evaluation process will be kept ongoing, with possible future candidates being Grass Lake Moss Bog, Hell Hole, Floating Island Lake, Pope and Baldwin Marshes, Cave Rock, Glacial Moraine Deposits, and Ward and Blackwood Canyons. Others may be considered on a case-by-case basis. None of the special features that characterize these areas are threatened by the current management direction.

Alternatives B, D, E, G, H, and I propose no SIAs for classification. However, even under these alternatives special values will be maintained and protected to keep open the option of future SIA consideration.

20. Timber and Vegetation

The effects of each alternative on the timber and vegetation resources are related to the amount of the forest vegetation that is being managed and how the managed portions are expected to respond. Table 4.17 displays the timber sale program quantity by cutting method for each alternative. Table 4.18 shows the land scheduled for harvest by land capability. Timber stands that are not actively managed will change over time from their existing condition, which in most cases tends toward mid-successional stage, toward older conditions. As the stands reach maturity and overmaturity, health and vigor will decline; insect and disease activity will increase; snags and downwood will become more prevalent. These natural processes will, over many decades, produce the conditions considered as old growth forest.

The following describes the conditions (consequences) which are anticipated in each alternative.

Alternative A - Natural processes will occur on much of the forest resulting in older stands. Active treatment would be primarily on the higher capability land. About 40 acres per year of small openings (averaging less than 2 acres) would be cut and regenerated each year using group selection methods. An occasional larger opening to five acres may be harvested. These openings would qualify as early seral stage habitat for wildlife. Treatment on other areas would be aimed at maintaining the health of the forest and the suitability for recreation use.

Alternatives B and G - These alternatives would be similar to A. The minimum required regeneration harvest of small openings would occur to insure habitats for all native wildlife species (40 acres per year). There would be little if any other harvesting for maintaining the general health of the forest.

Alternative C - This is the only alternative which does not satisfy the minimum management requirement for vegetative diversity. No regeneration harvest that creates large or small openings is included. In order to maintain the historic harvest level and provide increased integrated pest management opportunities the acres of individual tree selection and sanitation salvage is increased to 360 and 200 acres respectively. These treatments will increase the health of treated stands and accelerate the development of an older more mature forest.

Alternative D - The consequences of this alternative would be similar to those described above for Alternatives B and G. The larger regeneration openings (up to 20 acres each) would give a definite even-aged pattern to treated lands. Large clearcuts combined with a low goal for acres regenerated (40 per year) would concentrate the areas treated to perhaps only two new openings each year. Maintaining the health and suitability of the forest for other uses would be limited.

Alternative E - This alternative includes a substantial increase in timber harvest. Much of the available and capable timber land would be intensively managed for regulated timber production. Harvest methods would favor 20-acre clearcuts. In time, the forest would be a mosaic of 20 acre even-aged stands representing a good mix of seral stages. A smaller portion of the forest would progress naturally toward older, more mature conditions. Firewood production would be double the current level.

Table 4.17. Timber Program Quantity
(by Silvicultural System and Decade)
(Average Annual)

Silvicultural System and Decade.		A Selec.	B Cur.	C Cons.	D CEE.	E MKT.	F AMN.	G LBU.	H RPA	I WLI.
		Alternatives								
Clearcut										
1	Volume MMBF	0	0	0	.8 1/	8.3 1/	0	0	0	0
	Acres				40	236				
2	Volume MMBF	0	0	0	.9	5.9	0	0	0	0
	Acres				40	177				
3	Volume MMBF	0	0	0	1.0	10.6	0	0	0	0
	Acres				40	306				
4	Volume MMBF	0	0	0	1.1	12.0	0	0	0	0
	Acres				40	319				
5	Volume MMBF	0	0	0	1.2	15.9	0	0	0	0
	Acres				40	403				
Group Selection										
1	Volume MMBF	1.4 1/	1.8 1/	0	0	0	2.4 1/	.9 1/	5.5 1/	3.0 1/
	Acres	40	48				100	40	170	91
2	Volume MMBF	1.4	1.8	0	0	0	2.6	1.0	5.5	3.3
	Acres	40	45				100	40	160	93
3	Volume MMBF	1.4	1.8	0	0	0	2.9	1.1	5.8	3.3
	Acres	40	40				100	40	121	89
4	Volume MMBF	1.5	1.8	0	0	0	3.2	1.2	5.7	3.3
	Acres	45	40				100	40	109	70
5	Volume MMBF	1.7	1.7	0	0	0	3.5	1.3	5.7	3.3
	Acres	50	40				100	40	142	60
Selection (Individual Tree)										
1	Volume MMBF	2.3 2/	3.5 2/	3.6 3/	0	.4 1/	.3 2/	.2 2/	.1 3/	.3 2/
	Acres	260	350	360		323	40	20	188	40
2	Volume MMBF	2.8	3.5	3.6	0	.4	.3	.2	1.5	.3
	Acres	280	350	360	0	323	40	20	548	40
3	Volume MMBF	3.1	3.5	3.6	0	.5	.3	.2	1.6	.3
	Acres	310	350	360	0	323	40	20	548	40
4	Volume MMBF	3.2	3.5	3.6	0	.5	.3	.2	1.7	.3
	Acres	320	350	360	0	323	40	20	548	40
5	Volume MMBF	3.3	3.5	3.6	0	.5	.3	.2	1.8	.3
	Acres	330	350	360	0	323	40	20	548	40
Intermediate Harvest (Thinning and Sanitation/Salvage)										
1	Volume MMBF	.4 2/	.5 2/	.8 3/	0	6.5	1.7 2/	.8 2/	3.4 2/	1.7 2/
	Acres	100	125	200	0	1526	150	75	300	150
2	Volume MMBF	.4	.5	.8	0	10.2	1.7	.8	3.4	1.7
	Acres	100	125	200	0	1449	150	75	300	150
3	Volume MMBF	.4	.5	.8	0	7.4	1.7	.8	3.4	1.7
	Acres	110	125	200	0	1348	150	75	300	150
4	Volume MMBF	.5	.5	.8	0	8.3	1.7	.8	3.4	1.7
	Acres	120	125	200	0	1136	150	75	300	1.5
5	Volume MMBF	.5	.5	.8	0	7.0	1.7	.8	3.4	1.7
	Acres	130	125	200	0	1302	150	75	300	1.5
Maximum Allowable Sale Quantity - 16th Period										
	(MMCF)	0	0	1.13	0	3.65	0	0	.95	0
Long Term Sustained Yield										
	(MMCF)	NA	NA	1.51	NA	3.82	NA	NA	1.64	NA

1/ FORPLAN Harvest Report
2/ Other products - primarily firewood
3/ FORPLAN Harvest Report and firewood

Alternative F - This alternative would create 100 acres each year of small openings in the forest to create early seral stages of vegetation. Individual openings would be less than 5 acres in size. Harvesting for forest health through other cutting methods would be limited. A large portion of the basin forest would progress naturally toward older conditions.

Alternative H - This alternative includes a substantial timber program. Harvest would produce a series of five-acre patches. Firewood production would be twice the current level as a by-product of slash disposal, recreation site maintenance, habitat maintenance, etc. A good balance of seral stages will result in the small openings producing a somewhat uneven-aged effect. One consequence of producing an equivalent volume with small openings, assuming the openings must be dispersed, will be that the total area affected will be greater. For that reason this alternative produces a desirable mosaic of seral stages.

Alternative I - This alternative intensifies management on nonwilderness areas to produce timber yields which are slightly higher than current. The primary harvest method would be patch cutting. Firewood would be produced at the current level. This program would ensure adequate diversity, though older stands, and eventually old growth, would still be the more dominant seral stage over time. Overall the consequences of this alternative are similar to Alternatives A and F, even though the average annual acreage treated is less.

Table 4.18. Acres Scheduled for Harvest by Land Capability 1/
(for decades 1 through 5)

Land Capability1/	Decade	Alternatives A	B	C	D	E	F	G	H	I
Low	1	309	352	464	400	1119	771	400	1431	905
Hazard	2	420	377	497	400	1769	1000	400	1603	870
Class	3	345	281	370	400	700	750	400	691	831
5-7	4	310	325	428	400	885	494	400	408	469
	5	382	381	503	370	915	424	400	212	340
Moderate	1	91	73	96	0	1245	228	0	267	0
Hazard	2	0	48	63	0	0	0	0	0	60
Class	3	115	144	190	0	2305	250	0	522	60
3-4	4	175	100	132	0	2301	506	0	686	228
	5	128	44	57	30	2121	577	0	1207	260
High	1	0	0	0	0	0	0	0	0	0
Hazard	2	0	0	0	0	0	0	0	0	0
Class	3	0	0	0	0	0	0	0	0	0
1-2	4	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	470	0	0	0	0

1/ Refers to Bailey land capability classification (Forest Plan Appendix E).

21. Visual Resources

The visual condition is a dynamic factor that changes through time. New activities may disturb the natural landscape. The degree of impact is affected by the size and type of the activity as well as the location. The effects are determined by the degree of alteration to the natural line, color, texture, and form in the landscape. However, many effects are temporary, because the vegetation grows back restoring a natural appearance.

To display the effects of the alternative on visual resources, indicators are used that compare the alternatives to two baselines: the initial Visual Quality Objectives and the Existing Visual Condition. Visual Quality Objectives (VQO) set goals on how the landscape should look at future points in time. The initial Visual Quality Objectives evolved from an inventory of the physiological and sociological environment and set preliminary goals on acceptable amounts of landscape alteration. The other baseline, the Existing Visual Condition (EVC), measures and describes how the landscape presently looks. While the initial VQO and the EVC of any given area are not necessarily the same (since the former sets a preliminary goal for the future and the latter displays a current condition), the six VQO levels do equate to the six visual condition levels displayed in Figure 4.2.

Table 4.19 displays the Future Visual Condition (FVC) expected to result from implementing each alternative by the fifth decade. It shows the predicted distribution of acreage in each FVC by variety classes. Acreage totals are also shown for the Existing Visual Condition and Initial VQO. Consequently, the table compares how the land would be visually altered in each alternative over time. The table also provides, on a relative basis, a measure of whether an alternative would be more highly scenic or more common in nature.

Table 4.20 displays the visual quality objectives by variety classes for each alternative and compares the objective to the existing condition and the initial visual quality objective.

All alternatives except for Alternative E (Market) far exceed the national goal for visual resources in terms of acres meeting Preservation and Retention.

Figure 4.3 displays visual quality objective by percentage for each alternative.

Figure 4.4 illustrates the Visual Quality Index (VQI) changes of each alternative to the year 2030. The VQI is a composite rating of the entire LTBMU. The figure shows the changes from the existing visual condition for each alternative, compares the future condition of each to each other, to the initial VQO, and to the maximum possible index if there was no visual alteration on national forest lands.

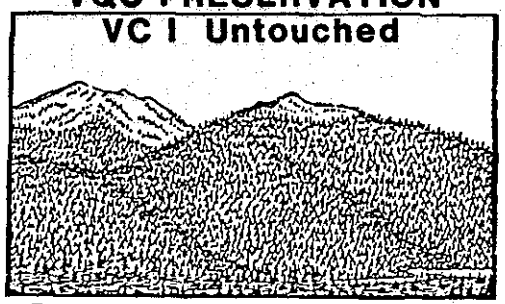
Figure 4.5 displays the decline in visual condition for each alternative by the year 2030.

FIGURE 4.2

VISUAL QUALITY OBJECTIVE
VISUAL CONDITION
(VQO & VC)

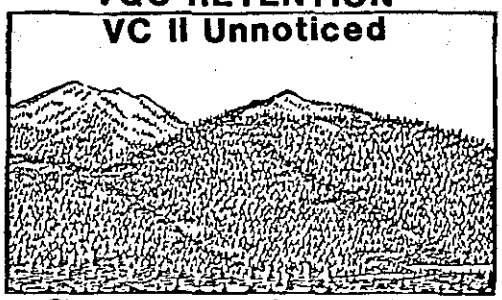
NATURAL CHARACTER DOMINATES

VQO PRESERVATION
VC I Untouched



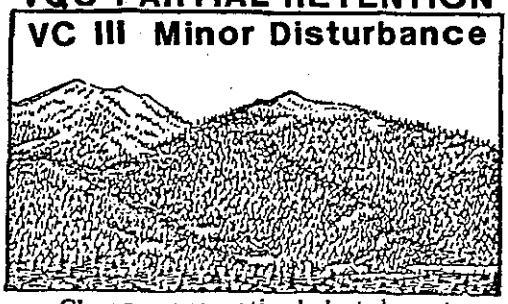
Predominantly ecological changes.

VQO RETENTION
VC II Unnoticed



Changes are not visually evident.

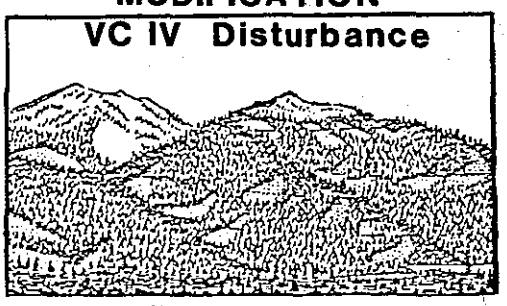
VQO PARTIAL RETENTION
VC III Minor Disturbance



Changes are noticed, but do not attract attention.

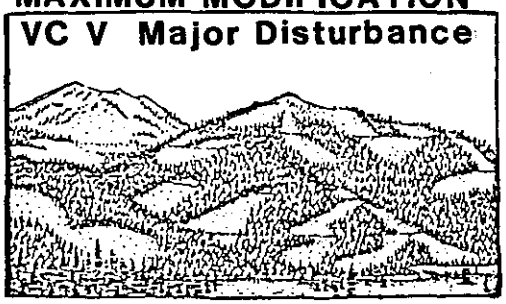
ALTERED CHARACTER DOMINATES

MODIFICATION
VC IV Disturbance



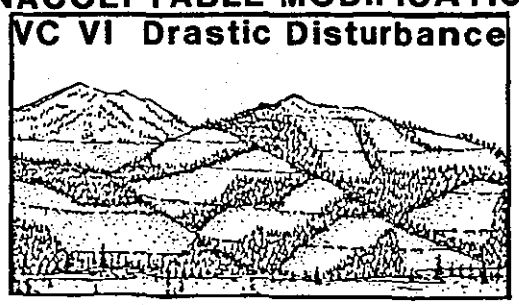
Changes are easily noticed and attract attention.

MAXIMUM MODIFICATION
VC V Major Disturbance



Changes are very strong and attract attention.

UNACCEPTABLE MODIFICATION
VC VI Drastic Disturbance



Changes are in glaring contrast and disharmony with natural patterns.

Figure 4.3
Percent Distribution of Visual Quality Objectives by Alternative

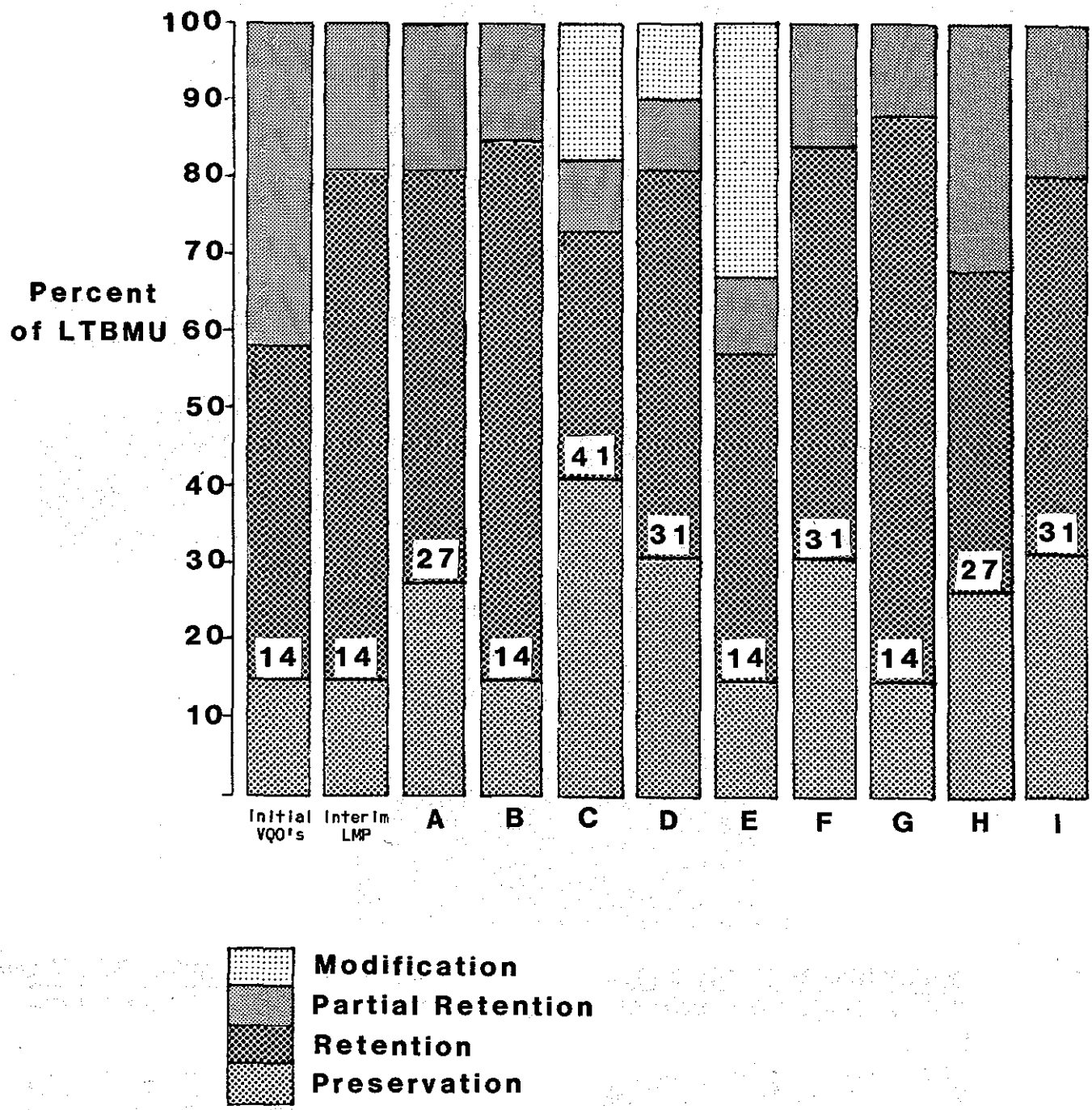


FIGURE 4.4
CHANGE IN VISUAL QUALITY INDEX BY ALTERNATIVE

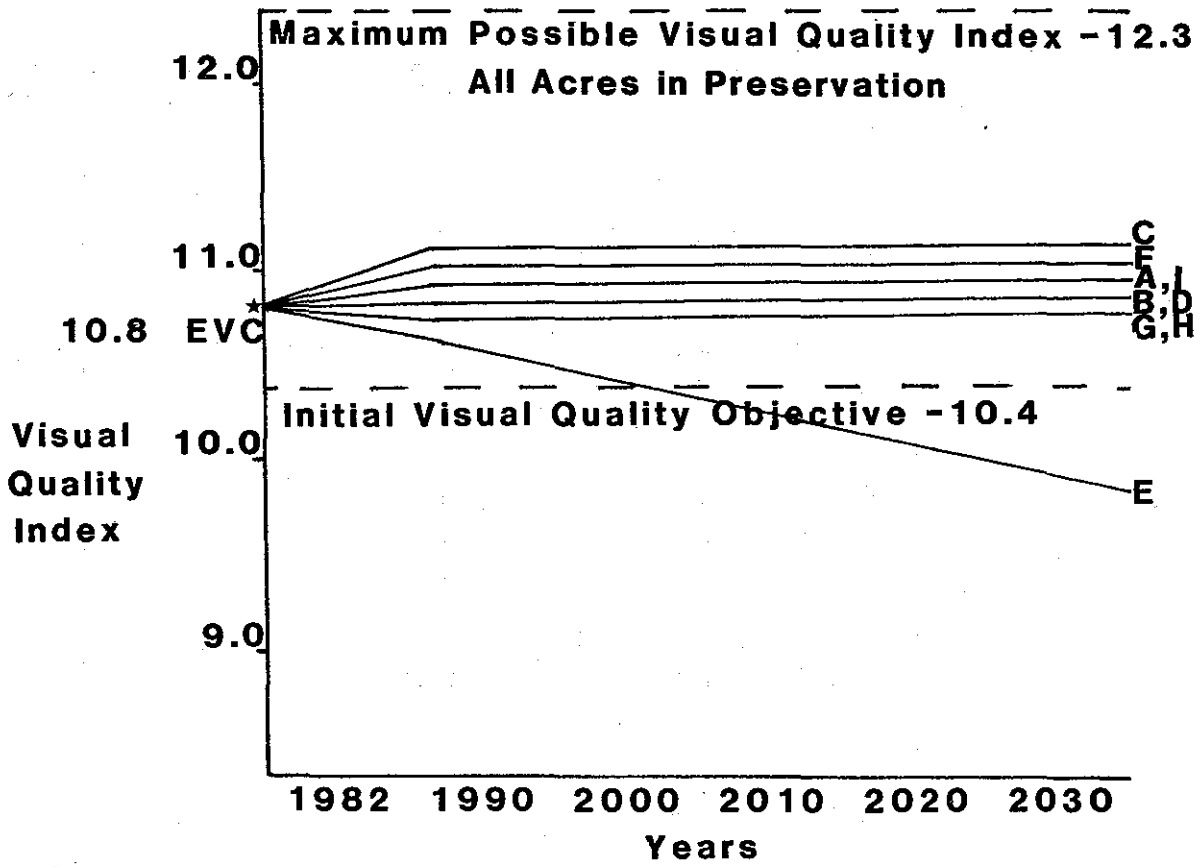


FIGURE 4.5
VISUAL CONDITION DECLINE BY THE YEAR 2030 BY ALTERNATIVE

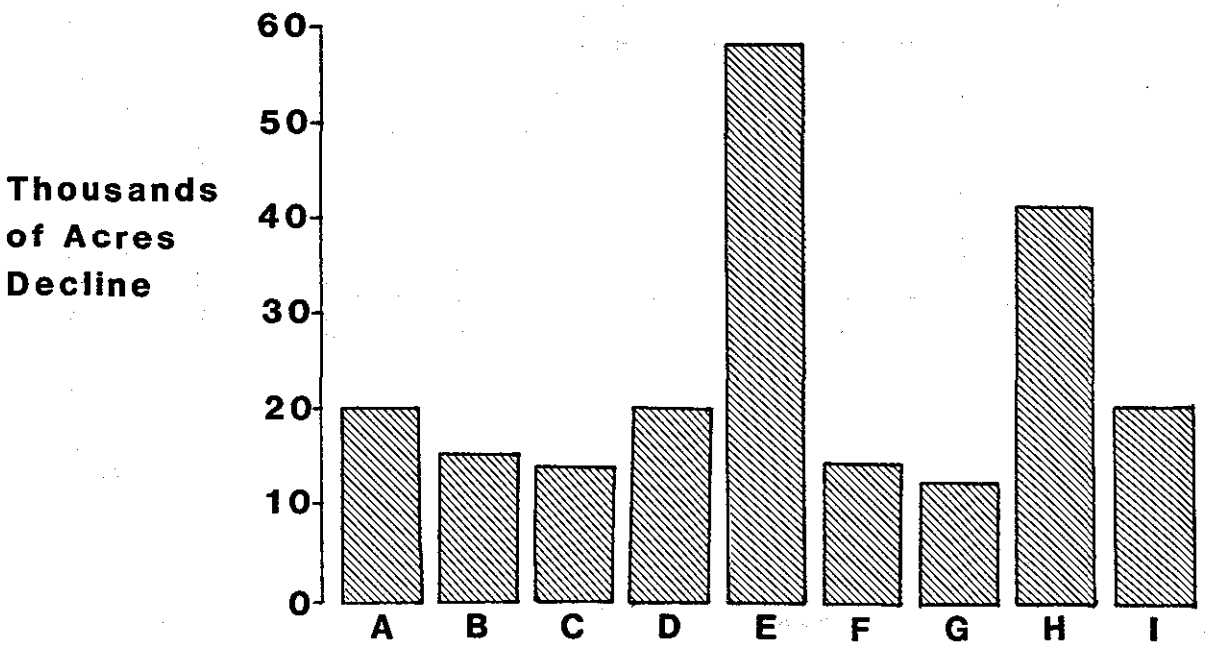


Table 4.19. Acres of Existing and Future Visual Conditions by Variety Class

Acres Shown for Year 2030

Visual Condition	Variety Class	Existing Condition	A Selected	B Current	C Consv.	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
			Alternatives								
I	A	20,874	23,955	21,330	46,255	31,755	21,330	31,755	21,330	31,755	31,755
	B	0	0	0	14,465	14,465	0	14,465	0	7,800	14,465
	Subtotal	20,874	23,955	21,330	60,720	46,220	21,330	46,220	21,330	39,555	46,220
II	A	41,149	37,915	40,211	15,615	30,064	27,530	30,468	40,240	30,115	29,508
	B	76,860	54,679	60,970	40,214	40,728	33,849	46,143	65,890	29,498	40,634
	Subtotal	116,009	92,594	100,981	55,829	70,792	61,379	76,611	106,130	59,613	70,142
III	A	1,974	2,683	3,012	2,683	2,734	2,264	2,330	2,520	2,683	3,290
	B	2,093	28,382	22,291	28,382	12,797	14,986	22,453	17,071	45,763	27,962
	Subtotal	4,067	31,065	25,302	31,065	15,531	17,250	24,783	19,591	48,446	31,252
IV	A	482	19	19	19	19	13,448	19	482	19	19
	B	2,421	100	100	100	15,171	34,326	100	200	100	100
	Subtotal	2,903	119	119	119	15,190	47,774	119	682	110	119
V	A	74	0	0	0	0	0	0	0	0	0
	B	332	0	0	0	0	0	0	0	0	0
	Subtotal	406	0	0	0	0	0	0	0	0	0
VI	A	19	0	0	0	0	0	0	0	0	0
	B	1,455	0	0	0	0	0	0	0	0	0
	Subtotal	1,474	0	0	0	0	0	0	0	0	0
Visual Quality Index		10.8	10.9	10.8	11.1	10.8	9.8	11.0	10.7	10.7	10.9

Table 4.20. **Acreage of Existing and Future Visual Quality Objectives by Variety Class**
Acres Shown for the Year 2030

Visual Quality Objective	Variety Class	Current VQO	Initial VQO	Alternatives A Selected	B Current	C Consv.	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
Preservation	A	21,330	21,330	23,955	21,330	46,255	31,755	21,330	31,755	21,330	31,755	31,755
	B	0	0	0	0	14,465	14,465	0	14,465	0	7,800	14,465
	Subtotal	21,330	21,330	23,955	21,330	60,720	46,220	21,330	46,220	21,330	39,555	46,220
Retention	A	40,540	43,242	37,915	40,211	15,615	30,064	27,530	30,468	40,240	30,115	29,508
	B	54,683	19,285	54,679	60,970	40,214	40,728	33,849	46,143	65,890	29,498	40,634
	Subtotal	95,223	62,527	92,594	100,981	55,829	70,792	61,379	76,611	106,130	59,613	70,142
Partial Retention	A	2,683	0	2,702	3,031	2,702	2,734	2,264	2,349	2,520	2,702	3,309
	B	28,378	63,887	28,482	22,391	28,482	12,797	14,986	22,553	17,071	45,863	28,062
	Subtotal	31,061	63,887	31,184	25,422	31,184	15,531	17,250	24,902	19,591	48,565	31,371
Modification	A	19	0	0	0	0	19	13,448	0	482	0	0
	B	100	0	0	0	0	15,171	34,326	0	200	0	0
	Subtotal	119	0	0	0	0	15,190	47,774	0	682	0	0
Maximum Modification	A	0	0	0	0	0	0	0	0	0	0	0
	B	0	0	0	0	0	0	0	0	0	0	0
	Subtotal	0	0	0	0	0	0	0	0	0	0	0
Unacceptable Modification	A	0	0	0	0	0	0	0	0	0	0	0
	B	0	0	0	0	0	0	0	0	0	0	0
	Subtotal	0	0	0	0	0	0	0	0	0	0	0
Visual Quality Index		10.7	10.4	10.9	10.8	11.1	10.8	9.8	11.0	10.7	10.7	10.9

Since so much of the LTBMU currently appears undisturbed, there is very little land that would not meet the VQO of any alternative. The exceptions tend to be sites that are recovering naturally already and do not need rehabilitation or sites like Heavenly Valley and parts of Blackwood Canyon that need rehabilitation in all alternatives.

Alternative A - The preferred alternative puts a strong emphasis on protection of the scenic quality of the Tahoe Basin. Over 91% of the LTBMU would be undisturbed or natural appearing. Timber harvesting would be limited to openings of five acres or less on the flatter lands so that they will blend easily with the natural landscape. Some disturbed sites will require assistance to meet visual quality objectives. These are usually associated with watershed restoration work such as Heavenly Valley and Blackwood Canyon. The only significant reduction in scenic quality would be from expansion of existing ski areas. The visual quality ratings for roadway and shoreline units would be maintained on national forest land. Foreground and middleground views from the California highways eligible for scenic highway classification would generally meet retention VQO, where management activities are not visually evident.

Alternative B - This alternative also emphasizes scenic protection in the standards and guidelines. More than 92% of the LTBMU would appear undisturbed. Openings are restricted to eight acres or less. The low funding levels for this alternative would limit the amount of restoration that could be accomplished. As in Alternative A, there would be some slight impact from ski area expansion. There would be no reduction in the visual quality ratings, and potential scenic corridors would be protected.

Alternative C - This alternative emphasizes visual quality second only to the Amenity Alternative. Recreation development is deferred and reduced in scale and dispersed recreation is emphasized during the first two decades. All roadless areas including Dardanelles are recommended for wilderness designation resulting in the highest VQI of any alternative. The environmental thresholds for scenic resources would be met or improved in this alternative. Middleground views along the scenic highway candidates would generally meet Retention or Partial Retention VQO.

Alternative D - The two further planning roadless areas would be managed for wilderness preservation. All potential ski areas would be constructed. Clearcutting in 20-acre blocks would be allowed as the most efficient harvesting method, but only on flat, low hazard land. About 78% of the LTBMU would remain in a natural appearing condition, but the wilderness additions would balance the impacts of clearcutting and skiing so the visual quality index would be the same as the current level. With the low level of clearcutting involved, the visual quality ratings would be maintained, and the scenic highway corridors would meet the Retention or Partial Retention VQO.

Alternative E - Since this alternative emphasizes high levels of market goods, it has the greatest impact on scenic quality and the lowest visual quality index. Only about 53% of the LTBMU would remain natural appearing. Over 40,000 acres would be managed for clearcutting in this alternative on both flat and steep lands. All potential ski areas would also be built. Many of the roadway and shoreline unit scenic ratings would be reduced because of the

effects of clearcutting. Areas in the scenic corridors would barely meet Partial Retention.

Alternative F - Of all the alternatives, this alternative puts the highest emphasis on visual quality. Over 94% of the LTBMU would remain natural appearing, and Lincoln Creek and Freel would both be recommended for wilderness preservation. No new recreation or ski development would occur. The timber management program would be limited to small openings on low and moderate hazard land. The watershed program would restore much of the existing visual disturbance. The environmental thresholds for scenic resources would be maintained or improved in this alternative. Middleground views along scenic corridors would meet Retention or Partial Retention VQO, just as they do today.

Alternative G - Because of the small budget proposed in this alternative, activities would be limited mostly to existing sites. Consequently 92% of the LTBMU would remain natural appearing and the visual quality index would remain the same. Timber harvesting would be at reduced levels, with openings limited to eight acres or less. There would be some ski area expansion. Little restoration would occur through the watershed program and the much reduced fire organization would increase the risk of a major wildfire that could damage scenic quality over a long period. With little new activity, this alternative would maintain the scenic threshold ratings and protect scenic corridors.

Alternative H - Although this alternative produces the same timber outputs as Alternative C, here the maximum opening size is limited to eight acres or less. Since this occurs primarily on the flatter lands, timber harvesting would have little scenic effect. There would be some impacts from ski area expansion. The recommendation of Freel for wilderness would guarantee permanent scenic protection. Overall, the visual quality index would actually increase slightly, and 91% of the LTBMU would be natural appearing. The scenic thresholds would be achieved, and the State scenic highways would be protected.

Alternative I - This alternative has effects quite similar to the preferred alternative. The main differences are that Alternative I provides slightly more ski area expansion and the recommendation of two new wilderness areas. The visual quality index is slightly higher than the existing index, and 91% of the LTBMU would be natural appearing. The environmental thresholds would be met, and the scenic corridors would be protected.

22. Water

The potential effects of each alternative upon water quality and quantity vary appreciably. The effects on water quality are of a greater magnitude than those on water quantity, but both are equally important. The need for water rights to implement the activities of the Forest Service also differs between alternatives. (Also see the geology section for a discussion of groundwater.

Water Quality

Several indicators were used to evaluate and compare alternatives for water quality effects, since this is a major issue in the Lake Tahoe Basin. The indicators were impervious surface coverage, amount of land disturbance, type and location of land disturbing activities, potential for atmospheric

deposition of airborne nutrients, and the size of the watershed restoration program.

Acquisition of land through the Santini/Burton Act program would also be an indicator of beneficial effects upon water quality. Acquired land would no longer have the potential to be developed in a manner detrimental to water quality, i.e. increased impervious surface coverage and land disturbance. Since all alternatives are projected to acquire the same amount of land, there is no difference between them in beneficial effects to water quality. As part of the Santini/Burton Act program, watersheds are prioritized for acquisition based on environmental sensitivity and amount of disturbance as relative to protection of water quality. Cumulatively, the land acquisition program will have a net beneficial impact on water quality regardless of alternative; therefore this topic is not included in further analysis in this section. (See the landownership adjustment section of this chapter.)

As discussed in the soil and water section of Chapter 3, mitigation of both on-site and cumulative watershed impacts is the primary factor in protection or enhancement of water quality in Lake Tahoe. In this section, amount of impervious surface coverage and land disturbance will be used as proxies for assessment of cumulative watershed impacts associated with national forest land management activities.

Measurement of land covered with impervious surfaces (asphalt, concrete, etc.) is used by all agencies in the basin to determine the extent of permanent alteration to the watershed. Roads (associated primarily with timber management activities) and parking areas (associated with recreation management activities) are the most notable causes of impervious land coverage on national forest land. Trails, buildings, recreation improvements, and other activities also create coverage. Changes in coverage have been predicted for each alternative. This was accomplished by determining the average amount of impervious coverage that could be expected by implementing various management prescriptions. Estimation of the amount of coverage by alternatives is displayed in Table 4.21.

None of the alternatives cause the land coverage limits to be exceeded on national forest land in any watershed. Several watersheds, already having impervious coverage in excess of that which is recommended, would receive additional coverage due to national forest management activities. These watersheds are in the Incline, Cave Rock, and Kingsbury areas. Excess coverage in these areas is a result of activities on private lands. Alternative sites for proposed impervious coverage on national forest land in these areas will be carefully evaluated prior to implementation.

Table 4.21. Impervious Surface Coverage

(Total acres of coverage)

Decade	Alternative A	B	C	D	E	F	G	H	I
1982 (Base)1/	880	880	880	880	880	880	880	880	880
1	917	914	886	896	918	886	826	901	896
2	987	930	934	964	988	934	842	955	964
3	1052	946	1032	1053	1059	992	853	1032	1053
4	1110	949	1092	1114	1129	1018	853	1097	1114
5	1156	950	1139	1183	1213	1045	853	1143	1184

1/ Distributed as follows: Highways - 110 acres; Forest roads and trails - 466 acres; Developed recreation sites - 244 acres; Developed ski areas - 60 acres.

Another measure of cumulative watershed effects is the amount of total land disturbance. This differs from impervious land coverage in that soil permeability remains, although diminished. Even where water may infiltrate readily, nutrient utilization and storage is not as effective as under natural conditions. The soil surface may be compacted, and a protective cover of vegetation and litter may be missing. Unlike impervious coverage, disturbed areas can recover to natural stability over time. For each type of land disturbing activity, estimates were made of: (1) the extent of disturbance expected for each acre of the activity, (2) the rate at which the disturbance would recover, and (3) whether the recovery would be to natural stability or less than natural stability. As examples, timber management activities would substantially disturb 10% to 33% of an acre treated, but would recover to natural stability in 30 to 40 years. An acre of ski development could disturb up to 32% of the land, primarily in ski lift and trail clearing. If no grading is done following removal of tree cover, the effects upon soil stability are not adverse. However, removal of natural groundcover, especially shrubs and stumps, by grading with equipment would make the area susceptible to accelerated erosion. Planting grasses and installing structural measures may assist in protecting the cleared and graded land. Natural stability may return in up to 30 years with the re-establishment of native shrubs and other deep rooted plants. The type of timber harvest method, i.e. clearcut, group selection, single tree selection, or intermediate harvest, and its impact on water quality were also included in the land disturbance analysis. Table 4.17, Timber Program Quantity, is the basis for this information. Table 4.22 displays the amount of disturbed land area expected as a result of existing and proposed activities. The acres of disturbance do not include acres of impervious surface coverage nor does it include the existing 2,140 acres of disturbance that is planned for restoration.

Table 4.22. Land Disturbance

(Total Acres of Land Disturbance from Activities 1/)

Decade	Alternatives A	B	C	D	E	F	G	H	I
1982 Base 2/	2231	2231	2231	2231	2231	2231	2231	2231	2231
1	2638	2535	2429	2387	2850	2429	2358	2765	2537
2	2682	2470	2400	2314	2982	2250	2248	2876	2540
3	2550	2239	2550	2285	2940	2050	1918	2679	2521
4	2650	2208	2650	2571	3355	2004	1877	2759	2731
5	2538	2142	2538	2802	3855	2002	1826	2838	2902

1/ Figures do not include Impervious Coverage Acres included in Table 4.20
2/ Distributed as follows: Highways = 90 acres; Forest roads and trails = 1,078 acres; Developed recreation sites = 24 acres; Developed ski areas = 897; Timber and other activities = 142 acres.

The most effective means to minimize cumulative watershed impacts is to monitor the type and location of activities. The "Bailey" system provides a method by which the most suitable lands may be selected for a particular activity (although the system is primarily designed for urban activities), and the more sensitive types of land (stream environment zones, steep and unstable areas) can be protected. The land disturbance constraint system developed by the Forest Service also provides a means by which the total amount of disturbance within a watershed may be monitored. There is also the possibility that unforseen circumstances may arise. The likelihood of cumulative watershed impacts occurring increases on steep and sensitive lands due to the difficulty of effectively implementing Best Management Practices. A geologic inventory identifying landslide hazards and risks will also aid in determining sensitive areas.

Atmospheric deposition of nutrients, especially nitrogen from auto emissions, adversely affects water quality. The effect is direct when deposited upon the surface of Lake Tahoe or other water bodies in the basin. When deposited on undisturbed land, the nutrients would be absorbed by the soil and probably be taken up by vegetation before being transported to Lake Tahoe. However, when the deposition is upon impervious coverage or disturbed land areas lacking vegetation, runoff from these areas would be additionally enriched with nutrients. If the runoff is not treated in some manner, such as spreading it upon vegetated land areas where nutrient stripping can occur, then it could have adverse impacts upon water quality in Lake Tahoe just the same as if it were directly deposited upon the lake's surface.

As discussed in the section on air quality, the primary unnatural sources of nutrients in atmospheric deposition are automobile emissions and smoke from burning vegetation (firewood or slash). A measure of the potential amount of these emissions is displayed in Tables 4.2 and 4.3.

Remedial action on disturbed land is another measure of how the alternative plans affect water quality. Restoration activities would provide a positive effect by correcting past problems. There is a large inventory of lands from which sediment and/or nutrients are being transported to, or toward, Lake Tahoe at higher than natural rates. These lands will respond to treatment with remedial techniques designed to prevent or retard adverse effects to surface and groundwater. In some cases the remedial treatments will be completely effective upon completion of the restoration project. In other cases, especially those requiring the establishment of deep rooted, dense vegetation cover, treatment may take many years to be completely effective.

TRPA water quality management standards call for restoration of the 2,140 acres in the inventory within 20 years, or by 2005. A high level watershed restoration program would be needed to achieve this goal, at a cost of $1,050,000 a year for 20 years. A moderate level program would require 40 years to complete restoration of the inventory at a cost of $500,000 a year. A low level program would treat only the worst sites (1,090 acres or about 55 % of the backlog) over 50 years, at a funding level of $260,000 a year. The remaining 960 acres would remain untreated to recover at naturally. Until restoration work is completed, water quality will continue to be adversely affected.

The following discussion provides further elaboration on the information presented in Table 4.23. Alternatives are listed in order of most potential adverse impact on water quality to the least potential adverse impact on water quality.

Alternative E (Market) - The potential for negative impacts upon water quality is greatest under this alternative due to the impacts associated with an emphasis on production of timber, livestock, and developed recreation, including expansion of five ski areas. Acres of impervious coverage generated from these activities by the fifth decade would be an additional 40% beyond 1982 levels, at an average rate of 6.7 acres a year. Roads and parking areas would be the primary sources of impervious coverage. Land disturbing activities, primarily timber management, would cause a 75% increase in disturbed acreage from 1982 levels by the 5th decade. To meet timber production goals under this alternative, 300 acres a year would be harvested, primarily through clearcutting of 20-acre maximum openings. High erosion hazard lands would be harvested, increasing the potential for water quality impacts associated with increased surface erosion. The potential for deposition of airborne nutrients from prescribed burning of timber management slash would be more than twice as much as 1982 levels. The potential for airborne nutrients associated with increased recreation development under this alternative would increase by 33% from 1982 levels. A low level watershed restoration program would address only 55%, or 1,090 acres of the inventory, allowing 960 acres to go untreated, thus continuing to degrade water quality.

Over the next five decades the cumulative effects of the level of management activities under this alternative could cause water quality to decline, impacting beneficial uses of water such as fish habitat, visual quality, soil productivity and riparian habitat. The environmental thresholds for water quality standards would not be met in 20 years due to the long term restoration program schedule. Increases would occur in the amount of impervious coverage and land disturbance. The potential for increase in deposition of airborne

nutrients from all sources could also contribute to the overall decline in water quality.

Table 4.23. Indicators of Effects on Water Quality
(Change over 5 decades)

Indicator	Alternative A	B	C	D	E	F	G	H	I
Impervious Coverage: (change in acres)	+276	+70	+259	+303	+333	+165	-27	+263	+304
Land Disturbance: (change in acres) 1/	+307	-89	+307	+571	+1654	-229	-405	+607	+671
Airborne Nutrients:									
a)% change in slash burning	-20	0	+130	-85	+125	+5	-70	+20	-25
b)% change in vehicle miles of travel before mitigation	+30	+20	+30	+33	+33	+13	+12	+30	+33
Watershed Restoration Program:									
a) Acres restored each year	110	22	110	22	22	110	22	55	22
b) % of backlog restored	100	55	100	55	55	100	55	100	55

1/ Change in acres of disturbed land does not include changes due to additions of impervious coverage or deletions from the restoration program.

Alternative I (Wilderness) - This alternative increases the amount of land under wilderness classification while intensifying management activities on nonwilderness lands. Potential impacts upon water quality are therefore increased over present. Acres of impervious coverage created from these activities would be in the form of roads and parking areas and would increase coverage by 35% from 1982 levels at an average rate of 6.1 acres a year over the next fifty years. Land disturbing activities, primarily timber management, would cause an increase in disturbance of 31% from 1982 levels by the fifth decade. Timber production goals would require harvest of 80 acres a year primarily using the group selection method. The timber production goal and harvest method in this alternative would require that low and moderate erosion hazard lands be harvested; no harvest would occur on high hazard lands as a significant portion of them would be under wilderness classification, thus not

subject to timber management activities. The potential for deposition of airborne nutrients from prescribed burning of timber management slash would be 25% less than 1982 levels. The potential for airborne nutrients associated with increased recreation development would increase by 33% from 1982 levels. A low level watershed restoration program would address only 55% or 1,090 acres of the backlog, allowing 960 acres to go untreated, thus continuing to degrade water quality.

Cumulative impacts over the next fifty years from management activities under this alternative could negatively impact water quality, although to a lesser extent than Alternative E. Beneficial uses of water such as fish habitat, visual quality, soil productivity, and riparian habitat could be negatively impacted. The environmental thresholds for water quality could not be met as the watershed restoration program would take over 50 years. Impervious coverage increases until the sixth decade, after which no more is generated. Land disturbance increases each decade, however, and water quality impacts are not offset by the acreage restored, except during the third decade. The potential for deposition of airborne nutrients from increased recreation development could also contribute to the overall degradation of water quality.

Alternative H (RPA) - Water quality could be negatively impacted under this alternative (although to a lesser degree than under Alternatives E and I) due to the impacts associated with moderately high levels of timber, livestock grazing, and developed recreation, including expansion of four ski areas. Acres of impervious coverage generated from these activities by the fifth decade would be an additional 30% beyond 1982 levels, at an average rate of 5.3 acres a year. Roads and parking areas would be the primary sources of impervious coverage. Land disturbing activities, primarily timber management, would cause a 27% increase in disturbed acreage beyond 1982 levels by the fifth decade. To meet timber production goals under this alternative, about 140 acres a year would be harvested, primarily using the group selection method; to meet production goals using this harvest method would require more land area to be harvested than under Alternative E, due to the smaller, eight acre maximum opening limit in this alternative. This alternative would not require more land area to be harvested than under Alternative I, however, due to the lower timber production goal in that alternative. High erosion hazard lands would be harvested after the fifth decade, increasing the potential for increased surface erosion and water quality impacts. Harvesting high erosion hazard lands would cause more land disturbance than under Alternatives I or D. The potential for deposition of airborne nutrients from prescribed burning of timber management slash would be about 20% greater than 1982 levels. The potential for airborne nutrients associated with increased recreation development would increase by 30% from 1982 levels. A moderate level watershed restoration program would complete the program over 40 years.

Cumulatively, the level of management activities under this alternative could cause water quality to decline, impacting beneficial uses of water such as fish habitat, visual quality, soil productivity and riparian habitat. The environmental thresholds for water quality would not be met within 20 years, due to the watershed restoration schedule of 40 years. During the next five decades, increases in the rates of impervious coverage would occur every decade, and increases in the rate of land disturbance would occur during four decades. The watershed restoration program would offset the land disturbance impacts only

during the third decade. The potential for deposition of airborne nutrients could also contribute to the overall decline in water quality.

Alternative D (Efficiency) - This alternative emphasizes developed recreation and wilderness to maximize economic efficiency. Water quality could be negatively impacted. Impacts would be primarily due to a larger timber management and recreation development program (including expansion of four ski areas). Roads and parking areas would be the primary sources of the 34% increase in impervious coverage. Impervious coverage would increase at an average rate of 6.1 acres a year over fifty years. Although timber management activities would not disturb as much land as under previous alternatives, disturbance would be higher than under Alternatives A, B, C, G, and F, due to the use of the clearcut harvest method and 20 acre maximum opening. High erosion hazard lands would be too expensive to access and harvest, thus would not be economically efficient. All harvesting would occur on low or moderate erosion hazard lands at a rate of 40 acres a year. The potential for deposition of airborne nutrients from prescribed burning of timber management slash would be 85% less than 1982 levels. The potential for airborne nutrients associated with increased recreation development would increase by 33% from 1982 levels. A low level watershed restoration program would restore 1,090 acres in 50 years, leaving 960 acres untreated and continuing to contribute to water quality degradation.

Cumulative impacts on water quality due to management activities under this alternative could be negative, impacting beneficial uses of water to a degree less than described under previous alternatives. The environmental thresholds for water quality would not be met as the restoration program schedule takes over 50 years and does not complete the entire inventory. Over the next fifty years the amount of impervious coverage and land disturbance would continue to increase; the restoration program would only offset land disturbance during the second and third decades. The potential for deposition of airborne nutrients associated with increased recreation development could also contribute to overall water quality degradation.

Alternative B (Current) - Environmental protection is moderately emphasized but also limited by budget. Potential adverse effects upon water quality would not be increased from present levels as a result of timber management activities but could be increased through ski area expansion. Impervious coverage would be increased 8% from 1982 levels at an average rate of 1.4 acres a year. Roads would be the primary source of impervious coverage. Over the next fifty years land disturbance would decrease by 4% from 1982 levels, primarily from the decreased timber program. Timber harvest would occur on 45 acres a year with a maximum opening size of eight acres; group selection and single tree selection would be the primary harvest methods. Harvest would occur only on low and moderate erosion hazard lands. The potential for deposition of airborne nutrients from prescribed burning of timber management slash would remain the same as 1982 levels. The potential for airborne nutrients associated with a low level of recreation development would increase by 20% from 1982 levels. A low level watershed restoration program would complete 55% of the inventory allowing 960 acres to continue to degrade water quality.

Cumulatively, water quality would be improved, due to the combination of low levels of management activities and a moderate emphasis on environmental

protection. Beneficial uses of water would be protected. Although impervious coverage increases each decade, increments are smaller than previous alternatives (except under Alternative G); land disturbance increments are also smaller than other alternatives, except for G and F and decrease each decade for four decades. Restoration activities contribute to the overall decrease in land disturbance. The potential for deposition of airborne nutrients from a low level recreation program could also impact water quality.

Alternative G (Low Budget) - The levels of management activities under this alternative are similar to those under Alternative B, except that the budget would be reduced by 25%. Impervious coverage would be decreased by 3% from 1982 levels due to closure and removal of some roads and parking areas at recreation sites, though three ski areas could be allowed to expand. Land disturbance would decrease from 1982 levels by 18%, primarily due to the decrease in timber management activities. The timber harvest would be at the rate of 40 acres a year with a maximum size opening of eight acres; group selection and single tree selection would be the primary methods of harvest. Only low and moderate hazard lands would be harvested. The potential for deposition of airborne nutrients from prescribed burning of timber management slash would decrease by 70% from 1982 levels. The potential for airborne nutrients associated with the recreation program could increase by 12% from 1982 levels. Due to budget constraints, a low level watershed restoration program would occur, completing 1,090 acres of the inventory in 50 years.

Over all, water quality impacts would be small. Impervious coverage increases would be in increments smaller than any other alternative for the first three decades and remain constant after that. Land disturbance decreases each decade except for the first, due in part to the watershed restoration program. The potential for deposition of airborne nutrients is less than under any other alternative, except F, due to less recreational development.

Alternative A (Selected) - This alternative emphasizes protection of environmental values (particularly water quality), recreation, and timber management activities in descending order of emphasis. Water quality would be maintained at a high level, although impacts associated with recreation development (including expansion of four ski areas) and timber management (primarily associated with vegetation and habitat diversity threshold needs) would occur. Impervious coverage would increase by 31% from 1982 levels at an average rate of 5.5 acres a year. Roads and parking areas would be the primary sources of impervious coverage. By the end of the fifth decade, land disturbance would increase 35% from 1982 levels. Timber harvest would occur at a rate of 40 acres a year, with a maximum opening of five acres. The primary method of harvest would be group selection, although the single tree selection harvest method would also be used. Both these methods and the five acre opening limitation cause less land disturbance than Alternatives E, C, and D which utilize the clearcut method and 20-acre openings. High erosion hazard land would not be harvested under this alternative. The potential for deposition of airborne nutrients from prescribed burning of timber management slash would decrease 20% from 1982 levels. The potential for airborne nutrients associated with increased recreation development would increase by 30% from 1982 levels. A large watershed restoration program would restore the entire inventory over 40 years.

Cumulatively, water quality would be potentially impacted by the level of management activities under this alternative; the impacts are those associated with meeting thresholds for recreation opportunity, vegetation, and habitat diversity. The environmental thresholds for water quality would be met in 20 years. Thus, beneficial uses of water would not be impaired over the long term. Impervious coverage and land disturbance would increase, but watershed restoration activities would offset increases. The potential for deposition of airborne nutrients from increased recreation development could contribute to impacts on water quality.

Alternatives C (Conservation) and F (Amenity) - These alternatives emphasizes nonmarket resources and environmental protection. Water quality would be impacted the least under this alternative. Potential impacts could be from timber management associated with attaining diversity and from dispersed recreation activities. No ski areas would be expanded nor would new developed recreation sites be constructed in Alternative F. The same would apply in Alternative C through the first decade and thereafter, if good progress is not occurring on reaching the environmental thresholds. Roads and parking areas (primarily trailheads) would be the primary sources of impervious coverage. An increase in impervious coverage would occur at an average rate of 3.3 acres a year. Land disturbance would decrease by 26% from 1982 levels due to the relatively low levels of the timber and developed recreation programs and the high level watershed restoration program. Timber harvesting would occur on 40 acres a year, utilizing an eight acre maximum opening under the group selection and single tree selection methods in Alternative F, whereas in Alternative C only single tree selection would occur. High hazard lands would not be harvested. Watershed restoration would occur in 20 years under a high level program. The rate of deposition of airborne nutrients from prescribed burning of timber management slash would increase by 5% from 1982 levels. The potential for airborne nutrients associated with recreation development would increase 13% from 1982 levels.

Cumulative water quality impacts would be positive, protecting or enhancing all beneficial uses of water. Although impervious coverage increases each decade, the increments of increase are smaller than under all alternatives except B and G, and no coverage is created after the fifth decade. Land disturbance increases during the first decade then decreases. The intensive watershed restoration program improves the rate at which water quality is enhanced, and also achieves the water quality environmental thresholds within 20 years. The potential for deposition of airborne nutrients could impact water quality, although to a lesser extent than all other alternatives.

Water Quantity

Water yield varies, although not appreciably, by the amount of timber harvested, the type of harvest method, and acres of opening created in each alternative. Other activities which cause removal of vegetation also influence water yield. Ski run clearing would cause a permanent increase in water yield as runs are not reforested after clearing. Conversely, all other areas in which timber management occurs would recover to normal average water yield conditions within about 30 to 50 years. Table 4.24 displays expected water yield from implementation of activities under each alternative. Yields were determined based upon yield change predicted for management activities. The portion meeting water quality standard was determined by calculating the effect

of each alternative's watershed restoration program level on water quality. This portion increases as the watershed restoration program reduces the 13,400 acres of land affected by the backlog of disturbed sites. Figures do not include impervious coverage, land disturbance, or size of timber program in calculation of portion meeting water quality standard.

Over the long term (beyond five decades), the alternatives which have the largest timber program (causing high erosion hazard lands to be harvested) and utilize the 20-acre maximum openings produce the most water yield and degrade water quality the most. Correspondingly, alternatives which have a smaller timber program (causing harvest to occur only on low and moderate erosion hazard lands) and utilize smaller, eight or five acre maximum openings create less water yield and do not degrade water quality as significantly.

Table 4.24. Average Annual Water Yield and Portion Meeting Water Quality Standard

(Average in Thousand Acre Feet Per Annum)

Decade		Alternatives A	B	C	D	E	F	G	H	I
1982 Base 1/	Quantity	316.7	316.7	316.7	316.7	316.7	316.7	316.7	316.7	316.7
	Quality	286.0	286.0	286.0	286.0	286.0	286.0	286.0	286.0	286.0
1	Quantity	318.2	317.9	318.1	317.9	319.7	318.1	317.8	318.9	318.2
	Quality	295.2	288.5	295.2	288.5	290.3	295.2	288.4	292.1	288.8
2	Quantity	318.7	318.1	318.4	318.2	320.6	318.4	317.9	319.5	318.7
	Quality	310.8	291.1	310.8	291.2	293.6	310.8	290.9	300.3	291.7
3	Quantity	319.1	318.1	318.6	318.5	322.1	318.6	318.0	319.8	319.0
	Quality	319.1	293.5	318.6	293.9	297.5	318.6	293.4	308.4	294.4
4	Quantity	319.2	318.2	318.6	318.8	323.0	318.6	318.0	319.8	319.2
	Quality	319.2	296.0	318.6	296.6	300.8	318.6	295.8	316.0	297.0
5	Quantity	319.2	318.2	318.6	318.9	324.3	318.6	318.1	319.9	319.2
	Quality	319.2	298.4	318.6	299.1	304.5	318.6	298.3	319.9	299.4

1/ 1982 Base water yield includes water from surface runoff, subsurface flow, and groundwater recharge.

Alternatives are discussed below in order of most water yield to least water yield.

Alternative E (Market) - This alternative would increase water yield by about 1.3 MAFA per decade. Increases are primarily from openings created from timber harvesting and ski run clearing. Primary harvest method is clearcutting. High

erosion hazard land would be harvested. The low level restoration and high level timber programs would cause the most water quality impacts, thus making it the alternative least likely to meet standard.

Alternative H (RPA) - This alternative would increase water yield about 0.6 MAFA per decade, due to the harvest of timber using primarily the group selection harvest method and to ski trail construction. This alternative would harvest high erosion hazard lands.

Alternative I (Wilderness) - This alternative would increase water yield about 0.5 MAFA per decade. Tree removal in small openings and ski run clearing would be the primary producers of this effect. Yield to water quality standard would take more than 50 years due to the slower restoration program.

Alternative A (Selected) - Timber harvesting and ski area development would produce a water yield increase of about 0.5 MAFA per decade. The yield is to standard by the third decade.

Alternative D (Efficiency) - An increased water yield of 0.4 MAFA would occur under this alternative. This is the result of timber harvesting and from clearing of ski runs. Progress toward the entire water yield meeting standard is slow due to the low level restoration program.

Alternative F (Amenity) - This alternative would increase water yield about 0.4 MAFA per decade primarily from timber harvesting. The portion of yield meeting water quality standard would achieved in the third decade.

Alternative C (Conservation) - Water yield would increase about 0.4 MAFA per decade primarily from ski run clearing if this occurs. Otherwise increased yield would be small or nonexistent. Restoration of watersheds would bring the yield to standard by the third decade.

Alternative B (Current) - Water yield is increased an average of 0.3 MAFA per decade. A low level watershed restoration program would cause water quality from several areas to remain below standard.

Alternative G (Low Budget) - Similar to Alternative B; the average water yield increase would be 0.3 MAFA per decade resulting from an average annual harvest of 1.1 MMBF. The portion of yield meeting water quality standard would be the same as under Alternative B.

Water Rights

Domestic recreation uses, snowmaking on ski runs, streamflow enhancement for fish and wildlife habitat, livestock watering improvements, and irrigation of erosion control projects are the principle consumptive uses of water by the LTBMU. Each alternative varies in the water rights required to assure availability of water for the consumptive uses in these programs. They also vary somewhat in the timing of the use. All figures reflect the concept of "fair share" allocation of developed recreation capacity as discussed in the TRPA Regional Plan. Table 4.25 compares the demand for water use by alternative. The amount of water required is based upon the "Report on Water Use and Rights for the California Portion of the Lake Tahoe Basin Management

Unit, 1983", amended version. Water use information for Nevada was developed based upon use rates similar to those utilized in the California analysis.

Table 4.25. Maximum Consumptive Water Use

(Acre Feet Per Annum)

Type of Water Use	Alternatives A	B	C	D	E	F	G	H	I
Domestic Use 1/	855	596	855	918	918	590	503	787	918
Erosion Control Irrigation 2/	194	67	368	67	67	368	67	194	67
Ski Area Snow Making and Irrigation 3/	728	656	656	728	728	0	656	728	728
Livestock Water	5	4	0	0	10	0	0	8	5
Streamflow Enhancement for Fish and Wildlife Habitat 4/	235	235	455	90	90	455	118	235	235
TOTAL (Basinwide)	2017	1558	2334	1803	1813	1413	1344	1952	1953
Percent of LTBMU water yield (316,700 afa)	0.63	0.49	0.74	0.57	0.57	0.44	0.42	0.61	0.61

1/ Domestic water use is primarily a function of developed recreation facility. It is necessary to secure the water now to assure future availability.

2/ Erosion control irrigation water would be used for the watershed restoration program to achieve permanent vegetative cover on restored sites.

3/ Water use associated with ski area snowmaking and erosion control irrigation would increase with ski area expansion and would be used on a permanent basis.

4/ Streamflow enhancement projects would be carried out over the next fifty years. Evaporation and transpiration losses are the only consumptive water "uses" associated with these projects.

23. Wilderness

The wilderness resource is influenced by activities that are occurring both inside and outside the classified wilderness area. These activities effect the naturalness of the area and the opportunity for solitude. The greatest external influence upon wilderness in the Lake Tahoe Basin would be from urbanization. If urbanization expands, as is expected, then there would be a larger population, more tourism, more noise from vehicle traffic and aircraft overflights, more smoke and other emissions, and more improvements and activities visible or audible to wilderness travelers. The magnitude of this external influence would be fairly uniform for all alternatives and would vary only to the extent that acreage within wilderness classification varies. As with urbanization, activities on national forest land outside of the wilderness areas would effect the wilderness resource, although at a level substantially less than that from the total urbanization. Among the more significant activities that would have an effect are ski area developments, road construction for timber access, large timber regeneration harvest areas, and smoke from slash burning. All of these activities could be viewed from within the wilderness areas. The smoke could also be transported into the areas.

Ability to maintain naturalness and opportunities to experience solitude within the wilderness are influenced by several factors. One is the intensity of management planned for wilderness. Where the intensity, or standard, is low there would be less control upon the number and distribution of visitors, there would be less maintenance of trails, and there would be less cleanup of trash. Variation also occurs in the use of management practices available to aid in the maintenance of the natural environment. However, all alternatives are limited by water and air quality management requirements which could restrict the availability of prescribed fire to maintain naturalness.

The amount of unroaded area outside of wilderness indirectly effects ability to maintain the wilderness resource. Semi-primitive recreation use, especially day use, can be directed to unroaded areas when such areas are available to take user pressure off of wilderness.

Alternative A - As proposed, wilderness area increases to almost 24,000 acres. The wilderness resource would be maintained through intensive management, especially the management of recreation use. There would be fewer acres of unroaded area into which dispersed recreation users could be directed as an alternative to wilderness. Ski area development and timber management activities would also increase the influence of external factors upon the wilderness experience.

Alternative B - There is no increase in acreage and, therefore, the availability of wilderness in this alternative. Low standard management of the recreation use limits ability to maintain the wilderness resource and the opportunities for solitude. Recreation use would probably increase in the wilderness, especially from day use, even though current acreage of unroaded recreation remains for visitors to use in lieu of wilderness. External influences from other activities on the forest do not change in a way that would effect wilderness attributes.

Alternative C - As proposed, wilderness area nearly triples to 59,552 acres. Intensive management would preserve the wilderness resource. There would be

few unroaded areas outside wilderness available to direct dispersed recreation as an alternative to wilderness. No ski area or other recreation development would occur as external detractors from the quality of the wilderness experience at least through the next decade.

Alternative D - As recommended, wilderness area doubles to 46,220 acres. Maintenance of the wilderness resource would not be assured because recreation use would be managed at low standard. In other respects, this alternative would be similar to Alternative H.

Alternative E - There is no increase in the acres of wilderness. Maintenance of the wilderness resource would not be assured because recreation use would be managed at low standard. There are few acres of unroaded area outside wilderness into which dispersed recreation users could be directed as an alternative to wilderness. Ski area development and timber management activities would increase the influence of external factors upon the wilderness experience. Large openings from clearcutting and a more extensive road system would be noticeable throughout the basin. Smoke from slash burning would be substantially increased.

Alternative F - As proposed, wilderness area doubles to 46,220 acres. Intensive management would preserve the wilderness resource. Unroaded areas outside wilderness would be available to direct dispersed recreation as an alternative to wilderness. No ski area or other recreation development would occur as external detractors from the quality of the wilderness experience.

Alternative G - There is no increase in wilderness acreage. Low standard management would diminish the ability to maintain the wilderness resource and opportunities for solitude. Unroaded acreage remains at the current level. There is no increase in activities outside the wilderness that would add to external influences upon the wilderness experience.

Alternatives H - As recommended, wilderness area nearly doubles to 39,555 acres. Wilderness resources would be maintained through intensive management, especially the management of recreation use. However, there are fewer acres of unroaded area into which dispersed recreation users could be directed as an alternative to wilderness. Ski area development and timber management activities would also increase the influence of external factors upon the wilderness experience. Smoke from increased slash burning would be an effect in both alternatives.

Alternative I - As proposed, wilderness area doubles to 46,220 acres. Intensive management would protect the wilderness resource and opportunities for solitude. Unroaded acreage would be reduced. Thus, dispersed recreation users not seeking wilderness would have fewer places to go. Ski area and other recreation development and timber management activities would increase as external influences upon the wilderness experience.

Appendix C contains details of the effects on wilderness attributes and nonwilderness resources and uses in Freel, Lincoln Creek, Dardanelles, Pyramid, Granite Chief and Mt. Rose roadless areas. Table 4.26 shows the annual outputs from the roadless areas by alternative.

Table 4.26. Roadless Area Evaluation
Average Annual Outputs in Decades 1 and 5

Output	Decade	A Selected	B Current	C Conserv.	D Efficiency	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
		Alternatives								
Recommended Wilderness (acres)	--	9,290	0	39,390	24,890	0	24,890	0	18,225	24,890
Nonwilderness (acres)	--	30,100	39,390	0	14,500	39,390	14,500	39,390	21,165	14,500
Total Developed Recreation (M RVD)	1	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0	0
Dispersed Recreation (M RVD)	1	11.7	18.5	0	9.0	23.6	9.0	17.0	11.7	9.0
	5	31.3	18.5	0	16.0	60.9	16.0	17.0	14.7	16.0
Wilderness Recreation (M RVD)	1	28.7	0	51.0	28.7	0	28.7	0	28.7	28.7
	5	38.8	0	63.1	54.1	0	54.1	0	38.8	54.1
Total Wildlife & Fish User Days (M WFUD)	1	9.4	9.2	9.5	9.1	9.2	9.5	9.2	9.3	9.2
	5	11.5	10.6	11.5	9.5	10.1	11.7	9.7	11.0	10.5
Grazing (AUM)	1	1000	1000	1000	0	1250	0	0	1000	1000
	5	1000	1000	1000	0	1550	0	0	1300	1000
Suitable Timber Land (acres)	1	0	0	0	0	5400	0	0	0	0
	5	0	0	0	0	5400	0	0	0	0
Timber Volume (MMBF)	1	0	0	0	0	0.4	0	0	0	0
	5	0	0	0	0	0.5	0	0	0	0
Disturbance (acres)	1	16	0	16	15	17	16	7	16	15
	5	24	0	23	24	50	23	7	28	24
Gross Revenue ($ M)	1	1.9	1.9	1.9	0	55.4	0	0	1.9	1.9
	5	1.9	1.9	.6	0	91.4	0	0	2.5	1.9
Net Revenue ($ M)	1	-38.1	-7.0	-60.6	-39.2	-26.4	-38.3	-7.4	-38.1	-37.5
	5	-55.9	-7.4	-75.7	-69.8	-49.1	-70.9	-7.5	-51.0	-69.3
Total Cost ($ M)	1	40.0	8.9	62.5	39.2	81.8	38.3	7.4	40.0	39.4
	5	58.1	9.3	76.3	69.8	140.5	70.9	7.5	53.5	71.2

24. Wildlife

The effects of alternatives on wildlife resources is the result of application of management direction, standards and guidelines, land allocation, and the amount of habitat improvement scheduled for wildlife emphasis species.

The major positive and negative impacts on wildlife result from vegetation manipulation, such as wildlife habitat improvements, timber management practices, new recreational developments, livestock grazing, and fires; or the lack of these manipulations. Changes in vegetation would influence the quantity, quality, and diversity of wildlife habitats. The effects of alternatives on vegetative diversity defined in terms of vegetative types and seral stages are a primary component of assessing wildlife resource impacts. (See "Diversity" section of this chapter for environmental consequences on vegetative diversity.) In addition to vegetative diversity, animals may require special habitat features or components.

Management indicator species (MIS) and their habitats are used to monitor changes in vegetation and are listed in Chapter 3. Some of these management indicator species were selected to represent classes of wildlife with associated needs. Therefore, management emphasis for a single species would benefit many species.

Habitat capability and suitability models were developed from the Wildlife Habitat Relationship Programs of the Central Sierra and/or Northeast Interior Zone Forests. The model information was the criterion used to determine habitat capability and suitability for a specific species of wildlife. For the most part vegetation characteristics in the models were used to determine capability for wildlife. Other factors in the models function to determine suitability. The habitat criteria for each model were divided into high, medium, and low categories of capability and suitability. The low category would not provide the requirements necessary to sustain a viable population. The medium category would be the minimum level necessary to sustain a viable population.

All land on the LTBMU is available to serve as wildlife habitat, but developed sites, including surfaced roads, paved parking lots, and buildings, are not capable or suitable as wildlife habitat for this analysis.

All alternatives contain standards, guidelines and management direction to meet recovery levels of threatened and endangered species, and to protect or improve riparian areas. Forest Service responsibilities for meeting recovery levels of Federally listed threatened and endangered species (as specified in recovery and management plans) would be met in all alternatives. Viable population levels of spotted owls and goshawks are ensured in all alternatives through implementation of standards and guidelines for these species. (See Appendix B for further details.) Riparian-dependent wildlife and all MIS and associated wildlife species would be maintained or increased in all alternatives.

Direction to provide for vegetation diversity and special habitat components are included in all alternatives except the Conservation Alternative. This alternative does not include the small openings created through group selection

timber harvest needed to maintain early successional habitats favored by many wildlife species.

Table 4.27 presents the approximate habitat capability in acres of high and medium quality habitat for all LTBMU management indicator species. It also includes relative average animal numbers for deer based on vegetation manipulation. The amounts of capable habitat were determined based on FORPLAN allocations. The differences in habitat capability and/or animal numbers between alternatives for a species would be the result of land allocations. The procedures for calculating animal numbers for deer based on vegetation changes are explained in Appendix B and the planning records. These projections serve as the basis for assessing overall alternative impacts on wildlife MIS. A comparison of wildlife activity levels and wildlife outputs by alternative is presented in Table 2.23b in Chapter 2. Effects of alternatives upon percentage change in habitat capability for each MIS is presented in Table 2.24b.

In 50 years there would still be a shortage of some successional stages in all alternatives. The deficit then would be in mid-successional conifer forest ecotypes as the present large block of homogenous 3 size class (small sawtimber; 11 to 24 inch in diameter) conifer forest types shifts into 4 size class (medium to large sawtimber; greater than 24 inch in diameter) trees with virtually no replacement due to the current lack of early successional stages.

All alternatives provide at least 450 acres of potential bald eagle nesting habitat in mature mixed conifer forest. This exceeds the minimum management requirement of 300 acres. All alternatives, except Efficiency and Market, would maintain at least 380 acres for wintering bald eagles. It is important habitat for the birds. Three cliff sites would be established in all alternatives for Peregrine falcon nesting.

Spotted owl territory allocations were not made because the LTBMU is on the eastern-most and elevation boundaries of the spotted owl distribution range. Habitat capability for spotted owls was analyzed by alternative since spotted owls were selected as indicators of mature forest-related species.

All alternatives would exceed the existing potentially capable acres for spotted owls with some more than others based on the intensity of the timber management program planned in each. Capable habitat for at least 12 pairs of goshawks would be provided in all alternatives with some exceeding these levels based upon the planned intensity of the timber management programs.

All alternatives would result in a 36% increase in blue grouse habitat capability in the long term as the majority of conifer forest stands mature combined with small to moderate additions of early successional stages as a result of timber management activities. Both early and late successional stages of conifer forest are medium-high quality habitat for blue grouse. The lack of early stage habitat in the Conservation Alternative would make it less attractive to the grouse than other alternatives.

Table 4.27 Habitat Capability

(Medium and High Quality Habitat) in Acres for Management Indicator Species

		Alternatives and Decades																	
		A		B		C		D		E		F		G		H		I	
	FY 82	Selected		Conserv.		RPA		Efficiency		Market		Amenity		Low Budget		RPA		Wilderness	
Management Indicator Species	Base	1st	5th	1st	5th	1st	5th	1st	5th	1st	5th	1st	5th	1st	5th	1st	5th	1st	5th
Bald Eagle																			
Potential nesting habitat (M acres)	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	5	.5	.5	.5	.5
Wintering habitat (M acres)	.5	.5	.5	.5	.5	.5	.5	0	0	0	0	.5	.5	.5	.5	.5	.5	.5	.5
Peregrine Falcon	3 potential cliff nesting sites in all alternatives same as in FY 82 Base.																		
Goshawk Nesting habitat (M acres)	53	51	51	52	50	50	44	53	53	48	44	52	51	53	53	51	47	52	48
Spotted Owl Potential Nesting Habitat (M acres)	8	8	28	8	27	6	22	8	30	4	10	8	28	8	29	7	25	8	27
Mule Deer																			
Cover (M acres)	113	111	110	112	110	108	110	111	113	97	102	109	107	110	110	109	108	110	108
Forage (M acres)	61	62	64	61	63	64	69	61	60	74	94	64	72	61	61	62	66	62	64
Cover: Forage ratios	65:35	64:36	64:36	65:35	64:36	63:37	61:39	65:35	65:35	57:43	53:47	64:36	60:40	64:36	64:36	63:37	62:38	64:36	63:37
Animal numbers	1300	1530	1719	1503	1669	1560	1670	1318	1333	1368	1423	1630	1800	1386	1457	1560	1759	1514	1689
Pileated Woodpecker																			
Nesting habitat (M acres)	14	14	40	13	39	12	33	13	41	9	19	14	40	14	41	13	36	13	37
Mallard Nesting and Feeding Habitat (M acres)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Black Bear Breeding and Feeding Habitat (M acres)	71	70	84	70	86	68	79	71	87	61	59	70	86	70	87	69	83	70	85
Blue Grouse Nesting and Feeding Habitat (M acres)	76	77	104	76	104	76	104	76	104	80	104	77	104	77	104	76	104	76	104
Willow Flycatcher Habitat (M acres)	53	52	52	53	55	53	60	52	52	53	69	52	53	53	53	53	57	53	56

Alternative A (Selected) - This alternative would result in a 17% increase in the short term and a 32% increase in the long term in deer numbers. Approximately 75% of that would be attributable to direct habitat improvement and 25% induced benefits of timber and watershed restoration programs. These induced benefits result from a moderate level of wildlife coordination with these and other resource activities. RPA targets of 20% increase in deer habitat capability expressed in deer numbers would be achieved in the long term but not by 1990.

Habitat capability for other MIS would vary from current levels as a result of planned timber management activities and/or natural plant succession as follows. Habitat capability for late successional stage associated MIS would increase substantially in the long term, spotted owl +245% and pileated woodpecker +186%. Goshawk capability would decline slightly (-3%), but habitat capability for 15 pairs would be maintained. Mallard habitat capability would increase by 6% in the long term as a result of direct habitat improvement. Black bear habitat capability would increase 19% in the long term, while habitat capability for the willow flycatcher would decline slightly (1%) during the same period.

Alternative B (Current) - This alternative would result in a 15% increase in the short term and a 28% increase in the long term in deer numbers. Approximately 85% of that would be attributable to direct habitat improvements and 15% induced benefits of timber and watershed restoration programs. These induced benefits result from a moderate level of wildlife coordination with these and other resource activities. The RPA target of a 20% increase in deer habitat capability expressed in deer numbers would be achieved in the long term but not by 1990.

Habitat capability for other MIS would vary from current levels as a result of planned timber management activities and/or natural plant succession as follows. Habitat capability for late successional stage associated MIS would increase substantially in the long term, spotted owl +233% and pileated woodpecker +177%. Goshawk capability would decline slightly (-5%) but habitat capability for 15 pairs would be maintained. Mallard habitat capability would increase by 6% in the long term as a result of direct habitat improvement. Habitat capability for black bear and the willow flycatcher would increase 22% and 4% respectively in the long term.

Alternative C (Conservation) - This alternative would result in a 10% increase in the short term and a 20% increase in the long term in deer numbers. Approximately 90% of that would be attributable to direct habitat improvements and 10% induced benefits of timber and watershed restoration programs. These induced benefits result from a moderate level of wildlife coordination with these other resource activities. RPA targets of 20% increase in deer habitat capability expressed in deer numbers would be achieved in the long term (by 1990) but not in the short term.

Habitat capability for other MIS would vary from current levels as a result of timber management activities and/or natural plant succession as follows. Habitat capability for late successional stage associated MIS would increase substantially in the long term, spotted owl +245% and pileated woodpecker +186%. Goshawk capability would decline moderately (-3%), but habitat

capability for 15 pairs would be maintained. Mallard habitat capability would increase by 6% in the long term as a result of direct habitat improvement. Habitat capability for black bear and the willow flycatcher would increase 12% and 13%, respectively, in the long term.

Alternative D (Efficiency) - This alternative would result in only 1% increase in the short term and a 3% increase in the long term in deer numbers. This is the lowest increase of all alternatives. All of the deer capability increase would be attributable to induced benefits of timber and watershed restoration programs. Wildlife coordination with these resource activities would be extremely limited. RPA targets of 20% increase in deer habitat capability expressed in deer numbers would not be achieved in either the short or long term.

Habitat capability for other MIS would vary from current levels as a result of planned timber management activities and/or natural plant succession as follows. Habitat capability for late successional stage associated MIS would increase the most of all alternatives in the long term; spotted owl +362% and pileated woodpecker +196%. Goshawk capability would remain at current levels with habitat capability for 16 pairs maintained. Mallard habitat capability would remain at current levels in both the short and long term. Black bear habitat capability would increase 23% in the long term while habitat capability for willow flycatcher would decline slightly (1%) during the same period.

Alternative E (Market) - This alternative would result in a 5% increase in the short term and a 9% increase in the long term in deer numbers. Large increases in potential high quality deer habitat would be created in this alternative as a result of the planned intensive timber management program. However, this gain in potential habitat capability would be offset by a decrease in suitability as substantial road building would accompany this increased timber management. All net gains in deer habitat capability would be attributable to induced benefits of timber and watershed restoration programs. Wildlife coordination with these other resource activities would be very limited. RPA targets of 20% increase in deer habitat capability expressed in deer numbers would not be achieved in either the short or long term.

Habitat capability for other MIS would vary from current levels as a result of planned timber management activities and/or natural plant succession as follows. Habitat capability for late successional stage associated MIS would decrease moderately in the short term and increase moderately in the long term; spotted owl (-48%) to (+26%) and pileated woodpecker (-34%) to (+33%). Goshawk capability would decline moderately (-17%) but habitat capability for 13 to 14 pairs would be maintained. Mallard habitat capability would remain at current levels in both the short and long term. Habitat capability for black bear would decrease moderately (-17%) in the long term; while habitat capability for willow flycatcher would increase by 30% over the same period.

Alternative F (Amenity) - This alternative would produce the highest deer outputs of all alternatives. A 25% increase in the short term and a 38% increase in the long term in deer numbers would result. Approximately 86% of that would be attributable to direct habitat improvements and 14% induced benefits of timber and watershed restoration programs. These induced benefits result from a high level of wildlife coordination with these other resource activities. RPA targets of 20% increase in deer habitat capability expressed

in deer numbers would be achieved in both the short term (by 1990) and long term, and the low extremes of deer herd plan goals would be achieved in the long term.

Habitat capability for other MIS would vary from current levels as a result of planned timber management activities and/or natural plant succession as follows. Habitat capability for late successional stage associated MIS would increase substantially in the long term; spotted owl +243% and pileated woodpecker +186%. Goshawk capability would decline slightly (-3%), but habitat capability for 15 pairs would be maintained. Mallard habitat capability would increase by 6% in the long term as a result of direct habitat improvement. Habitat capability for black bear would increase by 22%; while habitat capability for the willow flycatcher would remain at current levels throughout the planning period.

Alternative G (Low Budget) - This alternative would result in a 7% increase in the short term and a 12% increase in the long term in deer numbers. Approximately 81% of that would be attributable to direct habitat improvements and 19% induced benefits of timber, recreation (elimination of existing developed site recreation in good deer habitats), and watershed restoration programs. These induced benefits result from wildlife coordination with these other resource activities. RPA targets of 20% increase in deer habitat capability expressed in deer numbers would not be achieved in either the short or long term.

Habitat capability for other MIS would vary from current levels as a result of planned timber management activities and/or natural plant succession as follows. Habitat capability for late successional stage associated MIS would increase substantially in the long term, spotted owl +359%, and pileated woodpecker +194%. Goshawk capability would remain at current levels with habitat capability for 16 pairs maintained. Mallard habitat capability would remain at current levels in both the short and long term. Black bear habitat capability would increase 23% in the long term, while habitat capability for the willow flycatcher would remain at current levels during the same period.

Alternative H (RPA) - This alternative would result in a 19% increase in the short term and a 35% increase in the long term in deer numbers. Approximately 76% of that would be attributable to direct habitat improvements and 24% induced benefits of timber and watershed restoration programs. These induced benefits result from a moderate level of wildlife coordination with these other resource activities. RPA targets of 20% increase in deer habitat capability expressed in deer numbers would be achieved in both short term (by 1990) and long term. The lower extremes of the deer herd plan goals would nearly be achieved.

Habitat capability for other MIS would vary from current levels as a result of planned timber management activities and/or natural plant succession as follows. Habitat capability for late successional stage associated MIS would increase substantially in the long term; spotted owl +207%, and pileated woodpecker +158%. Goshawk capability would decline moderately (-11%), but habitat capability for 14 to 15 pairs would be maintained. Mallard habitat capability would increase by 6% in the long term as a result of direct habitat improvement. Habitat capability for black bear and the willow flycatcher would increase 18% and 8%, respectively, in the long term.

Alternative I (Wilderness) - This alternative would result in a 16% increase in the short term and a 30% increase in the long term in deer numbers. Approximately 85% of that would be attributable to direct habitat improvements and 15% induced benefits of timber and watershed restoration programs. These induced benefits result from a moderate level of wildlife coordination with these other resource activities. RPA targets of 20% increase in deer habitat capability expressed in deer numbers would be achieved in the long term but not by 1990.

Habitat capability for other MIS would vary from current levels for the most part as a result of planned timber management activities and/or natural plant succession as follows. Habitat capability for late successional stage associated MIS would increase substantially in the long term; spotted owl +224% and pileated woodpecker +167%. Goshawk capability would decline slightly (-9%), but habitat capability for 14 to 15 pairs would be maintained. Mallard habitat capability would increase by 6% in the long term as a result of direct habitat improvement. Habitat capability for black bear and the willow flycatcher would increase 20% and 15% respectively in the long term.

E. Means to Mitigate Adverse Impacts

Standards and guidelines for implementing forest practices provide controls that are intended to reduce the overall impacts and, therefore, the amount of mitigation required. These include, but are not limited to, Best Management Practices for soil and water protection, and Best Available Control Technology for air quality management.

Mitigation measures are a part of all alternatives to offset the adverse effects. Many measures would be used universally for all alternatives. Other measures would vary where the standard to be achieved varies by alternative. As an example, those alternatives in which all the threshold standards are to be achieved would require considerably more mitigation measures than the alternatives that only meet the minimum management requirements and the thresholds for water, air, waste discharge, and noise.

Some elements of the environment at Lake Tahoe have deteriorated beyond the established thresholds. As a result mitigation measures are required to reverse the downward trend and improve overall conditions. The TRPA has established a mechanism to accomplish this through offsetting mitigation. The system is sensible and at this time offers the soundest method for achieving the thresholds. Therefore the Forest Service will review projects on national forest land using the TRPA ordinances to help establish the appropriate mitigation. Mitigation may be performed directly or through the payment of fees to a fund from which mitigation projects would be financed.

F. Adverse Environmental Effects Which Cannot Be Avoided

All alternatives emit smoke into the atmosphere, which adversely effects visibility. The smoke is from the disposal by fire of residue from vegetation treatment activities or from the household burning of firewood. None of the alternatives produce sufficient smoke to exceed the threshold standards

established for the basin if there were no other sources of smoke. However, cumulative effects of smoke from both Forest Service and other projects could cause the thresholds to be exceeded. Mitigation measures must be employed to offset the adverse impacts.

All alternatives have an increase in the recreation visitor days of use which generate vehicle miles of travel. Auto emissions produce unavoidable air quality effects. National forest activities in all the alternatives would not generate emissions in excess of threshold. No new recreation use of the national forest would be approved unless offsetting measures are employed to maintain and enhance air quality.

National forest activities in all alternatives would produce noise. Some of the activities, such as from OHV and chainsaws, have the potential to produce noise levels above thresholds if not regulated. With controls, established single event or cumulative noise event level thresholds can be achieved even though overall noise levels would be increased.

Activities in all alternatives would increase visitation to the national forest which increases the probability of greater potential for adverse effects to threatened and endangered wildlife and plant species and cultural resources, especially those that have not been identified.

New land disturbance, even though within the bounds of established threshold levels would increase the potential for adverse water quality impacts.

Visual quality would be lowered for those people who prefer a natural appearing or unchanged landscape. Localized improvement in visual quality would occur as improvements are made at resorts, other recreation sites, and at administrative sites.

G. Relationship Between Short Term Uses and the Long Term Productivity of the Environment

The relationship between the short term use of man's environment and the maintenance and enhancement of long term productivity is complex. Short term uses are those that generally occur on a yearly basis on some part of the forest, such as livestock grazing as a use of the forage resource, hunting as a use of the wildlife resource, and recreation as a use of the water resource.

Long term productivity refers to the continued ability of resources to produce commodity and amenity values for future generations. This inherent ability remains if the soil productivity is not impaired, if the resilience of the land and water resources are not overtaxed, and if the physical character of the landscape is not altered beyond natural short term recoverability. Long term refers here to longer than the 50-year period addressed in this EIS. National forest managers often think in terms exceeding 100 years due to the long period required for trees to mature.

The alternatives have been assessed for cumulative and long term effects from the perspective that each generation is the trustee of the environment for succeeding generations. The production of commodities, along with the maintenance of long term productivity, is an integral part of land management.

Management must, therefore, be based on the capabilities of the land, rather than on short term needs. The quality of life for future generations will be determined by the capability of the land to maintain its productivity.

Forest management in the LTBMU has generally been conducted in a very conservative manner because of the recognized value of the exceptional water quality in Lake Tahoe. Unlike most lakes, the productivity of Lake Tahoe is not measured in pounds of fish or the amount and quality of water available for domestic and agricultural purposes, but is instead a function of the amenity value of its exceptionally clear, blue water. The relationship between short term uses and the future condition of the lake is the primary issue affecting land use decisions in the Tahoe Basin. The productivity of soils in the basin is not endangered under any of the alternatives. However, the potential for inadvertent damage is larger in those alternatives having the largest timber management programs and ski area development. The long term productivity of the lake, as an outstanding visual and recreational resource, is less certain.

Activities in the LTBMU are planned and carried out with care and often include expensive mitigation measures. The degree to which this approach would continue in the future varies by alternative. Therefore, each alternative represents varying levels of risk relative to the long term protection of the lake. Maintaining the clarity of Lake Tahoe is to a large degree dependent upon limiting man's disturbance from short term uses.

Protection of the lake's clarity is preferably accomplished through maintaining a naturally functioning watershed. While most of the impacts on the lake have resulted from rapid urbanization on private land, forest activities such as developed recreation, grazing, and timber harvest also contribute.

Alternative E with its high level of timber clearcutting, recreation development, and grazing represents the greatest potential for reducing long term productivity. Alternative F and, to a slightly lesser extent, Alternative C are designed to represent the most protection. Though Alternative C allows recreation site and ski area development like Alternative A, these activities are deferred until there is greater certainty that the thresholds are being achieved. Alternatives A, C, and F restore damaged watershed as soon as possible. Alternative H, which requires harvesting timber with small openings, would involve less potential for adverse effects than Alternative E. The other alternatives involve tradeoffs between wildlife habitat, potential for epidemic insect and disease activity, and incremental changes in program emphasis but, for the most part, represent a moderate potential to change the long term productivity of the environment, primarily as a result of ski area development.

H. Irreversible and Irretrievable Commitment of Resources

Each alternative commits resources to certain uses, depending upon its management emphasis, which may preclude these resources from other uses. For example, constructing a campground or ski area makes these areas less available to wildlife as habitat. These resource commitments are expressed in the differences in outputs between alternatives (see Chapter 2). The major irretrievable resource commitments are those associated with construction of facilities. There are approximately four acres committed with each mile of local road construction and seven acres with each mile of arterial or collector

road construction. (See road construction in Table 2.23.) The energy used to implement each of the alternatives is also considered an irreversible resource commitment. (See Table 4.28.)

The potential for disturbing or destroying cultural resources varies by alternative (See Table 4.10.). Alternatives E and H have the highest probable potential for disturbance. The probability of cultural resource disturbance varies little between the other alternatives, though C and F would have the least potential.

The decision to construct roads or otherwise develop roadless areas means that their wilderness potential is irreversibly lost. Alternative E, which accesses part of the Freel area for timber harvest, is the only alternative which involves developing a further planning area. Several alternatives include nonwilderness allocations for both of the LTBMU's further planning areas. However, these allocations do not compromise the areas' wilderness characteristics and are therefore reversible. The areas could be recommended for wilderness in the future.

Collectively, all the development and activities that occur within the Lake Tahoe Basin have the potential for further diminishing the quality of water in the lake. It is estimated that the clarity of the lake has declined by 15% with its transparency being reduced at the rate of one foot per year. Although the lake remains one of the clearest in the world, some people feel that the downward trend is irreversible no matter how much effort is placed upon regulating water quality impacts. Others believe that the trend can be reversed and at least some of the loss of clarity recovered. In any case, the downward trend is expected to continue for some years before practices implemented and planned for the protection of water quality can cause a reversal. This is partly due to the long flushing period (600 to 800 years) of the lake, which is a result of its large volume in comparison to the watershed that feeds it.

I. Possible Conflicts with Federal, State, and Local Land Use Plans

All alternatives except C conform to other Forest Service planning level direction. Alternative C deviates in its recommendation of Dardanelles Roadless Area for wilderness. The California Wilderness Act released the area from consideration as wilderness in current planning. It is the policy of the Forest Service to not consider released areas for wilderness.

Plans and policy of other Federal agencies were considered in forest planning and are not known to be in conflict. Recommendations in the Department of Interior National Natural Landmark program would not be directly effected by any of the alternative plans.

Environmental threshold standards established for the Lake Tahoe Basin are very restrictive. They narrow the range of opportunities for use of the resources available from the forest. In order to develop a range of alternatives comparable to those analyzed for most national forests, the environmental thresholds could not be completely net in most alternatives. The Selected Alternative is the only alternative which meets all the thresholds. Only water quality, air quality, and noise thresholds are achieved as minimum management

requirements (MMR). However, the MMR do not necessarily achieve the standards by adhering to all of the policies established by the TRPA for these environmental elements. Alternative F favorably achieves all the thresholds except to provide a fair share of outdoor recreation. Alternative C delays recreational developments and also fails to meet the threshold for vegetative diversity. Alternatives D, and E fail to meet the State of California Water Quality Management Plan for Lake Tahoe since they allow clearcut logging practices. Although State park plans have not been completed for Lake Tahoe by either California or Nevada, substantial communication with these agencies has assured compatible goals.

The Washoe Indian Tribe, though not landowners in the basin, have developed plans to revive their cultural ties with the area at a cultural center to be sited on national forest land.

Local plans are, or will be, generally in conformance with the forest plan through the TRPA Regional Plan requirements. They may assume greater dependency upon national forest land for open space and urban recreation needs of residents and visitors to the communities.

The LTBMU Land and Resource Management Plan does not conflict with the State historic plans for California or Nevada.

J. Energy Requirements and Conservation Potential

Energy is consumed in the administration and use of natural resources from national forest system lands. Each alternative affects energy consumption and yield to one degree or another, although overall differences between alternatives are modest. The main activities which consume energy on the LTBMU are timber management, range use, recreation (both dispersed and developed), and administrative activities of the Forest Service. Energy yield is developed from such sources as firewood and tons of red meat. This is summarized in Table 4.28.

Alternatives E and H increase sawlog and firewood production but consume more energy to do so. Most of the energy consumed would be from logging, transport, road construction and maintenance, site preparation and slash disposal. Encouraging firewood utilization helps conserve other forms of fuel but may increase woodstove emissions and have an adverse effect on air quality.

Energy consumption from range use varies significantly by alternative. Energy consumed in utilizing range is the estimated amount required to haul livestock to and from the area, and the energy consumed for range improvement practices. Alternatives C, D, F, and G have no grazing program. Alternative D eliminates grazing because the costs exceed the benefits. In Alternatives C and F, livestock grazing is eliminated to minimize conflicts with dispersed recreation, water quality, and habitat objectives. Alternatives A and B continue the current level of range production. Alternatives E and H increases grazing production. Energy yield is based on meat on the hoof.

Table 4.28 Average Annual Energy Consumption and Yield

(Million B.T.U.s In the First Decade 1/)

Resource Group	Action	A Selected	B Current	C Conserv.	D Efficient	E Market	F Amenity	G Low Budget	H RPA	I Wilderness
		Alternatives								
Timber	Yield	0	0	0	0	0	0	0	0	0
	Consume	100.3	91.2	100.3	18.2	364.8	100.3	43.3	223.4	114.0
Range	Yield	47.5	43.2	35.0	8.6	172.8	47.5	20.5	105.8	54.0
	Consume	.2	.2	.2	0	.5	0	0	.4	.3
Recreation	Yield	.3	.2	.3	0	.6	0	0	.5	.3
	Consume	703.4	697.3	700.0	697.6	692.6	681.5	617.2	696.2	697.6
Roads	Yield	0	0	0	0	0	0	0	0	0
	Consume	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Fire	Yield	0	0	0	0	0	0	0	0	0
	Consume	2.8	2.8	3.0	4.1	2.7	2.8	4.1	2.4	3.3
Total	Yield	47.8	43.4	35.3	8.6	173.4	47.5	20.5	106.3	54.3
	Consume	813.8	780.4	810.4	726.8	1,067.5	791.6	671.6	929.4	822.0
Net Energy Balance	Net Yield	-765.8	-737.0	-775.1	-718.2	-894.1	-744.0	-651.1	-823.1	-767.7

1/ The Lake Tahoe Environmental Assessment, Dec. 1979, states that the total energy consumption in the Lake Tahoe Basin is 10,513,000 Million BTU's.

The largest amount of energy consumed in each alternative is in recreation. Energy is consumed in the operation, maintenance, and construction of sites. Transportation to the site and at the site for sightseeing, water skiing, etc., also consumes energy. Those alternatives that build new campgrounds and allow ski area expansion (A, D, E, H, and I) consume the most energy. Energy yield from recreation is difficult to quantify because it is based on the harvest of big game which is negligible in the LTBMU.

Energy consumed or lost is based on the number of fires, fuel treatment acres, and potential acres lost to fire. There is no usable energy yield acquired from fire management or wild fires. The consumption of energy is directly related to the number of acres burned in each alternative. Alternatives D, G, and I reduce the fire organization level and, therefore, have the potential of increasing the number of acres burned. Alternatives A, B, and F maintain the fire organization at the current level. Alternatives C, E, and H have a larger fire organization and reduce the energy loss (acres burned) by providing fire force capable of reducing the acres burned.

Overall Alternative E (with its high level of timber and other market resource outputs) consumes the most energy, while Alternative G consumes the least amount of energy.

There is no significant difference in energy consumption between alternatives when administrative activities are considered. The number of administrative sites is not expected to vary significantly by alternative. Estimated new vehicle miles traveled due to expansion of recreation opportunities increases most in Alternatives A, D, E, H, and I. Alternative G shows a reduction from current in the number of vehicle miles traveled.

According to the "Lake Tahoe Environment Assessment, Dec. 1979", total energy consumption in the Lake Tahoe Basin is 10,500 billion BTU. The total amount of energy consumed on national forest lands is less than 1% of that total.

The opportunities used by the LTBMU to conserve energy vary by alternative only in the amount of firewood produced for home heating. The TRPA has initiated regulations upon the use of firewood and woodburning devices. As the effectiveness of these measures on air quality are monitored, the Forest Service may need to re-evaluate its firewood program.

Alternatives A, C, and F place the greatest emphasis upon increasing opportunities for visitors to use alternatives to the personal automobile.

Capability to produce energy from hydroelectric and geothermal sources exist but are very limited regardless of the alternative.

(End of Chapter 4)

CONTENTS

CHAPTER 5. LIST OF PREPARERS

A. ID Team Members 5-1
B. Management Team 5-3
C. Support Staff 5-3
D. Other Specialists and Areas Consulted 5-4

CHAPTER 5. LIST OF PREPARERS

The LTBMU interdisciplinary team (ID Team) of Forest Service specialists developed and coordinated the planning activities for the forest plan. They were selected because of their expertise and ability to respond to the issues, concerns, and opportunities being analyzed during the planning process. Other specialists from both inside and outside of the Forest Service assisted the ID Team when special needs arose.

The primary duties of the ID Team were as follows:

1. Coordinate and integrate planning activities.

2. Integrate all physical, biological, social, and economic aspects of the resources into the planning process.

3. Identify and analyze the problems and opportunities associated with providing a range of goods and services.

4. Coordinate forest planning with planning of other Federal agencies, State, and local agencies, and with adjacent landowners.

The forest ID Team members' names, qualifications, and areas of responsibility are as follows:

William Toby Hanes Asst. Watershed Staff Officer 1982-84	M.S. in Forest Hydrology. Worked with the Forest Service in Hydrology. Areas of responsibility included water quality and quantity, watershed management, geology, soils and transportation.
Jonathan F. Hoefer Planning Staff Officer 1982-Present	Licensed Professional Forester; with the Forest Service 29 years in coordination of all resource management. Jon was responsible for the topics of landownership adjustment, research natural areas, special interest areas, private landowners, public participation and facilities.
Victoria G. House Hydrologist Replaced Toby Hanes 1984-86	B.S. in Natural Resources/Forestry. Nine years with the Forest Service in hydrology. Responsible for water quantity and quality, water rights, watershed management, geology, soils, transportation and dams.

Mark Johnson Fuels Specialist 1982-Present	B.S. in Natural Resource Management. nine years with the Forest Service in fire suppression and timber management. Areas of responsibility were minerals, energy, fire management, and lands activities.
Frank Magary Landscape Architect 1982-83	Master of Landscape Architecture. Twelve years with the Forest Service in planning and designing resource activities. Responsible for recreation and cultural resources.
James J. Oden Assistant Planner 1982-Present	Licensed Professional Forester; Eighteen years with the Forest Service in timber, recreation, resources, and land management planning. Areas of responsibility include timber, range, wildlife, pest management, economics, sociology and FORPLAN.
Jeff Reiner Hydrologist/ Fisheries Biologist 1986-Present	B.A. Aquatic Zoology M.A. Hydrology. Ten years with the Forest Service as hydrologist & fisheries biologist Replaced Vickie House on planning team.
Glenn Smith Planning Coordinator 1982-83 Retired 1983	Licensed Professional Forester; twenty seven years with the Forest Service in coordination of all resource management. Areas of responsibility included air quality, noise, and interagency coordination.
David Stoms Community Planner 1982-84	B.A. Architecture. Twelve years of service in planning. Areas of responsibility included economics, social, special land uses (nonrecreational), visual, wilderness and data base management.
Keith Thurlkill Public Information Officer Replaced Frank Magary 1984-Present	B.S. Forestry/Outdoor Recreation, Twelve years with the Forest Service in public information. Areas of responsibility included recreation and cultural resources. Replaced Mac Magary on planning team.
Kathy Maxson VanZuuk Planning Aide 1984-1987	M.A. Plant Ecology. Six seasons with the Forest Service in recreation. Areas of responsibility included energy, writer-editor, and operations control manager.

MANAGEMENT TEAM

Ralph Cisco	Forest Supervisor (retired April 1988)
William A. Morgan	Forest Supervisor (prior to 1985)
Don Breitinger	Timber, Range, Wildlife, Staff Officer (prior to 1988)
Stan Fitzgerald	Fire Management Officer (prior to 1987)
Sandy Godbold Bayles	Administrative Staff Officer (prior to 1986)
Glenn Hampton	Recreation Staff Officer (retired in 1984)
Jonathan Hoefer	Planning & Watershed Staff Officer
William Johnson	Watershed Staff Officer (prior to 1986)
Robert McDowell	Recreation Staff Officer
T. E. Neenan	Lands Staff Officer (prior to 1986)
Phil Nelson	Acting Fire Management Officer (1987)
Linda Reichl	Administrative Staff Officer
Wayne Shephard	Land Staff Officer
John Swanson	Staff Officer Timber & Fire (1988 -)

SUPPORT STAFF

Marie Corbet
Jim McKimmey
Joanne Schindler
Nancy Payne
Rex Owens
Allen Ross
Lorraine Gamst
Dorthy Reno
Jane Oden
Bruce Mangan
Terry Adams
Laura Mark
Laurie Vigil
John Wehern
Barbara Cooper
Brian Wilkinson
Sharon Quaresma
Yvonne Hoffman
Tom Hintz
Nate Leising
Jim Hush
Joyce Shields

OTHER SPECIALISTS
(and areas consulted)

Virgil Anderson, Forestry Technician	Special Uses Information
Mike Artemief, Recreation Technician	Off-Highway Vehicle Mgt.
Linda Attarian, Accountant	Budget and Finance
Gary Bump, Computer Programer	Computer Services
Jennifer DeJung, Dispatcher	Fire Modeling
Lori Doyle, Hydrologic Technician	Graphics
Jackie Faike, Visual Information Spec.	Recreation and Interpretation AMS
Jack Fox, Planning Technician	Writer/Editor
Bob Goodman, Maintenance Specialist	Facilities Condition
Kathy Hardy, Archaeologist	Cultural Resources
Dennis Hatch, Accountant	Budget and Finance
Andrea Holland, Hydrologist	Watershed
Allen King, Geologist	Geology and Groundwater
Rich Kraushaar, Archaeologist	Cultural Resources
Don Lane, Assistant Recreation Officer	Recreation Budget
Lisa O'Daly, Planning Technician	Writer/Editor
Ken Pence, Engineer	Transportation
Charly Price, Illustrator	Graphics
Sherry Reed, Wildlife Biologist	Wildlife
Val Russell, Engineer	Transportation Planning
Jim Schellenger, Forester	Silviculture
Helen Soderberg, Wildlife Biologist	Wildlife
Carol Sowers	Computer Services
Al Todd, Hydrologist	Watershed
John Wenz, Entomologist	Pest Management
Steve Widowski, Wildlife Biologist	Wildlife and Fish

CONTENTS

CHAPTER 6. MAILING LIST

A. State and Federal Elected Officials 6-1
B. Federal Agencies 6-1
C. California State Agencies 6-2
D. Nevada State Agencies 6-3
E. Local and Regional Agencies 6-3
F. Libraries 6-3
G. Individuals 6-4
H. Organizations and Businesses 6-7
I. News Media 6-8

CHAPTER 6. MAILING LIST

The following pages present a listing of the agencies, groups, and individuals that have been sent a copy of the Environmental Impact Statement and the Forest Plan.

This list is not intended to be complete; it is an indication of the number of copies that have been distributed.

The complete mailing list is on file in the planning records located at the Forest Supervisor's Office in South Lake Tahoe, California.

A. State and Federal Elected Officials

U.S. Senator Alan Cranston, CA
U.S. Senator Pete Wilson, CA
U.S. Senator Harry Reid, NV
U.S. Congressman Walter Herger, CA
U.S. Congressman Norman Shumway, CA
U.S. Congressman Chris Hecht, NV
U.S. Congresswoman Barbara Vucanovich, NV
California State Senator John Garamendi
California State Senator John Dolittle
California State Assemblyman Chris Chandler
California State Assemblyman Norman Waters
Nevada State Senator Charlie Goerg
Nevada State Senator Laurence Jacobsen
Nevada State Assemblyman Louis Bergevin
Nevada State Assemblyman David Nicholas

B. Federal Agencies

U.S. Department of Agriculture
- Forest Service
  - Chief
  - R-5 Regional Forester and Staff
  - Forest Supervisors:
    - Angeles National Forest
    - Cleveland National Forest
    - Eldorado National Forest
    - Inyo National Forest
    - Klamath National Forest
    - Los Padres National Forest
    - Mendocino National Forest
    - Modoc National Forest
    - Plumas National Forest
    - San Bernardino National Forest
    - Sequoia National Forest

State Board of Forestry
Office of Historic Preservation

D. Nevada State Agencies

Division of Historic Preservation and Archeology
Division of Environmental Protection
Department of Conservation and Natural Resources
Nevada State Planning Office
Nevada Archaeological Survey
Department of Fish and Game
Department of Transportation
State Forester
Attorney General

E. Local and Regional Agencies

Tahoe Regional Planning Agency
    Governing Board
Lahontan Regional Water Quality Control Board
Alpine County Board of Supervisors
El Dorado County Board of Supervisors
Placer County Board of Supervisors
Washoe County Commissioners
Carson City County Commissioners
Douglas County Commissioners
City of South Lake Tahoe
Washoe Council of Governments
    Regional Administrative Planning Agency
North Tahoe Public Utility District
    Recreation and Parks Department
Douglas County Public Utility District
Elk Point General Improvement District
Sacramento Municipal Utility District
Incline Village General Improvement District
Kingsbury General Improvement District
Round Hill General Improvement District
Tahoe Douglas Sewer District
South Tahoe Public Utility District

F. Libraries

Douglas County Library
Douglas County Library, Minden Branch
El Dorado County Library
El Dorado County Library, South Lake Tahoe Branch
Mountain View Public Library
Nevada County Library, Truckee Branch
Ormsby Public Library
Palo Alto City Library
Placer County Library, Auburn Branch

Fred Drexler
Robert Elkinton
Bernard Etcheverry
Phillip Farrell
Wendell Fingar
Gerald Finley
Galen Fisher
William Fleming
Alfred Gianelli
Lucy Gill
John Gilpin
Vernon Givan
E.E. Goldsmith
Ken Goldsmith
Peter Graf
Calvin Gunn
A.R. Gutowsky
Margaret Gwinn
Ann Harootunian
Mary Harrington
Roger Hoag
Dana Hoffelt
Roy Holmes
Alan Houser
Richard Howell
Sally Hudson
Luis Ireland
Adrian Itaya
Robert Ives
Marian Jordan
Doug Joses
John Kauke
Jean Kauwling
Bob Kelso
Mrs. Laurence Kennedy
Ralph King
Gertrude Knight-Stillman
Lloyd Krause
John Kuhl
Russell Labelle
Roger Lasswell
Kenneth Laver
Bruce Lawler
Allen Lemmon
Frances Leonard
John Lindvall
John Lloyd
Laurie Luedtke
James MacMaster
Eugene Majerowicz
Mary Maynard
Jack McDowell
M.E. McLoughlin
Barbara Meral

Chris Valle-Riestra
Mark Weiner
Fraser West
George Wever
Ernest Wichels
Wade Williams
James Wing
Leonard Wohletz
Paul Zigman

H. Organizations and Businesses

Alpine Meadows Ski Area
Amoco Production Co.
Atlantic Richfield
Big Chief Guides Nordic Center
Boise Cascade Corp.
California Cattlemen's Assoc.
California Chamber of Commerce
California Farm Bureau Federation
Cascade Property Assoc.
Drumm Estates Tract
Echo Nordic Center
Echo Summit Ski Area
Gardner Mountain Neighborhood
Glen Ridge Park Assoc.
Homewood Resort
Incline Village Chamber of Commerce
Kirkwood Ski Area
Kirkwood Ski Touring Center
KOA Campground
League to Save Lake Tahoe
Louisiana Pacific
Meeks Bay Vista Property Owners Assoc.
Modland Corp.
North Lake Tahoe Chamber of Commerce
North Tahoe Visitors and Convention Bureau
Northstar at Lake Tahoe
Northstar Nordic Center
NV. North Tahoe Property Owners Assoc.
Perkins, Coie, Stone, Olsen and Williams
Sierra Pacific Industries
Sierra Ski Ranch
Ski Incline
Ski Reno
South Lake Tahoe Chamber of Commerce
South Tahoe Gaming Alliance
Squaw Valley U.S.A.
Stanford Alumni Assoc.
Stanford Sierra Camp
Sunnyside Marina
Tahoe Douglas Chamber of Commerce
Tahoe Human Services, Inc.

Tahoe Nordic Center
Tahoe Sierra Preservation Council
Tahoe Ski Bowl
Telemark Country Sports
TMSL, Inc.
Voluntary Action Center
Western Forest Industries
Western Forestry and Conservation Assoc.
Western Interstate Energy
Western Timber Assoc.
Womanspace Unlimited
Zephyr Cove Property Owners Assoc.

I. News Media

Associated Press
California Explorer
Carson City Sun and Record Courier
Cycle News
El Hispano
High Sierra Times
K-102 Radio
KCRA-TV
KCRL-TV
KDTV-TV
KEMO-TV
KMUV-TV
KOVR-TV
KOWL Radio
KTHO Radio
KXTV-TV
Montery Peninsula Herald
Mountain Democrat
Nevada Appeal
Nevada State Journal
Oakland Tribune
Record Courier
Reno Evening Gazette
Sacramento Bee
San Francisco Chronicle
San Francisco Examiner
Sierra Sun
Sunset Magazine
Sup. Cal. Edition
Tahoe Daily Tribune
Tahoe TV Cable
Tahoe World
The Observer

(End of Mailing List)

GLOSSARY

A

ADT
Average daily traffic.

AMS
See analysis of the management situation.

AMN
Amenity Alternative.

ASQ
See allowable sale quantity.

AUM
See animal unit month.

acre-foot
The amount of water or sediment that would cover one acre to a depth of one foot (43,560 cubic feet; 326,000 gallons).

activity
A work process that is conducted to produce, enhance, or maintain an output or environmental quality objective.

activity fuels
Fuels which have been directly generated or altered by management activity.

activity outputs
The quantifyable goods or services resulting from any management actions taken on the forest.

administrative cost
Costs of required general administration which are prorated over fixed, variable, and investment costs.

administrative site
A single or multiple grouping of facilities which may facilitate one or more administrative functions. The site can be either seasonal or year-around activities for particular geographic areas.

afa
Acre feet per annum (year).

affected environment
The physical, biological, social, and economic environment within which human activity is proposed, that would be affected by a given Federal action.

age class
One of the intervals, usually 10 to 20 years, into which the age range of vegetation is divided for classification or use.

allocation
The assignment of sets of management practices to particular land areas to achieve the goals and objectives of the alternative.

allotment
See range allotment.

allowable sale quantity (ASQ)
The maximum quantity of timber that may be sold from land capable, available, and suitable for timber production for a time period; usually expressed on an average annual basis.

alternative
In forest planning, a given combination of resource uses and a mix of management practices that achieve a desired management direction, goal, or emphasis.

amenity (amenity value)
Typically used in land management planning to describe those resources for which market values (or proxy values) are not or cannot be established. See also nonmarket outputs.

analysis level II
A method to evaluate the effectiveness of proposed fire management program options designed to meet fire management objectives for Land Management Planning.

animal unit month (AUM)
The amount of forage required to support one mature cow (1,000 pounds) or the equivalent of one month (30 days).

apparent naturalness
The degree to which each roadless area reflects levels of environmental modification.

area of influence
A delineated geographic area within which the present or proposed actions of a forest unit exert an important influence on residents and visitors.

arterial roads
See roads.

artifact
A simple object (such as a tool or ornament) showing early human workmanship or modifications.

aspect
The compass direction that the slope of a land surface faces.

assigned value
A monetary value that represents the price consumers would be willing to pay for forest outputs, whether or not such prices are actually paid to the Federal Government by consumers. In forest planning the term assigned values refers to both market and nonmarket outputs because it is national policy to provide most forest outputs at either no charge to consumers or at a price less than the willingness to pay price.

avoidance area
An area having one or more physical, environmental, institutional or statutory impediments to corridor designation.

available lands
Those portions of the national forest not administratively excluded from any particular use, most often timber harvest or livestock grazing.

B

BACT
Best available control technology. Measures designed to protect air quality.

BD funds
Brush Disposal (BD) funds are a collection deposit from timber harvesting (primarily) used to finance fuel hazard reduction.

BLM
Bureau of Land Management.

BMP
See best management practices.

BSS
See Base Sale Schedule.

background
The view beginning 3-5 miles from the observer and as far into the distance as the eye can detect the presence of objects.

Bailey land capability system
A system that displays seven land capability classes designated by number in order of increasing tolerance for use without sustaining permanent damage. Land capability involves consideration of (1) risks of land damage from erosion and other causes, and (2) the subsequent impacts of such damage on vegetation, sedimentation, flooding, wildlife, and water quality.

basal area
The cross-sectional area of a stand of trees measured at 4.5 feet above the ground; expressed in square feet.
benchmark
An analysis of the supply potential of a particular resource, or of a set of resources subject to specific management objectives or constraints. Benchmarks define the limits within which alternatives can be formulated.
benefit
The total value of an output or other outcome.
benefit-cost analysis
An analytical approach to making choices on the basis of receiving the greatest required level of benefits at the lowest cost. Also referred to as cost effectiveness analysis when the benefits cannot be quantified in terms of dollars.
benefit-cost ratio
Measure of economic efficiency computed by dividing total benefits by total costs. Usually both benefits and costs are discounted to present. See also discounting.
best management practices (BMP)
Management actions which are designed to maintain water quality by preventative rather than corrective means.
biological control
The average net growth attainable in fully stocked natural forest land.
biomass
The total mass (e.g., weight, volume) of living matter in a biological system.
boardfoot
The amount of wood contained in an unfinished board one inch thick, 12 inches long, and 12 inches wide.
bog
A specific type of wetland. Technically Grass Lake is a transitional or oligotrophic peatland. See peatland.
bole
A tree stem once it has grown to substantial thickness, capable of yielding saw timber.
broadcast burning
A technique of applying fire to target fuels which ignites all burnable materials over the entire unit being treated.
browse
Leaf and twig growth of shrubs, woody vines, and trees available for animal consumption; act of consuming browse.
burning prescription
Written direction stipulating fire environment conditions, techniques, and administrative constraints necessary to achieve specified resource management objectives by use of fire on a given area of land.

C

CDF
California Department of Forestry.
CEE
Constrained economic efficiency Alternative.
CEQ
See Council on Environmental Quality.
CFR
Code of Federal Regulations.
CMAI
See culmination of mean annual increment.
CNEL
Cummulative noise events level. An average measurement of noise over a 24 hour period.
CUR
Current Alternative.
CalVeg type
CalVeg Type was used synonymously for CalVeg Series. The Series level identifies vegetation by general dominance types, i.e.; chamise, greenleaf manzanita, and huckleberry oak. The criteria for identification of Series is that only dominate overstory vegetation is named. Series identification is based upon a combination of canopy cover and life form (physiognomy), and must meet the minimum canopy cover criteria. The minimum cover criteria for identification of all Series is 25 percent, except for the Series within the Herbaceous Formation Class where the minimum cover criteria is two percent (National Standards). Series are usually designated by a single dominant species. However, when two species codominate a dual species designator is used or when three or more species occur in comparable amounts, a multispecies designator is used.
canopy
The more or less continuous cover of leaves and branches collectively formed by the crowns of adjacent trees in a stand or forest.
capability
The potential of land to produce resources and supply goods and services under a set of management practices and at a given level of management intensity. Capability depends upon site conditions such as climate, soils, and geology as well as the application of management practices, such as silviculture.
capability areas
The smallest unit of land or water used in forest planning. They are discrete and recognizable units classified primarily according to: physical (soil), administrative, and biological factors. All land within a capability area is homogeneous in ability to produce resource outputs and in production limitations.
capable timber lands
Lands having the capability to produce 20 cubic feet of wood per acre per year.
carrying capacity
The number of organisms of a given species and quality that can survive in (and not cause deterioration of) an ecosystem through the least favorable environmental conditions that occur within a stated interval of time.
Class I Area
An area designated for the most stringent degree of protection from future degradation of air quality. The Clean Air Act designates as mandatory Class I areas each National Park over 6,000 acres and each National Wilderness area over 5,000 acres.
Class II Area
An area not designated as Class I. The Clean Air Act designates mandatory Class I Areas. States may redesignate (upgrade) Class II Areas to Class I where appropriate.
clearcutting
Harvesting of all trees in one cut or area for the purpose of creating 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. See also succession.
closed canopy
A condition that exists when the crowns of the trees in a stand cover 100 percent of the potential open space.
commercial species
Tree species suitable for industrial wood products.
commercial thinning
See thinning.
commodity
See market outputs.

condition class
The dominant existing vegetation or physical features found on a unit of land. Forested condition classes are described by the dominant existing timber species and size class. Nonforested condition classes include rock, brush, water, mountain meadows, and prairie grass.
confine fire
To restrict the fire within determined boundaries established either prior to the fire, during the fire, or in an escaped fire situation analysis.
conifer
A tree that bears cones and in most cases has needle or scale-like leaves, such as pine, spruce, hemlock, or fir.
contain fire
To surround a fire or any spot fires with a control line, as needed, which can reasonably be expected to check the fire's spread under prevailing and predicted conditions.
control fire
To complete the control line around a fire, any spot fires therefrom, and any interior islands to be saved; burn out any unburned area adjacent to the fire side of the control line; and cool down all hot spots that are immediate threats to the control line until the line can reasonably be expected to hold under foreseeable conditions.
constraints
Limitations; actions which cannot be taken or which must be taken.
consumer surplus
The difference between the amount actually paid by consumers for a good or service and the amount each individual would be willing to pay.
consumptive use
Use of a resource that reduces the supply.
cord
A stack of wood measuring four feet high, four feet deep, and eight feet long. In wood volume, two cords roughly equal 1 MBF.
corridor
A narrow strip of land where existing or planned transportation and utility facilities are or will be located.
cost
The price paid or what is given up in order to acquire, produce, accomplish, or maintain anything.
cost effective
Achieving a specified level of outputs under given conditions for the least cost.
cost efficiency
A means of measuring how productive an input is in producing outputs. Measured by present net value in forest planning.
cover
Vegetation used by wildlife for protection from predators and weather conditions, or in which to reproduce.
coverage
Any structural improvement that results in an impervious surface that prevents infiltration of water.
Council on Environmental Quality (CEQ)
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.
critical habitat
Key land areas used by wildlife for forage, reproduction, or cover.
crown
The upper part of a tree carrying the main branch system and foliage.
cubic foot
A unit of measure usually referring to wood volume (1 foot x 1 foot x 1 foot).
cubic foot per second (cfs)
Unit measure of streamflow or discharge, equivalent to 449 gallons per minute or about 2 acre-feet per day.
culmination of mean annual increment (CMAI)
The point where the average annual growth of a stand of timber no longer increases.
cultural resources
Cultural resources are the tangible and intangible aspects of cultural systems, living and dead, that are valued by a given culture or contain information about the culture. Cultural resources include, but are not limited to sites, structures, buildings, districts, and objects associated with or representative of people, cultures, and human activities and events.
cumulative watershed impacts
All impacts on beneficial uses of water and soil located outside of primary land use sites. They are the additive or synergistic effects of multiple actions within a watershed. Cumulative effects occur as a result of more than one action and the changes may be either enhance or degrade water quality.
cushion plant
Plants that are specially adapted to tundra-like conditions of high winds, frigid temperatures, shallow soils, and short growing seasons.

D

DBH
See diameter breast high.
DEIS
Draft Environmental Impact Statement.
dam class
Hazard rating system for dams that evaluates height, amount of impounded water, and potential for downstream damage in the event of failure.
decision space
The limits within which forest planning alternatives occur. The outer limits are defined by benchmarks in forest planning.
demand
The quantity of goods or services which would be consumed or used, given a price and other combination of factors.
demand analysis
A study of the factors affecting the quantity and price of a good or service that would be used or purchased by consumers if made available.
dependent communities
Communities whose social, economic, or political life would become discernibly different in important respects if outputs from the national forest were significantly altered.
dependent species
A species for which a habitat element (e.g., snags, vegetative type) is deemed essential for the species to occur regularly or to reproduce.
design capacity
The maximum theoretical amount of use a developed recreational site was built to accomodate.
developed recreation site
Distinctly defined area where facilities are provided for concentrated public use, e.g., campgrounds, picnic areas, boating sites, and ski areas.
diameter breast high (DBH)
The diameter of a tree measured four feet six inches from the ground.
discount rate
The interest rate which is used to reduce costs and benefits occurring in the future to their value in the present. The higher the discount rate, the lower the present value of future benefits and costs. See discounting and present value.

discounted benefit
The present value of future benefits.
discounted cost
The present value of future costs.
discounting
An adjustment made to costs and benefits to compensate for the fact that dollars received or spent in the future have a lower value today than dollars in the present. For example, it would be preferable to receive $100 this year rather than in one year from now because it could be invested at 4 percent simple interest and be worth $104 in one year. Thus, given the choice between receiving benefits worth $100 today or benefits worth $100 one year from today, one would choose to receive it today. Discounting reduces future costs and benefits to reflect that fact and enables comparisons to be made of benefits and costs occurring at different points in time.
dispersed recreation
Outdoor recreation which occurs outside of planned and maintained recreational facilities, e.g., scenic driving, hunting, backpacking.
distance zone
One of three categories used in the Visual Management System to divide a view into near and far components. The three categories are (1) foreground, (2) middleground, and (3) background. See individual entries.
distinctive variety class
See variety class.
disturbance
from the word "disturb" to disarrange; put out of order. In LTBMU planning usually refers to soil disturbance where an activity disturbs the soil and vegetation, thereby affecting its ability to take up and filter water and nutrients. A temporary state of disorder.
diversity
The distribution and abundance of different plant and animal communities and species within an area.
dominant
One main crown class of trees with their tops in the uppermost layers of the canopy.

E

EA
See Environmental Assessment.
EAR
Environmental Analysis Report. Report which documents the analysis.
EIS
See Environmental Impact Statement.
EPA
Environmental Protection Agency
ERA
Equivalent road acres.
ESA
Endangered Species Act
early succession
The plant and animal community that develops immediately following the removal or destruction of the vegetation in an area.
ecology
The study of plants and animals in relation to their environment.
economic cost
Total fixed and variable costs for inputs, including costs incurred by other public and private parties, opportunity costs, and cost savings.
economic efficiency
A measure of how efficiently inputs are used to achieve outputs when all costs and benefits can be identified and valued. Usually measured by present net value or benefit-cost ratios.
ecosystem
The sytem formed by the interaction of a group of organisms and their environment.
edge
The area where plant communities meet or where successional stages or vegetative conditions within plant communities come together.
electronic sites
Areas designated for the operation of equipment which transmits and receives radio signals, excluding television antennae.
encumbrance
An interest or right in a real property that may decrease or increase the value of the fee but does not prevent its conveyance by the owner. Examples include easements, restrictions, reservations, mortgages & taxes.
endangered species
Any species listed as such in the Federal Register which are in danger of extinction throughout all or a significant portion of their range.
endemic plant
A plant confined to a certain country or region and with a comparatively restricted geographic distribution.
ending inventory constraint (EIC)
Constraint to ensure that the total timber volume left at the end of the planning horizon will equal or exceed the volume that would occur in a managed forest.
environmental analysis
An analysis of alternative actions and their predictable short and long term environmental effects, which include physical, biological, economic, social, and environmental design factors and their interaction.
environmental assessment (EA)
A concise public document required by the regulations implementing the National Environmental Policy Act which briefly provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.
environmental impact statement (EIS)
A statement of the environmental effects which would be expected to result from proposed alternative management actions.
environmental thresholds
See threshold.
ephemeral stream
A stream which flows only from snow melt and storm runoff and receives no contribution to flow from groundwater.
epidemic
Populations of plants, animals, and viruses that build up, often rapidly, to highly abnormal and generally injurious levels.
erosion
The detachment and movement of soil from the land surface by wind, water, or gravity.
ethnography
The scientific description and classification of various cultural and racial groups.
even-aged management
Management of forest stands that results in trees of essentially the same age growing together. Cutting methods producing even-aged stands are clearcut, and group selection.
even-aged stand
A forest stand composed of trees having no or relatively small differences in age.
even-flow
Maintaining a relatively constant supply of timber from decade to decade.

exclusion area
An area having a statutory prohibition to rights-of-way for lineal facilities or corridor designation.
extensive range management
Management seeking full utilization of the Animal Unit Months available for livestock grazing. No attempt is made to maximize livestock forage production by cultural practices such as seeding.
extensive vs. intensive management
Loose terms generally used to indicate a degree or level of management. For example, intensive timber management refers to all practices or a set of practices which emphasize timber production on land suitable for timber production. Extensive timber management consists of practices necessary to manage timber on land emphasizing other values.

F

FA&O
Fire, Administrative and Other.
FEIS
Final Environmental Impact Statement
FERC
Federal Energy Regulatory Commission.
FFF
Emergency fire fighting funds.
FHWA
Federal Highway Administration.
FLW
Flow Benchmark, maximizes present net value with changes in the volume of timber harvested between periods constrained.
FMAZ
Fire Management Analysis Zone. Fire management area that exhibits common fire management direction and fire behavior characteristics.
FMEI
See Fire Management Effectiveness Index.
FORPLAN
A linear programming model used for developing and analyzing forest planning alternatives. Also see linear programming and Appendix B.
FSH
Forest Service Handbook.
FSM
Forest Service Manual.
FY
Fiscal Year.
facility
A single or contiguous group of improvements for the purpose of shelter and/or support of Forest Service programs (FSM 7310.5). A general term which includes all property (both government owned and privately leased) such as buildings, dams, reservoirs, airports, roads, trails, parking areas, campgrounds and picnic areas, scaling platforms, and lookouts.
fair share
An amount of recreation or other resource capacity planned and reserved for public use from the total capability of the Lake Tahoe Basin. See Chapter 1.
fee ownership
Ownership of property that has no limitation, qualification, or condition affecting it. The maximum ownership possible in real estate under the system of property rights founded on English common law.
fee site
A Forest Service recreation area in which users must pay a fee.
final cut
Generally, removal of the last trees left in a stand; specifically, removal of the last seed bearers or shelter trees after regeneration is established under a shelterwood system.
firebreak
A wide strip of land from which fuels have been removed down to the soil. Used to stop or check fires and to provide access for fire fighting. See also fuelbreak.
fire intensity level
Measure of difficulty to control a fire (based on rate of spread and heat output) expressed as a relationship to flame length. In Level II Fire Planning, intensity level was developed by using slope, fuel model information, aspect, position on the slope, time of day, time of year, and weather information such as temperature, wind, relative humidity, and fuel moisture. Intensity level corresponds to flame length as follows:

Fire Intensity Level	Flame Length (in feet)
1	0-2
2	2-4
3	4-6
4	6-8
5	8-12

fire management
Activities required for the protection of resources and values from fire, or the use of fire to meet land management goals and objectives.
fire management area
One or more parcels of land with clearly defined boundaries to which established fire management direction is applied which is responsive to land and resource management goals and objectives.
fire management direction
Fire management prescriptions which are applied to land to meet the planned, measurable results desired from fire protection and use. These results consist of acceptably burned acreages (pars), operating constraints, and prescribed fire objectives which are based on land management goals and objectives.
Fire Management Effectiveness Index (FMEI)
A relative measure of annual fire management program effectiveness, calculated by adding the presuppression and suppression costs to the resource damage and then dividing by the total number of acres protected.
fire regime
An area exhibiting common fire occurrence and fire intensity.
fire risk
The potential risk of fire, resulting from human activities.
flood plain
The lowland and relatively flat areas adjoining inland and coastal waters, including debris areas and flood-prone areas of offshore islands. At a minimum, that area is subject to a 1% (100-year recurrence) or greater chance of flooding in any given year.
fixed cost
Costs which are not allowed to vary between alternatives or with different levels of output.
forage
All browse and nonwoody plants used for grazing or harvested for feeding livestock or game animals.
forb
Any nongrass-like plant having little or no woody material on it. A palatable, broad-leaved, flowering herb whose stem, above ground, does not become woody and persistent.
foreground
The portions of a view between the observer and up to 1/4 or 1/2 mile distant.

forest cover type
A classification of forest land referring to a group of timber stands of similar development and species composition. Examples in California include the Douglas-fir, mixed conifer, and the true fir types.

forest highway
A designation for roads approved by the Federal Highway Administration, California Department of Transportation, and USDA Forest Service as meeting the following criteria: (1) It is under the jurisdiction of a cooperator and open to public travel. It may be a Forest Service road which the cooperator accepts for jurisdiction and maintenance responsibility upon construction through the Forest Highway program. (2) It provides a connection between an adequate and safe public road and the renewable resources of the NFS which are essential to the local, regional, or national economy, and/or the communities, shipping points, or markets which depend upon those renewable resources. (3) It serves other local needs, such as schools, mail delivery, commercial supply, and access to private property within the national forest system land or serves traffic of which a preponderance is generated by use of the NFS and its resources, or serves NFS generated traffic volumes that have a substantial impact on roadway design and construction.

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 nonforest use.

forest survey site classes
A measure of the maximum capacity of an area to produce timber, measured in cubic feet per acre per year:

Site Class	Max. Cu. Ft./Ac./Yr.
1	225+
2	165-224
3	120-164
4	85-119
5	50-84
6	20-49
7	less than 20

free to grow
Young conifers (seedlings, saplings, and poles) will be considered "free to grow" if they have the growth potential to meet timber resource planning assumptions in Forest Land Management Plans. To achieve plan assumptions regarding tree growth, then generally manzanita, snowbrush, and bear clover must be kept at 'light' densities (e.g. 20% crown closure), and other brush at medium densities (e.g. 21-40% crown closure) for two decades. Tan oak and grasses must be kept at or below medium densities for one decade.

fuelbreak
A wide strip of land, strategically placed for fighting anticipated fires, where hazardous fuels have been replaced with less burnable fuels (like grass). They divide fire-prone areas into smaller parcels for easier fire control and provide access for fire fighting. See also firebreak.

fuel model
A simulated fuel complex for which all the fuel descriptors have been specified.

fuels
Any material capable of sustaining or carrying a forest fire, usually natural material both live and dead.

fuels management
The practice of planning and executing treatment or control of any vegetative material which adversely affects meeting fire management direction based upon resource management goals and objectives.

fuel treatment
The rearrangement or disposal of fuels to reduce fire hazard or to accomplish other resource management objectives.

fuelwood
Wood cut into short lengths for burning.

future use determination
An evaluation of existing and proposed land use.

G

gabion
Large rock filled wire basket used in slope stabilization.

General Forest
A Fire Management Analysis Zone (FMAZ) generally below 8,000 feet but not including urbanized areas. Encompasses most of the continually forested areas in the basin.

goal
As used in the Forest Service, a concise statement that describes a desired condition to be achieved sometime in the future. It is normally expressed in broad, general terms, and may not have a specific date for completion.

goods and services
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 herbage or artificial pasture forage by animals.

grazing permittee
An individual who has been granted written permission (a grazing permit) to graze livestock for a specific period on a range allotment.

groundwater
Subsurface water in the part of the ground that is wholly saturated.

group selection
The cutting method in which trees are removed periodically in small groups resulting in openings that are typically less than 2 acres in size; occasional openings up to 5 acres may be permitted. Results in an all-aged stand.

guideline
An indication or outline of policy or conduct that is not a mandatory requirement (as opposed to a standard, which is mandatory).

H

H_2O
Water.

habitat
The sum of environmental conditions of a specific place that is occupied by an organism, a population, or a community.

habitat capability
An evaluation based on the resources ability to provide for wildlife habitat.

habitat, late successional stage
Timber stands in which mature and overmature trees comprise more than 80% of the conifer cover.

hard snag
A dead tree that has not started to rot.

hardwood
A conventional term for broadleaf trees.

harvest level
The quantity of timber that may be sold from the area of land covered by a forest plan for a time period specified by the plan. The quantity is usually expressed on an average annual basis.

harvest species
Species of animals or fish that are hunted or fished for human consumption.
hazard, fire
The measure of ease of ignition, fire spread potential, and fire suppression difficulty, as influenced by the type, volume, size, distribution, condition, arrangement, and location of the fuel profile.
herbicide
A substance used to inhibit or destroy plant growth.
heliport
An area used by helicopters for landing and takeoff. Generally has supporting facilities and is accessible by road or boat.
helispot
Any designated landing spot for helicopters. It is distinguished from a heliport by lack of supporting facilities.
High Elevation
A Fire Management Analysis Zone (FMAZ) generally above 8,000 feet. Encompasses the high elevation barren lands of the basin.
home range
An area in which an individual animal spends all, or most of, its time.

I

ICO's
See issues, concerns, and opportunities.
ID Team
See interdisciplinary teams.
IPM
See integrated pest management.
impervious surface coverage
Any structural improvement that results in an impervious surface that prevents infiltration of water.
indicator species
Species selected to represent fish, wildlife, or vegetation in directing and coordinating forest management and monitoring the effects of management activities.
initial attack
The prompt and preplanned response to a wildfire.
inputs
Land, labor, and capital required to produce outputs. Inputs are generally represented by activity costs.
instream flow
The volume of surface water in a stream system passing a given point at a given time.
integrated pest management
A process wherein pests, their impacts, and management become part of resource management planning and decision making.
intensive range management
All available technology for range and livestock management is considered. Management seeks to maximize livestock forage prediction consistent with the constraints of maintaining the environment and providing for multiple use.
intensive timber management
Timber management practices carried out to increase timber yield per acre.
interdisciplinary team
A group of individuals with different training that solves a problem or performs a task through frequent interaction so that disciplines can combine to provide new solutions.
Interim Plan
The current land management plan for the Lake Tahoe Basin Management Unit (1980).
intermediate harvest
Any removal of trees from a stand between the time of its formation and the regeneration cut. Most commonly used intermediate cuttings are release, thinning, improvement, and salvage.
intermittent streams
Streams which do not contain water year-round.
interpretive services
Activities and displays that interpret the natural and social history of the national forest environment for the visiting public and inform them about national forest goals, programs, and services.
Interstate Water Compact
An agreement between California and Nevada for the allocation of water in the Lake Tahoe, Truckee River, Carson River, and Walker River Basins.
intertie
A major electric transmission.
intolerance
The inability of a tree to grow satisfactorily in the shade of, and in competition with, other trees.
inventory data and information collection
The process of obtaining, storing, and using current inventory data appropriate for planning and managing a National Forest.
irretrievable commitments
Applies to losses of production or use of renewable natural resources for a period of time. For example, timber production from an area is irretrievably lost during the time an area is used for skiing. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.
irreversible commitments
Decisions causing changes which cannot be reversed. Once used, the resource cannot be reinstated, nor can opportunities be recovered. Applies to nonrenewable resources such as minerals and cultural resources.
issue
A point of discussion, debate, or dispute.
issues, concerns, and opportunities (ICO's)
see Public Issues, Management Concerns, and Opportunities.

K

K-V funds
Funds set aside from timber sale receipts to finance reforestation, wildlife habitat, and other improvements in the timber sale area.
key winter range
The portion of the yearlong range where big game find food and/or cover during severe winter weather.
Known Geothermal Resource Area
An area in which the geology, nearby discoveries, competitive interests, or other idicia would, in the opinion of the Secretary, engender a belief in people who are experienced in the subject matter that the prospects for extraction of geothermal steam or associated geothermal resources are good enough to warrant expenditures of money for that purpose.

L

LBU
Low Budget Alternative.
LTBMU
Lake Tahoe Basin Management Unit.
LTSYC
See long-term sustained yield capacity (LTSYC).

LWCF
Land and Water Conservation Fund. A fund established from off-shore oil and gas lease receipts to purchase land for recreation purposes.
land exchange
The conveyance of nonfederal land or interests to the United States in exchange for National Forest System land or interests in land.
Land and Water Conservation Act
Provides funds for and authorizes Federal assistance to the states in planning, acquisition, and development of needed land and water areas and facilities; provides funds for the Federal acquisition and development of outdoor recreation resources.
landform
A natural landscape that exists as a result of wind, water, or geologic activity; e.g., a plain plateau, basin, mountain, etc.
landline location
To locate, survey, mark, and post the boundaries of national forest lands.
landownership adjustment
The transfer of the ownership of lands by land exchange, land purchase, donations, or other methods.
land status
The ownership status of lands within the national forest boundaries.
leasable minerals
Minerals which are developed (i.e., explored, mined, extracted, etc.) by a permit or lease in contrast to minerals development through claims staking. Congress has specified the following as leasable minerals: coal, oil, gas, potassium, sodium, phosphate, oil shale, native asphalt, solid and semisolid bitumen and bituminous rock, geothermal resources; deposits of sulfur in Louisiana and New Mexico; and all minerals including hardrock on acquired land. See also locatable mineral and salable mineral.
lifestyle
The characteristic way people live, indicated by consumption patterns, work, leisure, expressed values, and other behavior.
linear programming
A mathematical method used to determine the most effective allocation of limited resources between competing demands when both the objective and the restrictions on its attainment are expressible as a system of linear equalities or inequalities (e.g., y=a+bx).
local roads
See roads.
locatable minerals
Generally refers to hardrock minerals on public domain lands which are mined and processed to recover valuable metals, such as gold and copper, chemical grade limestone, and asbestos. May include any solid, natural inorganic substance occurring in the crust of the earth except for common mineral materials and leasable minerals. Generally developed through a claims location and patent process. See also leasable mineral and salable mineral.
long-term effects
Those outcomes that 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 in perpetuity under a specified management intensity consistent with multiple use objectives.
low standard service
A level of recreation management prescribed when recreation costs are reduced in an alternative and would therefore require different management direction.

M

M
Prefix indicating one thousand.
MA
See management area.
MM
Prefix indicating one million.
MBF
Thousand board feet. A measure of lumber volume equal to 1' x 1" x 1000'.
MCF
Thousand cubic feet. A measure of wood volume.
MIR
Minimum Implementation Requirement.
MIS
See management indicator species.
MKT
Market Alternative.
MKV
Market Value benchmark.
MLV
Minimum Level benchmark.
MMBF
Million board feet. A measure of lumber volume equal to 1' x 1" x 1,000,000'.
MMCF
Million cubic feet. A measure of wood volume.
MMR
Refers to either Minimum Management Requirement.
maintenance level costs (long term)
Costs required to keep capital assets at a given level of service and availability. These are variable costs.
management area
A contiguous area of land used in planning, usually consisting of differing analysis areas, to which one or more prescriptions are applied. Management areas do not vary between alternatives; however, the prescriptions applied to them vary.
management concern
An issue or problem requiring resolution.
management direction
A statement of multiple use and other goals and objectives, the management prescriptions, and the associated standards and guidelines for attaining them.
management emphasis
Long term management direction for a specific area or type of land.
management indicator species (MIS)
A particular type of plant or animal whose presence in a certain situation or location is a fairly certain sign or symptom that particular environmental conditions are also present.
management intensity
The management practice or combination of management practices and their associated costs designed to obtain different levels of goods and services.
management practice
A specific action, measure, or treatment.
management prescription
Management practices selected and scheduled for application on a specific area to attain multiple-use benefits and other goals and objectives.
market outputs
Outputs normally exchanged in markets as evidenced by transactions: timber, range, developed recreation, minerals, and commercial utilized fish.
mass movement

Downslope movement of a portion of the land's surface, i.e., a single landslide or the gradual downhill movement of the whole mass of loose earth material on a slope face.

maximum modification
See visual quality objectives.

mean annual increment
The average yearly growth of a tree, calculated by dividing the volume of the tree by its age.

middleground (middle distance)
The space between the foreground and the background in a picture or landscape. The area located from 1/4 - 1/2 to 3-5 miles from the viewer.

mineral development
The preparation of a proven deposit for mining.

mineral entry
Filing a claim to hold or purchase public land in order to claim the rights to minerals it contains.

mineral exploration
The search for minerals on lands open to mineral entry.

mineral withdrawal
The withholding of an area of federal land from mineral entry or development in order to reserve the area for a particular public purpose or program.

minerals, common variety
Deposits which, although they may have value for use in trade or manufacture, do not possess a distinct special economic value. These minerals include sand, stone, gravel, pumicite, cinders, and pumice.

minerals, leasable
Coal, oil, gas, phosphate, sodium, potassium, oil shale, and geothermal steam.

minerals, locatable
Hard rock minerals which are mined and processed. These include certain nonmetallic minerals and uncommon varieties of mineral materials, such as valuable and distinctive deposits of limestone or silica, and any solid, natural, inorganic substance occurring in the crust of the earth, except for the common varieties of mineral materials and leasable minerals.

minimum instream flow needs
A specified level of flow through a channel that must be maintained for biological, physical, or other purposes.

mining claims
Those portions of the National Forest System land held for mining purposes in which the right of exclusive possession of locatable mineral deposits is vested in the locator of a deposit.

mitigation
Actions to avoid, minimize, reduce, eliminate, or rectify the adverse impacts of a management practice.

modification
See visual quality objectives.

monitoring and evaluation
The evaluation, on a sample basis, of forest plan management practices to determine how well objectives have been met, as well as the effects of those management practices on the land and environment.

mortality
Dead or dying trees resulting from forest fire, insects, diseases, or climatic factors.

MOU
Memorandum of understanding.

multiple use
The management of all renewable surface resources of the national forests so that they are utilized in the combination that will best meet the needs of the American people.

Municipal water supply
A water system which has at least five service connections or which regularly serves 25 individuals for 60 days.

N

NEPA
See National Environmental Policy Act.

NFMA
National Forest Management Act.

NRA
National Recreation Area.

NON
Nonwilderness Benchmark

natural opening
A break in the forest canopy; an area of essentially bare soil, grasses, forbs, or shrubs in an area dominated by trees.

National Environmental Policy Act (NEPA)
A 1970 Act of Congress which is our basic national charter for protection of the environment.

National Forest System land
National forests, national grasslands, and other related lands for which the Forest Service is assigned administrative responsibility.

National Natural Landmark
Sites or areas which possess exceptional values or qualities which illustrate or interpret the natural heritage of the nation.

National Register of Historic Places
A listing maintained by the U.S. National Park Service of areas which have been designated as historically significant. The Register includes places of local and State significance, as well as those of value to the nation in general.

National Wilderness Preservation System
All lands covered by the Wilderness Act and subsequent wilderness designations, irrespective of the department or agency having jurisdiction.

natural fuels
Fuels not directly generated or altered by management activity. This includes fuels which have accumulated because of deliberate fire exclusion.

natural regeneration
The renewal of a tree crop by natural means without human seeding or planting. The new crop is grown from self-sown seed or by vegetative means, such as root suckers.

net national forest area
All National Forest System land within the proclaimed national forest boundary.

net public benefit
The overall 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 qualitative and quantitative criteria rather than a single measure or index.

net value change (NVC)
(Also Net Resource Value Change.) The sum of the changes resulting from increases (benefits) and decreases (damages) in the value of outputs from the land area affected as the consequences of fire.

new construction
Any process or project which creates a new facility.

no action alternative
The alternative which continues current management direction.

nonaccessed
Further than 1/4 mile from a system road.

noncommodity
An intangible output normally associated with a service or opportunity provided to the public; for example, nonmotorized recreation.

nonconsumptive species

Wildlife species normally observed, studied, photographed, etc. rather than hunted or trapped (not a harvest or consumptive species).

nonconsumptive use
Use of a resource that does not reduce the supply. For example, nonconsumptive uses of water include hydroelectric power generation, boating, swimming, and fishing.

nongame
Species of animals which are not managed as a sport hunting resource.

nonmarket outputs
Forest outputs not normally exchanged in markets. In the Forest Service, the following resource outputs are classified as nonmarket outputs: dispersed recreation, wildlife and fish user days, water. Although not normally exchanged in markets, the Forest Service assigns proxy values for analysis purposes.

nonmotorized recreation
Recreational opportunities provided without the use of any motorized vehicle. Participation in these activities will be accomplished through the use of foot, ski, snowshoe, or horseback travel. Motorized vehicle equipment may be authorized for administrative purposes of resource management.

nonpoint source pollution
Pollution occurring at many diffuse locations, as opposed to pollution from a specific site, such as a factory.

nonstructural range improvements
Silvicultural practices (type conversions, noxious weed control, seeding, etc.) that are carried out to increase forage production and enhance or protect the other resources.

not capable
Lands not capable (NOTCAP) of growing at least 20 cubic feet of timber/acre/year.

O

OHV
Off-highway vehicle; refers to (1) type of vehicle description (see off-road vehicle). (2) System road or route generally impassable by normal highway vehicles.

objective
A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms a basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals. (36 CFR 219.3 NFMA Regulations.)

objective function
A term used in linear programming referring to the item to be maximized (or referring to the item to be maximized (or minimized) in the problem's solution, e.g., maximize PNV, maximize timber.

occupancy trespass
The illegal occupation or possession of national forest land or property.

off-highway vehicle (OHV)
Any motorized vehicle capable of cross-country travel on or immediately over land, water, snow, ice, or other natural terrain. Examples of off-road vehicles include motorcycles, four-wheel drive vehicles, and snowmobiles.

old growth
A stand that is past full maturity and showing signs of decadence; the last stage in forest succession. Although the tree age, size, height, or density will vary by timber type, trees are usually 21 inch or larger DBH and 150 years or older.

opening
An area of land from which timber has been harvested (generally using even-aged management). In Region 5 the maximum size of openings is 5 to 60 acres for Douglas fir and 5 to 40 acres for all other forest types. An opening is no longer considered an opening when a specified number of trees per acre within a specific forest type and site class have reached 4.5 feet in height.

opportunity
A proposal that is considered in developing alternative activities, projects, or programs where an option exist to invest profitably to improve or maintain a present condition.

opportunity cost
The value of the benefits foregone when a management alternative is chosen.

output
A good, service, or on-site use produced from forest and rangeland resources.

overstory
That portion of the trees in a forest which forms the upper or uppermost layer.

P

PAOT
See persons-at-one-time.

PL 94-579
The Federal Land Policy and Management Act.

PL 96-586
The 1980 Santini/Burton Act that provides for acquisition of unimproved building lots and other parcels of environmentally sensitive lands in the Tahoe Basin.

PNV
See present net value.

PPR
Preferred Alternative.

Pacific Crest National Scenic Trail
One component of the National Trails System Act situated on the western side of the basin.

paleontological
Refers to areas having significant remains of flora and fauna of geologic time periods before the appearance of man.

partial retention
See visual quality objectives.

particulates
Small particles suspended in the air and generally considered pollutants.

patch cutting
Clearcut harvesting of trees in small openings of eight acres or less.

peatland
Lands whose soils are peat - the partially or incompletely decomposed remains of dead plants and, to some extent, animals. Based on nutrient availability, acidity, and vegetation, Grass Lake can technically be considered a transitional or oligotrophic peatland. Many peatlands belong to this rather "catchall" category.

perennial stream
Streams that flow throughout the year and from source to mouth.

permanent range
Those areas that contain plant communities that are self-regenerating under the prevailing climate, soils, and topography and show no evidence of replacement by other communities.

persons-at-one-time (PAOT)
A term used to measure recreation capacity which means the number of people that can use a facility or area at one time.

planned ignitions
A fire started by a deliberate management action

planning area
The area of the National Forest System covered by a regional or forest plan.

planning criteria
Standards, terms, tests, rules and guidelines by which the land and resource management 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. In Region 5 the planning horizon is 160 years.
planning period
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 documents data collections, analysis, inter-disciplinary team decisions, and activities that result from the process of developing a forest plan, revision, or significant amendment.
plant association
See plant community.
plant community
Any aggregation of plants that are similar in species composition and structure and occupy similar habitats.
plantation
A stand of trees resulting from planting or artificially seeding an area.
poletimber trees
Live trees of commercial species at least five inches in diameter at breast height but smaller than sawtimber, and of good form and vigor.
policy
A guiding principle upon which is based a specific decision or set of decisions.
potential timber yield
The harvest needed to achieve the optimum sustained-yield level under intensive forestry on regulated areas. The productivity of the land, conventional logging technology, standard cultural treatments, and interrelationship with other resource uses and the environment are considered.
practice
See management practice.
precommercial thinning
See thinning.
preferred alternative
The alternative recommended for implementation as the forest plan.
prescribed fire
Intentional use of fire under predetermined weather and fuel conditions to achieve specific objectives; e.g., dispose of slash, control unwanted vegetation.
prescription (RX)
The set of management practices applied to a specific area to attain specific objectives. Region 5 distinguishes between FORPLAN RX's and management RX's. FORPLAN RX's are sets of "pure" activities without spatial allocation and standards and guidelines. Management RX's are written as a result of allocating FORPLAN solutions to management areas and imposing standards and guidelines. See also management areas.
present net value (PNV)
The difference between the value of discounted benefits derived from all outputs to which monetary values or established market prices are assigned, and the total discounted costs of managing the planning area.
present value
The value which results when benefits or costs expected to occur in the future are discounted. See also discounting.
preservation
See visual quality objectives.
presuppression
The planning and preparatory work done before a fire occurs to ensure effective fire suppression action. Includes: (1) recruiting and training fire forces, (2) planning and organizing attack methods, (3) procuring and maintaining fire equipment, and (4) maintaining structural improvements necessary for the fire program.
programmed sale offerings
The volume of timber planned for sale including the allowable sale quantity and any additional material planned for sale.
protection boundary area
National Forest System land, adjacent and intermingled private land, and other public land under the Forest Service fire protection umbrella because their protection is necessary to protect National Forest System resources.
public issue
A subject or question of widespread public interest relating to management of the National Forest System. (36 CFR 219.23 NFMA Regulations)
public net benefit
The overall 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 benefit is measured by both quantitative and qualitative criteria rather than a single measure or index.

R

R-5
The Pacific Southwest Region of the U.S. Forest Service.
RARE II
See Roadless Area Review and Evaluation II.
RGN
Maximum Range benchmark.
RIM
See Recreation Information Management.
RNA
See Research Natural Area.
ROS
See Recreation Opportunity Spectrum.
RPA
Refers to the Resource Planning Act or the Resource Planning Alternative.
RPG
Constrained RPA Alternative.
RVD
See Recreation Visitor Day.
RX
See prescription.
range
primary - includes areas which are readily accessible, have available water and will be fully used before livestock significantly graze other areas.
secondary - areas less preferred by livestock which will ordinarily not be grazed significantly until the primary range has been fully used.
suitable - land that is or can be made accessible to livestock, that produces forage or has inherent forage producing capabilities, and that can be grazed on a sustained yield basis under given management goals.
transitory - land temporarily suitable for grazing; but transient over time and/or location. For example, grass may cover an area for a period before being replaced by growth not suitable for forage.
unsuitable - area that should not be grazed by livestock because of unstable soils, steep topography, or inherent low potential for forage production.
range allotment (allotment)
An area designated for grazing a prescribed number and kind of livestock.

range carrying capacity
optimum stocking under a grazing system without inducing damage to vegetation or related resources.
range condition
The state of the plant community on a range site in relation to the potential natural plant community for that site. It is usually rated in the general categories of Poor, Fair, Good, or Excellent.
range permittee
See grazing permittee.
range trend
Range trend is change in ecological range condition. It is measured by upward, static, and downward trend in range condition.
raptor
Bird of prey. Examples include hawks, owls, falcons, and eagles.
rare species
One that, although not presently threatened with extinction, is in such small numbers throughout its range that it may be endangered if its environment worsens.
rate-of-return
Rate of interest at which the net discounted benefits equal the net discounted costs. (Internal rate-of-return is a similar measure appropriate to private firms.)
rate of spread
Indicates the rate of wildfire spread.
real dollar value
A monetary value which compensates for inflation.
receipt shares
A percentage if revenue collected by national forests which is given to state and county governments where the forest is located for use on county roads and schools.
reconstruction
Any modification, improvement, or renovation of an existing facility.
recovery species
Federally listed threatened or endangered wildlife and fish species for which an objective has been set to raise the population to a viable level.
Recreation Information Management (RIM)
The Forest Service system for recording recreation facility condition and use.
Recreation Opportunity Spectrum (ROS)
A means of classifying and managing recreation opportunities based on physical setting, social setting, and managerial setting. The six different ROS classes briefly described are:
1. Primitive - An area three miles or more from roads and trails with motorized use; generally 5,000 acres or more in an essentially unmodified natural environment.
2. Semi-Primitive Non-Motorized - An area 1/2 mile from roads and trails with motorized use; generally 2,500 to 5,000 acres with only subtle modifications to an otherwise natural setting.
3. Semi-Primitive Motorized - Same as Semi-Primitive Non-Motorized but with motorized use of roads and trails, including OHV touring, snowmobile, hiking, cross-country skiing, etc.
4. Roaded Natural - An area 1/2 mile or less from roads; resource modifications range from evident to strongly dominant.
5. Rural - The setting is substantially modified with structures or other cultural modifications.
6. Urban - The setting is strongly dominated by structures, highways and streets.

Recreation Visitor Day (RVD)
Twelve (12) hours of recreation use in any combination of persons and hours, i.e., one person for 12 hours, three persons for 4 hours, etc.
reforestation
Reestablishing a crop of trees on forest land by natural or artificial methods.
regeneration
A crop of young trees on forest land which began growing as a result of natural or artificial reforestation methods.
regeneration cutting
Refers to logging stands to allow new crops of trees to be established; usually applied to forest which need to be renewed because of poor stocking, health, thrift, quality, or composition.
Regional Plan
See TRPA Regional Plan. (Also refers to the plan for the Pacific Southwest Region of the Forest Service.)
regulated harvest
Timber harvested from land managed for timber production on a regulated basis.
regulated timberland
Land which is capable and is managed to produce regular periodic yields of commercial timber in perpetuity. Ideally, a regulated forest would consist of equal areas in each age class so that the oldest could be cut annually to produce a sustained yield.
release and weeding
Freeing a tree or group of trees from immediate competition by eliminating growth that is overtopping or closely surrounding them.
Research Natural Area (RNA)
An area established specifically to preserve a representative sample of an ecological community; primarily for scientific and educational purposes.
resistance to control
Indicates the relative difficulty of wildfire containment.
resource element
A major category of activity required to accomplish the Forest Service 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. (36 CFR 218.3 NFMA Regulations.)
restoration
Work necessary to restore a facility to the original construction standard or to repair to an acceptable condition any damage resulting from natural causes which exceeds that normally occurring for the area and not anticipated or provided for in the annual maintenance plan.
retention
See visual quality objectives.
retrofit
The installation of a later control device to replace parts of an existing facility with newer, improved components.
revegetation
The reestablishment and development of a cover crop.
right-of-way
An accurately located land area within which a user may conduct operations approved or granted by the landowner. May also refer to a permit, easement, lease, license, or Memorandum of Understanding (MOU) used to authorize the land use.
right-of-way acquisition
Acquiring rights-of-way for Forest Service use of lands owned by others.
right-of-way grant
Rights-of-way granted to others to use national forest land in the manner specified.
riparian area
Land situated along the bank of a stream or other body of water and directly influenced by the presence of water, e.g., streamsides, lake shores, etc.
rip rapped
Refers to the installation of rock or cobble for soil stabilization.

roadless area
As defined by the Roadless Area Review, an area of undeveloped Federal land within which there are no improved roads or roads maintained for use by motorized vehicles; generally 5,000 acres or larger unless adjacent to an existing Wilderness.

Roadless Area Review and Evaluation (RARE) II
The assessment of "primitive" areas within the national forests as potential wilderness areas as required by the National Wilderness Act. This refers to the second such assessment which was documented in the final environmental impact statement of the Roadless Area Review and Evaluation, January 1979.

Road Maintenance Level 1
This level is basic custodial care as required to protect the road investment and to see that damage to adjacent land and resources is held to a minimum. Level 1 maintenance often requires an annual inspection to determine what work, if any, is needed to keep drainage functional and the road stable. This level is the normal prescription for the roads that are not opened for traffic. Level 1 is to maintain drainage facilities and runoff patterns.

Road Maintenance Level 2
This level is used on roads where management requires that the road be open for limited passage of traffic. Traffic is normally minor, usually consisting of one or a combination of the following:Administrative use, permitted use, or specialized traffic.

Road Maintenance Level 3
This level is used on roads which are open for public traffic and generally applies when use does not exceed 15 ADT. ADT should be used as a guide in determining the Maintenance Level and not as a sole criteria. A road may receive only one or two vehicles a day most of the year; however, during a brief period, i.e. hunting season, the road may receive 20 to 30 vehicles a day. Total traffic types and planned land use are important criteria for selecting Maintenance Level. The road is maintained for safe and moderately convenient travel suitable for passenger cars.

Road Maintenance Level 4
This level generally applies when use of a road is between 15 ADT and 100 ADT (see comment concerning ADT under Level 3). At this level, more consideration is given to the comfort of the user. These roads are frequently surfaced with aggregate materials but some routes may be paved to meet economical consideration of the limited aggregate resource and the surface replacement cost factors.

Road Maintenance Level 5
This level is generally maintained for use of 100 ADT and greater (see comment concerning ADT under Level 3). Roads in this category include both paved and aggregate surfaces. Safety and comfort are important considerations. Abrupt changes in maintenance will be posted to warn the traveler until these deficiencies are corrected.

roads
A general term denoting a way for purposes of travel by vehicles greater than 40 inches in width. Roads are functionally classified as:
1. arterial roads - Typically two-lane, surfaced roads serving large land areas and usually connecting with public highways.
2. collector roads - Single-lane or double-lane roads which are typically surfaced and serve smaller land areas. They usually form a link between arterial and local roads.
3. local roads - Typically native surface, single-lane roads accessing a single resource terminal facility such as a log landing, a campground, a trailhead, or ski facility.
4. 4X4 roads - A type of local road designed and maintained for use by high clearance and/or four wheel drive vehicles and by other off highway vehicles. Not normally recommended for use by or passable by standard highway vehicles such as passenger cars.

rotation
The length of time between the formation or regeneration of a tree stand and its final cutting.

S

SAOT
Skiers-at-one-time.

SEZ
Stream environment zone. Land area influenced by a water course including the stream, the area of riparian vegetation, the flood plan, and areas of high ground water.

SIA
See Special Interest Area.

SMUD
Sacramento Metropolitan Utility District.

SOFAR
South Fork American River Project.

SPM
Semi-primitive motorized; see Recreation Opportunity Spectrum.

SPNM
Semi-primitive nonmotorized; see Recreation Opportunity Spectrum.

salable minerals
Minerals occurring in high volume, low-unit-value deposits which don't have a distinct or special economic value over similar materials and are therefore usually sold rather than leased or claim staked. Examples are sand, gravel, stone, and clay.

sale schedule
The quantity of timber planned for sale, by time period, from an area of suitable land covered by a forest plan.

salvage
Dead or deteriorating trees often cut before their timber becomes worthless.

sanitation cutting
The removal of dead, diseased, insect, infested, damaged, or otherwise low vigor trees.

Santini/Burton Act
See PL-96-586.

saw log
A log meeting minimum standards of diameter, length, and defect. For softwoods, they are at least eight feet long, sound and straight, and with a minimum diameter inside bark of six inches.

sawtimber
Trees that will yield logs suitable in size and quality for producing lumber.

scheduling (scheduled outputs)
Timing, cost, and location of outputs whose level (yields) depend on both the chosen prescription and the timing of its application.

scoping process
Process used to identify issues and concerns which are within Forest Service authority to resolve. See also Appendix A.

sedimentation
The transporting and disposition of detached soil and rock material by concentrated flows of water.

Selected Alternative
FEIS Alternative A which was chosen by the Regional Forester to be the forest plan. The Selected Alternative was based on the Preferred Alternative from the DEIS.

selection cutting
See group selection and single tree selection.

sensitive species
Species which have appeared in the Federal Register as proposed additions to the endangered or threatened species list; those which are on an official State list or are recognized by the Regional Forester to need special management in order to prevent them from becoming endangered or threatened.

sensitivity level
A particular degree or measure of viewer interest in the scenic qualities of the landscape.

seral
A biological community which is a developmental, transitory stage in an ecologic succession.

Sikes Act
(Public Law 93-452) Authorized joint development of cooperative programs for fish and wildlife by the State and Federal agencies on Federal lands.
silvicultural prescription
An planned sequence of treatments involving the theory and practice of controlling the establishment, composition, and growth of forest.
silviculture system
The entire process by which forest stands are tended, harvested, and replaced. It includes all cultural practices performed during the life of the stand such as regeneration cutting, fertilization, thinning, improvement cutting, and use of genetically improved sources of tree seeds and seedlings to obtain multiple resource benefits. Silvicultural systems are classified as even or uneven-aged.
single tree selection cutting
The cutting method in which individual trees are removed to provide a stand with trees of different sizes and age classes on the same site. This method results in an uneven-aged stand.
site index
A numerical evaluation of the quality of land for plant productivity, especially used in forest land where it is determined by the rate of growth in height on one or more of the tree species.
site preparation
The preparation of an area for regeneration. It involves the removal of slash and/or competing vegetation and usually the exposure of bare mineral soil.
size class
For purposes of forest planning, size class refers to the three intervals of tree stem diameter used for classification.

1. seedling/sapling - less than five-inch diameter.
2. pole timber - five to eight-inch diameter.
3. sawtimber - greater than eight-inch diameter.

skiers-at-one-time(SAOT)
A term used to measure recreation capacity which means the number of skiers that can use a facility or area at one time.
slash
The residue left on the ground after timber cutting, or after storms, fire, etc. It includes unused logs, uprooted stumps, broken stems, branches, twigs, leaves, bark, and chips.
snag
A standing dead tree from which the leaves and most of the branches have fallen.
social category
People with a common social characteristic such as age, nationality, occupation, hobby, interest, or educational level.
social group
People who cooperate to pursue common interests and/or attain mutual goals.
social impact
Changes in social or cultural conditions that directly or indirectly result from a Forest Service program, project, or activity.
social impact analysis
The social component of the environmental analysis process; a systematic effort to determine how present programs or proposed actions affect the human environment.
social organization
The structure of a society described in terms of roles, relationships, norms, institutions, and/or community cohesiveness and stability.
social value
A shared standard of preference or desirability, as wealth, beauty, good health, honesty, or privacy.
social variable
A social or cultural element such as population size, employment, opinion on an issue, crime rates, satisfaction with community life or recreation-use patterns, that can be evaluated at different times or places to show the effects of a Forest Service action.
soft snag
A standing dead tree from which the leaves and most of the branches have fallen and which has started to rot internally.
soil horizons
Layers of the soil each of which has comparatively uniform characteristics different from adjacent layers.
soil productivity
The natural capacity of a soil to produce a specified plant or sequence of plants under a specified system of management.
soil resource inventory
The systematic examination, description, classification and mapping of soil.
Special Interest Area (SIA)
Areas established and managed for their unique special feature. They include geological, historical, archaeological, botanical, and other memorable features.
special-use permit
A permit authorizing the occupancy and use of National Forest land in the manner specified.
stand
A community of trees or other vegetation which is sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities and to thus form a management entity.
standard
A principle requiring a specific level of attainment, a rule to measure against.
standard of road
The standard of a forest development road is described in terms of average daily traffic, user safety, short or long term facility, width, design speed, the road geometrics, and the type of payment structure.
standard service
Management of recreation facilities which provides for vegetation management, full maintenance of facilities, appropriate toilet cleaning and garbage pick up, and information and interpretive services for the recreation user.
stocking level
The degree to which land is occupied by trees, (measured by basal area and/or number of trees by size and spacing), compared with a stocking standard which establishes the stocking required to utilize fully the growth potential of the land.
strategic/critical minerals
Minerals that are necessary for industry and national defense and have been identified by Congress for stockpiling.
stream class
A classification given to drainages or stream channels based on stream size, season, amount of flow, importance as a fishery or water source, and other characteristics. They range from Class I (largest, most important) to Class IV (small, often intermittent).
structural range improvements
Range improvements constructed and maintained (fences, water developments, etc.) to facilitate the management of the range resource.
STPUD
South Tahoe Public Utility District.
succession
The gradual supplanting of one plant community by another as the site changes over time until the climax community is reached.
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. (36 CFR 219.3 NFMA Regulations).

suppression
Actions taken to extinguish or confine a fire.

sustained yield
See long-term sustained yield.

system road
Any classified Forest Service road that is managed and inventoried in the Transportation Information System.

system trail
Any classified Forest Service trail that is inventoried in the Transportation Information System. System trails are managed for a variety of administrative and recreational uses according to the Trails Management Handbook.

T

TBR
Maximum Timber benchmark.

T & E
Threatened and endangered species. See separate listings.

TRPA
Tahoe Regional Planning Agency - an agency established by California and Nevada, ratified by the Congress in PL 96-551, to plan for and regulate activities in the Lake Tahoe Basin.

TRPA Regional Plan
Refers to the Regional Plan of the Tahoe Regional Planning Agency.

TRPA threshold
See threshold.

Tahoe Rim Trail
LTBMU Forest Service proposed trail generally situated on the watershed divide of the Basin. Most of the planning and construction is being done by volunteers.

target
A statement used to express planned results to be reached within a stated time period.

temporary grazing permit
A written authorization issued for a period not to exceed one year to graze a specific number, kind, and class of livestock for a specified time on the National Forest System or other land administered by the Forest Service.

tentatively suitable lands
Tentatively suitable lands are defined as those:
1. presently forested, currently producing, or capable of producing, crops of industrial wood.
2. not withdrawn from timber production by Congress, the Secretary of Agriculture, or the Chief of the Forest Service.
3. for which technology and knowledge exist and are available to ensure timber production without irreversible damage to soil productivity or watershed conditions.
4. where there is reasonable assurance that adequate restocking can be attained within five years after final harvest.
5. where adequate information is available to project responses to timber management activities.

territory
An area within a habitat that is occupied by an individual or group and is defended against other individuals or groups of the same species.

threshold
An environmental standard necessary to maintain a significant scenic, recreational, scientific, or natural value of the region or to maintain public health and safety within the region.

thinning
Cutting timber to improve the quality and growth of the trees that remain. In commercial thinning, merchantable timber, i.e., timber of salable quality, is cut. In precommercial thinning, nonmerchantable trees are cut.

threatened species
Any species which is likely to become an endangered species within the foreseeable future and which has been designated in the Federal Register as a threatened species.

tiering
Refers to the practice of covering general matters in broader environmental impact statements which are subsequently incorporated by reference into narrower environmental impact statements or environmental analyses, allowing them to concentrate solely on the issues relevant to a specific project.

timber harvest schedule
The quantity of timber planned for sale and harvest, by time period, from the area of land covered by the forest plan.

Timber Stand Improvement (TSI)
The use of noncommercial thinning, cleaning, weeding, and intermediate cuttings to eliminate or suppress less desirable vegetation and improve composition, condition, structure, or growth of a stand.

timber strata
Timber designation representing more than one timber stand as shown on timber type maps.

tolerance
The ability of a tree to grow satisfactorily in the shade of, and in competition with, other trees.

tradeoff
The impact on an output or cost caused by changing another output or cost.

trail
A general term denoting a way for purposes of travel by foot, stock, or trail vehicle having a width less than 40 inches.

transitory range
Land that is suitable for grazing use of a nonenduring nature over a period of time. For example, on particular disturbed lands, grass may cover the area for a period of time before being replaced by trees or shrubs not suitable for forage.

true fir
Any conifer of the genus Abies.

type conversion
The conversion of one type of vegetation cover to another, e.g., forested to nonforested; one tree species to another.

U

USGS
United States Geological Survey.

unavailable
Lands not available for timber regulation since they have been withdrawn by the Chief or higher authority.

underburning
Broadcast burning under a canopy of timber. (Normally at moderate to low fire intensity lands, flame heights and vegetation scorch designed to be within acceptable resource management limits).

understory
Low-growing vegetation (herbaceous, brush or reproduction) growing under a stand of trees. Also, that portion of trees in a forest stand below the overstory.

uneven-aged management
Management of forest stands which results in trees of several or many ages growing together. Cutting methods producing uneven-aged stands are single-tree selection and group selection.

unplanned ignition

A fire started at random by either natural or human causes, or a deliberate incendiary fire.

unregulated harvest
This is timber harvest not charged against the allowable sale quantity, and includes dead material and noncommercial species and products. It also includes all volume removed from nonsuitable areas.

Urban Interface
A Fire Management Analysis Zone (FMAZ) including or adjacent to urbanized areas in the basin. Also, the area of land for which management is influenced by its proximity to a community.

utilization
The removal of slash, submerchantable trees, and previously existing dead and down material for fire hazard reduction and site preparation.

utilization standards
The minimum size of tree that may be cut as sawtimber or roundwood.

utilized top
The top diameter inside the bark, projected to be in the merchantable bole of the tree.

V

VIS
Visitor Information Service.

VMT
Vehicle miles traveled.

VQO
See visual quality objective.

VQI
See visual quality index.

variety class
A classification system with three visual landscape categories:
1. Distinctive (Variety Class A) -- Unusual and/or outstanding landscape variety that stands out from the common features in the landscape.
2. Common (Variety Class B) -- Prevalent, usual, or widespread landscape variety; also refers to ordinary or undistinguished visual variety.
3. Minimal (Variety Class C) -- Little or no visual variety in the landscape; monotonous or below average compared to the common features in the landscape.

vertical diversity
The distribution and abundance of different plant and animal communities from the ground level up.

viable populations
Populations of reproductive plants or animals of sufficient numbers and distribution to assure perpetuation of the species in perpetuity.

Visual Absorption Capability (VAC)
The ability of the landscape to withstand management manipulation without significantly affecting its visual character. Rated as high, moderate, and low.

visual condition level
A measure of the degree of human-caused alteration of a landscape from its natural condition. The amount of alteration defined by each level is as follows:

I - Pristine, no trace of human activities; only alteration from natural ecological processes.
II - Evidence of management activities is not detectable by the average viewer.
III- Effects on the landscape of management activities are visible but remain visually subordinate to the characteristic landscape.
IV - Landscape alterations caused by management activities visually dominate the characteristic landscape but vegetative and land form alterations must borrow visual characteristics that naturally occur within the surrounding area.
V - Effect of human activities visually dominate the natural landscape, but the visual characteristics of the alteration must appear to be of natural occurrence only when viewed in the background. When seen in the foreground or middleground, they may not appear at all natural.
VI - Landscape alterations totally dominate the natural landscape and appear unnatural when viewed at any distance and in stark contrast to surrounding natural features.

visual quality index
A numerical rating of scenic quality that reflects both the condition of the landscape and the acreage of land in each of the six condition levels ranging from Type I which appears to be untouched by human activities to Type VI where changes in the landscape appear to be drastic disturbances and are in glaring contrast to the natural appearance.

visual quality objective (VQO)
A set of measurable maximum levels of future alteration of a characteristic landscape. The levels are:

1. Preservation -- Ecological change only here.
2. Retention -- Human activities are not evident to the casual forest visitor.
3. Partial Retention -- Human activity may be evident but must remain subordinate to the characteristic landscape.
4. Modification -- Human activity may dominate the characteristic landscape but must, at the same time, follow naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.
5. Maximum Modification -- Human activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.
6. Enhancement -- A short term management alternative which is done with the express purpose of increasing positive visual variety where little variety now exists.

visual quality objective, initial
A visual quality objective developed from an inventory which followed the standard Forest Service procedures outlined by Agricultural Handbook 462 and Regional FSM 2380 supplements. It sets a goal for how the landscape should look based on predictions of the amount of landscape alteration that would be generally acceptable to the public. It is developed without consideration of other competing resource values.

The initial VQO is derived by combining indexes quantifying the public's concern for scenic quality (sensitivity level); the diversity of natural features (variety class); and distance zones (foreground, middleground and background).

Initial VQO is not current landscape management direction. FSM 2300, Supplement 147 specifies that they will be used as management guidelines prior to approval of a forest plan, wherever landscape management is not cover by existing unit plans.

visual variety class
A measure of the inherent potential of the landscape for scenic value, based on the premise that greater diversity in landscape features increases the natural scenic quality. The three variety classes are:

-- Class A (distinctive) - Areas with landforms, water features, vegetative patterns or rock formations that create a landscape of unusual and outstanding visual quality.
-- Class B (common) - Areas with landscape features that provide an average amount of variety and create a landscape that is common to the area.
-- Class C (minimal) - Areas with little change in their landscape features and thus with little scenic quality.

W

WFHR
See Wildlife and Fish Habitat Relationships.

WFUD
See Wildlife and Fish User Day.
WHR
See Wildlife Habitat Relationship.
WIN
Watershed Improvement Needs - a Forest Service inventory of watershed improvement needs.
WLN
Wilderness benchmark.
water bar
Any structure used to divert or control runoff and erosion.
water rights
The legal right to use water.
watershed
The entire area that contributes water to a drainage system or stream.
watershed association
A grouping of watersheds.
Water Quality Plan 208
A federal Act, PL 92-500 providing for a planning process dealing with water quality protection. The State of California and the TRPA both have developed "208" plans; to date the State of Nevada has not.
water yield
The total amount of water coming from an area of land, commonly a watershed, over a given period of time.
Western Utility Group
A group of regional utility companies for the purpose of identifying mutual needs and coordination.
wetlands
An area at least periodically wet or flooded, where water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface, e.g., bogs and marshes.
wilderness
Briefly, under the Wilderness Act of 1964, wilderness:
- is undeveloped Federal land without permanent improvements or human habitation; is protected and managed so as to preserve its natural conditions;
- has outstanding opportunities for solitude or primitive recreation;
- has at least 5,000 acres or is of sufficient size to make practical its conditions; and may contain features of scientific, educational, scenic, or historical value, as well as ecologic and geologic interest.

wildfire
An unplanned fire requiring suppression action.
Wildlife and Fish Habitat Relationships (WFHR)
A system for organizing information about wildlife and fish species, their habitats, and relationships between them which is used in land and resource management planning to set standards and guidelines, evaluate species and habitat diversity, identify special habitat needs, etc.
wildlife and fish user day (WFUD)
Eight hours of recreation use oriented to wildlife and fish.
wildlife habitat diversity
The distribution and abundance of different plant and animal communities and species within a specific area.
Wildlife Habitat Relationship
A multiagency program developed to provide land managers with qualitative and quantitative information regarding the responses of wildlife species to land management activities.
window
A critical segment of terrain through which rights-of-way could pass in traversing from points of origin to destination.
withdrawal
Withholding an area of Federal land from settlement, sale, location, or entry allowed under the general land laws to reserve the area for a particular purpose or program.

Y

yield table
A tabular statement of timber volumes expected to be produced under a specified set of conditions.

(End of Glossary)

BIBLIOGRAPHY

The material listed in this section can be obtained either at or through the public libraries in the Lake Tahoe area or by writing directly to the publisher. Specific locations for some materials are listed below.

Location Codes

LTBMU - Information may be obtained at the Lake Tahoe Basin Management Unit office. Box 731002, South Lake Tahoe, CA 95731-7302.

TRPA - Information may be obtained at the Tahoe Regional Planning Agency, Box 1038, Zephyr Cove, NV 89448.

PSW - Information may be obtained at the Pacific Southwest Regional Office, 630 Sansome St., San Francisco, CA 94111.

SWRCB - Information may be obtained at the State of California Water Resources Control Board office, 901 "P" Street, Box 2000, Sacramento, CA 95810.

Forest Service Manuals (FSM) and Forest Service Handbooks (FSH) are on file in Washington, D.C. at the Office of the Chief of the Forest Service, at the Pacific Southwest Forest and Range Experiment Station (PSW), and at the Forest Supervisor's Office, (LTBMU) South Lake Tahoe, Ca.

1) Bailey, Robert G.
1974. Land Capability Classification of the Lake Tahoe Basin, California-Nevada, A Guide for Planning. 32 pp. plus map. USDA Forest Service in cooperation with the Tahoe Regional Planning Agency, TRPA.

2) California Native Plant Society
1974. Inventory of Rare and Endangered Vascular Plants of California. Special California Native Plant Society Publication #1. 56 pp. California Native Plant Society, Berkeley, CA.

3) California-Nevada Interstate Compact Commission
1971. California-Nevada Interstate Compact Concerning Waters of Lake Tahoe, Truckee River, Carson River and Walker River Basins. 40 pp. SWRCB.

4) Colorado State University
1982. Proceedings of the Western Snow Conference, April 19-23, Reno, Nevada. Water Yield Improvement in the Sierra Nevada Snow Zone: 1912-1982. Proceedings available from Robert T. Davis, Rm 360, U.S. Courthouse, Spokane, WA 99201.

5) Cooper, Clark and Associates
1974. Natural Hazards of the Lake Tahoe Basin, California-Nevada. For the Tahoe Regional Planning Agency. Includes accompanying maps. TRPA.

6) Dornbusch, David M. & Co., Inc.
1978. A Study of the Impacts of the Alternative Land Use Plans for the Lake Tahoe Basin. Prepared for the Tahoe Regional Planning Agency and U.S. Forest Service. TRPA, LTBMU.

7) Dornbusch, David M. & Co., Inc.
1977. Five Special Reports of the Forest Service, Lake Tahoe Basin Management Unit, LTBMU. Includes the following reports:
A System for Assessing the Social and Economic Effects of Campground and Winter Sports Development In the Lake Tahoe Basin. 11 pp.
Characteristics of Summer Home Use in the Lake Tahoe Basin. 7 pp.
Impact of Wilderness Use. 12 pp.
Mechanisms for Preserving Open Space at Lake Tahoe - A Summary. 13 pp.
Classification of Environmental Factors. 18 pp.

8) Downs, James F.
1963. "Differential Response to White Contact: Paiute and Washo" in Warren L. D'Azevedo (Ed) The Washo Indians of California and Nevada. Anthropological Papers, No. 67. University of Utah, Salt Lake City, UT.

9) Elston, Robert et al.
1977. The Archeology of the Tahoe Reach of the Truckee River. 171 pp. University of Nevada, Reno.

10) Haynes, Richard W., Kent P. Connaughton, and Darius M. Adams
1980. Stumpage Price Projections for Selected Western Species, USDA Forest Service Research Note PNW-367, November 1980. LTBMU.

11) Highway Research Board
1965. Special Report 87: Highway Capacity Manual. National Academy of Sciences - National Research Council, Washington, D.C.

12) Holt, Rinehart and Winston
1966. The Two Worlds of the Washo. San Francisco, CA.

13) Hurley, Janey F. et al.
1981. Wildlife Habitat Capability Models and Habitat Quality Criteria for the Western Sierra Nevada. Stanislaus National Forest. LTBMU.

14) Johnson, K. Norman, Daniel B. Jones, Brian M. Kent
1980. Forest Planning Model (FORPLAN) User's Guide and Operations Manual. USDA Forest Service. LTBMU, PSW.

15) Leonard, Robert L.
1977. Prescribed Burning in Ward Valley: Water Quality Impacts. 8 pp. final report of a cooperative study between USDA Forest Service, Lake Tahoe Basin Management Unit and the Tahoe Research Group, University of California, Davis.

16) Osaki, S.K.
1980. Wildlife Habitat Relationships. Lake Tahoe Basin Management Unit, USDA Forest Service.

17) Nevada State Park System
1977. Recreation in Nevada, Statewide Comprehensive Outdoor Recreation Plan. Carson City, Nevada.

18) Park and Recreation Information System (PARIS)
1966. Supply-Demand Analysis for California Outdoor Recreation Facilities. State of California, Department of Parks and Recreation.

19) Public Law 91-148
1969. An Act to grant the consent of the Congress to the Tahoe Regional Planning Compact, to authorize the Secretary of the Interior and others to cooperate with the planning agency thereby created, and for other purposes. TRPA, LTBMU.

20) Public Law 91-425
1970. An Act to authorize the Secretary of Interior to study the feasibility and desirability of a national lakeshore on Lake Tahoe in the States of Nevada and California, and for other purposes. 91st Congress S.2208, September 26, 1970. LTBMU.

21) Public Law 96-586
1980. An Act to provide for the orderly disposal of certain Federal lands in Nevada and for the acquisition of certain lands in the Lake Tahoe Basin, and for other purposes. (Santini/Burton Act). 94. STAT. 3381. LTBMU.

22) Row, Clark H., Fred Kaiser, and John Sessions
1981. "Discount Rate for Long-Term Forest Service Investments", in Journal of Forestry, June 1981. LTBMU.

23) Schmidt, Andrew
1979. The Role of the Forest Service and Other Federal Agencies in the Lake Tahoe Region. USDA Forest Service. Pacific Southwest Region. PSW, LTBMU.

24) Scotch, Norman A. and Freda L.
1963. "Social Factors in Hypertension Among the Washo" in Warren L. d'Azevedo (Ed), The Washo Indians of California and Nevada. Anthropological Papers, No. 67, University of Utah, Salt Lake City, UT.

25) Scott, Edward B.
1973. The Saga of Lake Tahoe, 2 Vols. Sierra-Tahoe Publishing Co., Crystal Bay, Lake Tahoe (Nevada) and Carmel, CA.

26) Seidelman, Paul J.
1981. Methodology for Evaluating Cumulative Watershed Impacts. USDA Forest Service Regional Office. PSW, LTBMU.

27) Smithsonian Institution
1974. Report on Endangered and Threatened Plant Species of the United States. 200 pp. Smithsonian Institution, Washington, D.C.

28) Stanford Research Institute
1971. Transportation Planning Alternatives in the Tahoe Basin. 117 pp. plus appendices. Stanford Research Institute, Menlo Park, CA.

29) State of California - Water Resources Control Board
1975. Water Quality Control Plan Report - North Lahontan Basin. SWRCB.

30) State of California - Water Resources Control Board
1979. Report on Water Use and Water Rights for the Lake Tahoe Basin. 203 pp. and appendices. SWRCB.

31) State of California - Water Resources Control Board
1980. Final (208) Water Quality Plan: Lake Tahoe Basin.

32) State of California - Water Resources Control Board
1984. Policy For Water Allocation in the Lake Tahoe Basin; Draft EIR. SWRCB.

33) Tahoe Regional Planning Agency
1987. Regional Plan for the Lake Tahoe Basin, Goals and Policies, Ordinances, Planning Area Statements, and Associated Environmental Documents. TRPA.

34) Tahoe Regional Planning Agency
1982. Lake Tahoe Basin Non-Attainment Air Quality Plan. TRPA.

35) Tahoe Regional Planning Agency
1978. Lake Tahoe Basin Water Quality Management Plan, 3 Vols. TRPA.

36) Tahoe Regional Planning Agency
1982. Resolution No. 82-11, Resolution of the Governing Body of the Tahoe Regional Planning Agency Adopting Environmental Threshold Carrying Capacities for the Lake Tahoe Region. August 26, 1982. TRPA.

37) Tahoe Regional Planning Agency
1983. Environmental Impact Statement for Adoption of a Regional Plan for the Lake Tahoe Basin. TRPA.

38) Tahoe Regional Planning Agency and USDA Forest Service
1971. Climate and Air Quality of the Lake Tahoe Region - A Guide to Planning. 31 pp. Technical Committee Report. TRPA, LTBMU.

39) Tahoe Regional Planning Agency and USDA Forest Service
1971. Cultural and Historical Significance of the Lake Tahoe Region - A Guide to Planning. 28 pp. plus maps. Technical Committee Report. TRPA, LTBMU.

40) Tahoe Regional Planning Agency and USDA Forest Service
1971. Fisheries of Lake Tahoe and Its Tributary Waters - a Guide to Planning. 44 pp. plus map. Technical Committee Report. TRPA, LTBMU.

41) Tahoe Regional Planning Agency and USDA Forest Service
1971. Geology and Geomorphology of the Lake Tahoe Region - A Guide to Planning. 59 pp. plus map. Technical Committee Report. TRPA, LTBMU.

42) Tahoe Regional Planning Agency and USDA Forest Service
1971. Hydrology and Water Resources - A Guide to Planning. 22 pp. Technical Committee Report. TRPA, LTBMU.

43) Tahoe Regional Planning Agency and USDA Forest Service
1971. Land Resources of the Lake Tahoe Region - A Guide to Planning. 38 pp. plus maps. Technical Committee Report. TRPA, LTBMU.

44) Tahoe Regional Planning Agency and USDA Forest Service
1971. Limnology and Water Quality of the Lake Tahoe Region - A Guide to Planning. 13 pp. plus map. Technical Committee Report. TRPA, LTBMU.

45) Tahoe Regional Planning Agency and USDA Forest Service
1971. Recreation Resources of the Lake Tahoe Region. 51 pp. plus map. Technical Committee Report. TRPA, LTBMU.

46) Tahoe Regional Planning Agency and USDA Forest Service
1971. Scenic Analysis of the Lake Tahoe Region - A Guide to Planning. 37 pp. Technical Committee Report. TRPA, LTBMU.

47) Tahoe Regional Planning Agency and USDA Forest Service
1971. Soils of the Lake Tahoe Region - A Guide to Planning. 21 pp. plus map. Technical Committee Report. TRPA, LTBMU.

48) Tahoe Regional Planning Agency and USDA Forest Service
1971. Vegetation of the Lake Tahoe Region - A Guide to Planning. 43 pp. Technical Committee Report. TRPA, LTBMU.

49) Tahoe Regional Planning Agency and USDA Forest Service
1971. Wildlife of the Lake Tahoe Region - A Guide to Planning. 42 pp. Technical Committee Report. TRPA, LTBMU.

50) The Sierra Tahoe Regional Resource Library, El Dorado County Free Library, Box 15030, South Lake Tahoe, CA.

51) U.S. Department of Agriculture, Forest Service
1964. Five Sites With Potential For Major Winter Sports Development. 14 pp. Eldorado National Forest, Placerville, CA. LTBMU.

52) U.S. Department of Agriculture, Forest Service
1971. Nation's Range Resources. Forest Service Report No. 19. Washington, D.C. LTBMU.

53) U.S. Department of Agriculture, Forest Service
1974. Forest Hydrology Part II-Hydrologic Effects of Vegetation Manipulation. Northern Region Office, 200 East Broadway, Missoula, MT.

54) U.S. Department of Agriculture, Forest Service
1976. Environmental Analysis Report on Proposed Off-Road Vehicle Plan. 44 pp. and 10 maps; 13 pp. amendment. LTBMU.

55) U.S. Department of Agriculture, Forest Service
1978. Desolation Wilderness Management Plan. 45 pp. and appendix. Eldorado National Forest and Lake Tahoe Basin Management Unit. LTBMU.

56) U.S. Department of Agriculture, Forest Service
1978. Environmental Analysis Report, Guide for Management of Angeles, Cleveland, Los Padres, and San Bernardino National Forest, Mission Planning Area. 154 pp. PSW.

57) U.S. Department of Agriculture, Forest Service
1978. Lake Tahoe Basin Management Unit Land Management Plan - Part I. 91 pp. LTBMU.

58) U.S. Department of Agriculture, Forest Service
1978. Lake Tahoe Basin Unit Traffic Study. Transportation Systems Analysis Section, Pacific Southwest Region Office. PSW.

59) U.S. Department of Agriculture, Forest Service
1978. Skiing in Northern California. 99 pp. Tahoe National Forest, Nevada City, CA. LTBMU.

60) U.S. Department of Agriculture, Forest Service
1978. Visual Resource Inventory of the Lake Tahoe Basin Management Unit. 23 pp. plus maps. Lake Tahoe Basin Management Unit. LTBMU.

61) U.S. Department of Agriculture, Forest Service
1978. Wilderness Management. 381 pp. Miscellaneous Publication No. 1365 authored by Hendee, Stankey and Lucas. Washington, D.C.. LTBMU, PSW.

62) U.S. Department of Agriculture, Forest Service
1979. Bald Eagle Winter Management Plan for the Lake Tahoe Basin Management Unit. 23 pp. and appendix. LTBMU.

63) U.S. Department of Agriculture, Forest Service
1979. National Forest System Land and Resources Management Planning. 72 pp. in Federal Register, Vol. 44, No. 181, September 17, 1979. (Regulations to implement the National Forest Management Act of 1979) Washington, D.C. LTBMU, PSW.

64) U.S. Department of Agriculture, Forest Service
1979. Proceedings of Workshop on Scheduling Timber Harvest for Hydrologic Concerns. Pacific Northwest Region. 200 East Broadway, Missoula, MT.

65) U.S. Department of Agriculture, Forest Service
1979. Rare II Final Environmental Statement - Roadless Area Review and Evaluation. 113 pp. plus 20 appendices. Washington, D.C. LTBMU.

66) U.S. Department of Agriculture, Forest Service
1980. An Assessment of the Forest and Range Land Situation in the United States. Washington D.C. LTBMU.

67) U.S. Department of Agriculture, Forest Service
1981. Draft Regional Plan for the Pacific Southwest Region. PSW, LTBMU.

68) U.S. Department of Agriculture, Forest Service
1981. Final EIS - Land Management Plan, Part 2. Lake Tahoe Basin Management Unit. LTBMU, PSW.

69) U.S. Department of Agriculture, Forest Service
1981. Land Management Plan. October 1981. Lake Tahoe Basin Management Unit. LTBMU, PSW.

70) U.S. Department of Agriculture, Forest Service
1981. Soil Resource Inventory Maps, 3rd Order Soil Survey. Revised 1981. Tahoe National Forest, Coyote St., Nevada City, CA.

71) U.S. Department of Agriculture, Forest Service
1982. Final Environmental Impact Statement, Land Acquisition Plan for the Lake Tahoe Basin (PL 96-586). LTBMU.

72) U.S. Department of Agriculture, Forest Service
1982. Off-Road Vehicle Opportunity Map, Lake Tahoe Basin Management Unit. LTBMU.

73) U.S. Department of of Agriculture, Forest Service
1982. Water quality Monitoring Plan and Annual Report. Pertinent data for periods of records. Lake Tahoe Basin Management Unit. LTBMU.

74) U.S. Department of Agriculture, Forest Service (Hoefer)
1983. Application of Land Coverage Limitations to National Forest Land. Draft, February 28, 1983. Unpublished. LTBMU.

75) U.S. Department of Agriculture, Forest Service (House)
1983. Report on Water Use and Rights for the California Portion of the Lake Tahoe Basin Management Unit in State of California, Water Resources Control Board; Draft EIR; Policy for Water Allocation in the Lake Tahoe Basin. 1984. (See item #31).

76) U.S. Department of Agriculture, Forest Service
1983. The Principal Laws Relating to Forest Service Activities. Agriculture Handbook No. 453. Washington, D.C. LTBMU, PSW.

77) U.S. Department of Agriculture, Forest Service
1984. Draft EIS - 1985 to 2030 Resource Planning Act Program, appendix F. Washington D.C. LTBMU, PSW.

78) U.S. Department of Agriculture, Forest Service
1984. Land Management Planning Direction. Revised January 15, 1984. Pacific Southwest Region. PSW, LTBMU.

79) U.S. Department of Agriculture, Forest Service
1984. Watershed Improvement Needs Inventory and Cost Estimates. Unpublished. Lake Tahoe Basin Management Unit. LTBMU.

80) U.S. Department of Agriculture, Soil Conservation Service
1981. Soil Survey Maps of Douglas County, Nevada. LTBMU.

81) U.S. Department of Agriculture, Soil Conservation Service and Forest Service in cooperation with University of California Agricultural Experiment Station and the Nevada Agricultural Experiment Station
1974. Soil Survey: Tahoe Basin Area California and Nevada. 84 pp. plus maps. LTBMU.

82) U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Analysis Division
1977. Industry-Specific Growth Output Multipliers for B.E.A. Economic Areas. LTBMU, PSW.

83) U.S. Department of Interior
1973. Lake Tahoe - A Special Place, a Report to the President. LTBMU.

84) U.S. Department of Interior, Bureau of Reclamation
1981. Sierra Cooperative Pilot Project; Environmental Assessment and Finding of No Significant Impact. Office of Atmospheric Resources Research. LTBMU.

85) U.S. Department of Interior, Environmental Protection Agency
1975. The Lake Tahoe Study, A Report to Congress. San Francisco, CA. LTBMU.

86) U.S. Department of Interior, Geological Survey
1979. Leasable Mineral Maps, California and Nevada. 12 maps. Geological Survey, Menlo Park, CA. LTBMU.

87) U.S. Department of Interior, Geological Survey
1987,1982. Water Resources Data for California. Period of record for pertinent stations. Menlo Park, CA.

88) U.S. Department of Interior, Geological Survey
Mineral Resource Potential Summary Reports of Basin Roadless Areas and Desolation Wilderness. Menlo Park, CA. LTBMU.

89) U.S. Government, Western Federal Regional Council
1978. Federal Policy for the Lake Tahoe Basin. 49 pp. Western Federal Regional Council. PSW, LTBMU.

90) U.S. Government, Western Federal Regional Council
1979. Lake Tahoe Environmental Assessment. 240 pp. LTBMU, PSW.

Appendix A	Land Use and Landownership
Appendix B	Recreation
Appendix C	Vegetation
Appendix D	Wildlife
Appendix E	Fisheries
Appendix F	Visual Resources
Appendix G	Water Resources and Environmental Utilities
Appendix H	Emissions and Air Quality
Appendix I	Government
Appendix J	Transportation
Appendix K	Energy
Appendix L	Socio/Economics
Appendix M	Data Analysis

91) University of California, Davis, Institute of Ecology, Tahoe Research Group
1983. Interagency Tahoe Monitoring Program, Third Annual Report, Water Year 1982. Davis, CA. LTBMU, TRPA, SWRCB.

92) Western Utility Group
1980. Regional Corridor Study.

(End of Bibliography)

INDEX

Key Words	Chapter-Page
Adjacent lands	3-11, 3-12, 4-13.
Administrative sites	2-15, 2-19, 2-49, 2-55, 2-80, 4-24, 4-40.
Adverse environmental effects	2-11, 4-95, 4-96.
Air quality	2-12, 2-15, 2-24 thru 26, 2-32, 2-36 thru 38, 2-44, 2-49, 2-54, 2-56, 2-61, 2-62, 2-68, 2-73, 2-81, 2-111, 3-8 thru 3-10, 4-8 thru 12, 4-26.
Alternatives	
-comparison of	2-4 thru 7, 2-77 thru 112, all of chapter 4.
-considered but eliminated	2-2 thru 7, 2-11.
-description of	2-24 thru 76, 4-4.
-development process	2-2 thru 4.
-direction common to	2-11 thru 16.
-selected (proposed action)	2-24 thru 29.
-treatment of issues	2-82, 2-95.
Amenity values	2-4.
Area of influence	3-5, 3-7.
Bailey land capability system	2-14 thru 16, 2-26, 2-37, 2-38, 3-59, 4-65.
Benchmarks	2-1 thru 13, 2-22, 2-84 2-99, 2-100
Best management practices	2-15, 2-19, 2-25, 2-37, 2-43, 2-49, 2-56, 2-61, 2-67.
Budgets	2-5, 2-6, 2-30, 2-31, 2-37, 2-43, 2-49, 2-60, 2-61, 2-67, 2-73, 2-81, 2-99, 2-100, 2-108, 4-3.
Burning	2-37, 2-55, 2-61, 2-81, 4-27.
Capability areas (Also see Bailey land capability system)	

Carrying capacity (See thresholds)

Corridors, utility — 2-22, 2-26, 2-31, 2-38, 2-43, 2-49, 2-55, 2-61, 2-67, 2-73, 2-80, 3-37, 3-38, 4-38, 4-39.

Costs — 2-2, 2-4 thru 6, 2-13, 2-23, 2-42, 2-54, 2-60, 2-81, 2-99, 2-100, 2-108 thru 112.

Coverage — 3-59 thru 62.

-impervious — 2-15, 3-61.

-land — 3-59 thru 62.

Cultural resources — 2-4, 2-15, 2-25, 2-31, 2-37, 2-43, 2-49, 2-55, 2-61, 2-67, 2-73, 2-77, 3-32 thru 34, 4-33 thru 37.

Dams — 3-19, 3-20, 4-23.

Disturbed acres — 2-30, 2-31, 4-61 thru 65.

Diversity — 2-5, 2-7, 2-12, 2-13, 2-21, 2-25, 2-31, 2-38, 2-43, 2-50, 2-55, 2-61, 2-68, 2-73, 2-79, 2-99, 3-12 thru 15, 3-55, 4-14.

Economic — 3-2.

-analysis — 2-109 thru 112, 3-2.

-efficiency — 2-3, 2-42, 2-109, 3-2, 4-13.

Employment — 2-81, 2-99, 3-2, 4-1 thru 3.

Energy — 3-39, 3-40, 4-99 thru 101.

-conservation — 2-19, 4-99 thru 101.

-production — 3-39, 3-40, 4-101.

Environmental consequences — all of Chapter 4.

Facilities — 2-11, 2-14 thru 21, 2-24, 2-26, 2-31, 2-38, 2-42, 2-43, 2-48, 2-49, 2-54, 2-55, 2-60, 2-61, 2-66, 2-67, 2-73, 2-80, 2-110, 3-15 thru 21, 4-20 thru 24.

Fair share — 1-9, 1-11, 2-24, 2-32, 2-38, 2-44, 2-50, 2-56, 2-62, 2-68, 2-73, 2-77, 3-43.

Fire and fuels management	1-10, 2-15, 2-25, 2-31, 2-37, 2-43, 2-49, 2-55, 2-61, 2-67, 2-73, 2-81, 3-21, 4-25 thru 28, 4-61.
-protection	2-81, 3-21.
-suppression	2-11, 2-37, 2-43, 2-61, 2-67, 2-81, 3-21, 4-62.
Firewood (Fuelwood)	2-31, 2-37, 2-38, 2-43, 2-49, 2-55, 2-56, 2-61, 2-67, 2-73, 2-100, 2-109 thru 111, 3-55.
Fish	3-22, 4-29 thru 30.
-habitat diversity	2-4, 3-23, 4-29.
-management indicator species	2-14, 2-24, 2-30, 2-36, 2-42, 2-48, 2-54, 2-50, 2-66, 2-72, 3-23 thru 26, 4-29.
Forage (See range)	3-41, 4-48.
Forest pests	2-14, 2-24, 2-30, 2-36, 2-42, 2-48, 2-54, 2-60, 2-66, 2-72, 3-26 thru 28, 4-30, 4-31.
FORPLAN	2-2 thru 4.
Further planning areas	2-6, 2-30, 2-72, 2-77, 2-109, 2-110, 3-66, 4-86 thru 88.
Geology	2-16, 3-28, 4-32.
Geologic Hazards	2-16, 3-29, 4-32.
Geologic Resources	2-16, 3-29, 4-32, 4-33.
Grazing (See range)	
Groundwater	2-16, 3-28 thru 31, 4-32.
Habitat capability	2-24, 2-30, 2-42, 2-48, 2-54, 2-60, 2-66, 2-72, 2-78, 2-79, 3-68 thru 73, 4-91.
Herbicide (See pesticides)	4-30, 4-31.
Historic sites	2-25, 2-38, 2-55, 2-78, 3-32, 4-33 thru 35.
Insects and diseases (See forest pests)	
Integrated pest management (See forest pests)	

Interstate Water Compact 3-31.

Issues 1-9, 2-1, 2-3, 2-4, 2-11, 2-16, 2-24, 2-30, 2-36, 2-42, 2-48, 2-54, 2-60, 2-66, 2-72, 2-82.

Land exchange (See landownership adjustment)

Landlines 2-15, 2-80, 3-36, 3-37, 4-38.

Lands 2-15, 3-35 thru 38, 4-38, 4-39.

Landownership adjustment (See also Santini/Burton Act) 2-15, 3-35, 3-36, 4-38.

Landslide Hazards 3-29, 4-32.

Management areas 2-3, 2-16 thru 18, 2-23.

Management direction 1-10, 2-2, 2-25, 2-26.

Management indicator species (MIS) (See fish and see wildlife)

Management practice 2-1, 2-2, 2-16, 2-19, 2-20, 2-22, 2-31, 2-37.

Management prescriptions 2-1, 2-3, 2-11 thru 13, 2-16, 2-82.

Market values 2-6.

Minerals 2-16, 2-80, 3-38 thru 40, 4-39 thru 41.

Minimum implementation requirements 2-12, 2-13, 2-100.

Minimum management requirements 2-3 thru 7, 2-12, 2-13, 2-48, 2-79, 2-80, 2-99, 2-100, 2-109, 2-111.

Mitigation 1-10, 2-13, 2-24 thru 26, 2-43, 2-62, 2-67, 2-68, 2-100.

Monitoring and evaluation 2-13, 2-21.

National Environmental Policy Act (NEPA) 1-1, 2-1.

National Forest Management Act (NFMA) 1-1, 2-1 thru 3, 2-5, 2-16, 2-99.

National Register of Natural Landmarks 1-5, 3-54.

National Recreation Area (NRA) 1-5.

Noise 3-8, 3-10, 3-11, 4-13.

Off-highway vehicle (OHV) 2-14, 2-18, 2-36, 2-54, 2-60, 2-72, 4-49, 4-50.

Old growth 2-14, 2-36 thru 38, 2-73, 4-63 thru 65.

Outputs 1-1, 1-9, 2-2 thru 6, 2-11, 2-20, 2-23, 2-24, 2-30, 2-42, 2-54, 2-66, 2-72, 2-78, 2-79, 2-82, 2-85 thru 87, 2-100, 2-111.

Pesticides 3-26 thru 28, 4-30.

Planning areas 2-6, 2-30, 2-72, 2-109, 2-110.

Planning process 2-1, 2-2, 2-4.

Planning records 2-2, 2-3.

Plant communities 2-12, 2-13, 2-25, 2-38, 2-55, 2-78, 3-12 thru 15, 4-30, 4-62 thru 65.

Present net value 2-2, 2-5, 2-42, 2-81, 2-99, 2-100, 2-105, 2-106, 2-109.

Proposed action (See also Alternatives - Selected) 2-1, 2-4.

Public involvement 1-3, 2-21.

Range 2-6, 2-7, 2-22, 2-24, 2-31, 2-37, 2-42, 2-48, 2-55, 2-60, 2-67, 2-72, 2-79, 3-41, 4-48.

RARE II 3-66, 4-86 thru 88.

Recreation 1-5, 1-8, 1-9, 2-5, 2-14, 2-20, 2-23, 2-24, 2-30, 2-36, 3-42 thru 48, 4-2, 4-42, 4-53.

-developed 2-6, 2-7, 2-11, 2-18, 2-24, 2-30, 2-36, 2-77, 3-42 thru 44, 4-42 thru 45.

-dispersed 2-5, 2-6, 2-18 thru 20, 2-24, 2-30, 2-36, 2-77, 3-44 thru 51, 4-45 thru 50.

-downhill skiing 2-2, 2-6, 2-14, 2-18, 2-23, 2-36, 2-77, 3-45, 3-46, 4-51, 4-52.

Recreation Opportunity Spectrum (ROS) 3-47, 3-48, 4-53 thru 56.

Research Natural Areas (RNA) 2-21, 2-25, 2-31, 2-37, 2-43, 2-49, 2-55, 2-61, 2-67, 2-73, 2-78, 3-48, 4-40, 4-56.

Resources Planning Act (RPA) 1-1 thru 4, 2-1 thru 3.

Rights-of-way 2-4, 2-15, 2-22, 2-26, 2-31, 2-67, 2-80, 3-38, 4-39.

Riparian areas (See stream environment zones)

Roadless areas 1-9, 2-6, 2-30, 2-36, 2-42, 2-54, 2-60, 2-66, 2-72, 2-77, 3-66, 4-86 thru 88.

Roads (See transportation)

Santini/Burton Act 1-9, 2-80, 3-2, 4-38.

Scenic (See visual quality)

Scoping process 1-9, 2-2.

Seismic hazards 3-29, 4-32.

Sensitive plants (See threatened and endangered species)

Social 2-11, 2-81, 2-109 thru 111, 3-3 thru 6, 4-5, 4-6.

Soils 2-14, 3-32, 3,50 thru 54, 4-59 thru 62.

Special Interest Areas (SIA) 2-25, 2-31, 2-38, 2-43, 2-49, 2-55, 2-61, 2-67, 2-73, 2-78, 3-51 thru 54, 4-62.

Standards and guidelines 2-1, 2-3, 2-13, 2-14.

Stream environment zones 2-14, 2-15, 2-20, 2-25, 2-37, 3-48, 3-49, 4-57 thru 59.

Suitability 2-2, 2-3, 2-15, 2-82, 3-55, 3-56.

Threatened and endangered species 2-5, 2-12, 2-14, 2-48, 3-22, 3-23, 3-49, 4-29, 4-59.

Thresholds 1-8, 1-9, 2-13, 2-24, 2-26, 2-32, 2-36, 2-38, 2-44, 2-50, 2-54, 2-56, 2-62, 2-68, 2-73, 2-78, 2-110, 3-9 thru 11, 3-55.

Timber 2-14, 2-20 thru 22, 2-25, 2-31, 2-37, 2-42, 2-49, 2-55, 2-61, 2-67, 2-73, 2-79, 3-54 thru 56, 4-48, 4-61 thru 65.

Trails 2-43, 2-55, 2-73, 3-17 thru 19, 4-22, 4-23, 4-48.

Transportation systems 2-16, 3-17, 4-20, 4-21, 4-61.

-public transit 3-9, 3-10, 3-16.

-roads 2-26, 2-31, 2-38, 2-43, 2-49, 2-55, 3-16, 4-20, 4-21, 4-61.

Urbanization 3-23, 3-36, 3-37, 3-47, 3-59, 3-73.

Utility corridors (See Corridors, utility)

Values 2-3, 2-4, 2-6, 2-12, 2-14, 2-19 thru 21, 2-24, 2-25, 2-30, 2-37, 2-42, 2-55, 2-109, 2-110.

Vegetation 3-54, 4-30, 4-61 thru 65

Visual quality 2-14, 2-24, 2-30, 2-36, 2-42, 2-48, 2-54, 2-60, 2-66, 2-72, 3-57, 4-66 thru 73.

Volcanic hazards 3-29, 3-30, 4-32.

Water (Also see Groundwater) 3-7, 3-58, 4-73 thru 85.

-consumption and rights 1-10, 2-14, 2-25, 2-30, 2-37, 2-80, 3-7, 4-84, 4-85.

-quality 1-5, 1-9, 2-43, 2-49, 2-55, 2-61, 2-67, 2-73, 3-58, 3-59, 4-73 thru 82.

-yield 2-43, 2-80, 3-63 thru 65, 4-82.

Watershed 2-14, 2-25, 2-30, 2-37, 2-49, 2-55, 2-61, 2-67, 2-79, 3-62.

Wetlands (Also see Stream environment zones) 3-40, 3-48, 3-49, 4-41 thru 57.

Wilderness 2-14, 2-19, 2-23, 2-24, 2-30, 2-36, 2-42, 2-48, 2-54, 2-60, 2-66, 2-72, 2-77, 3-66, 4-40, 4-86 thru 88.

Wildlife 3-66 thru 73, 4-89 thru 95.

-habitat diversity 2-4, 2-5, 2-12, 2-13, 2-79, 2-111, 3-12 thru 15, 3-55, 4-15 thru 20.

-management indicator species 2-24, 2-30, 2-36, 2-42, 2-54, 2-60, 2-66, 2-72, 3-23 thru 26, 3-66 thru 73.

Withdrawals 2-15, 2-80, 3-38, 4-39.

(End of Index)