



United States
Department of
Agriculture

Forest Service

1992



Pacific
Southwest
Region

*Final
Environmental
Impact Statement
for the Land and
Resource Management Plan*

FINAL EXTRA COPY

Lassen National Forest

Final Environmental Impact Statement for the Land and Resource Management Plan Lassen National Forest 1992

FINAL EXTRA COPY

<i>Type of Action:</i>	Administrative
<i>Responsible Agency:</i>	USDA Forest Service
<i>Responsible Official:</i>	Ronald E. Stewart, Regional Forester USDA Forest Service Pacific Southwest Region 630 Sansome Street San Francisco, California 94111
<i>For Further Information Contact:</i>	Leonard Atencio, Forest Supervisor Lassen National Forest 55 South Sacramento Street Susanville, California 96130 (916) 257-2151

Abstract The Lassen National Forest is located within portions of Butte, Lassen, Modoc, Plumas, Shasta, Siskiyou and Tehama Counties. This Final Environmental Impact Statement describes four alternatives for managing the land and resources of the Forest. The land area involved is 1,129,585 acres. The alternatives provide different mixes of management prescriptions, resulting in different levels of outputs, goods, and services, and different environmental consequences. These are described and compared. The PRF Alternative, the Forest Service's Preferred Alternative, represents a balance between commodity production and conservation of amenity values. PRF differs from previous management and, to a lesser degree, from the Preferred Alternative in the Draft EIS by providing greater emphasis on protection of old growth communities and dependent species. PRF is the basis for the Forest's Land and Resource Management Plan which accompanies this document. The Plan will guide management of the Forest for the next 10 to 15 years.

This document and its supporting analysis show expected outputs and effects of the alternatives for a period of 10-15 years. Outputs and effects for the four decades beyond this period are provided only as projected information for the decision-makers and public.



Persons of any race, color, national origin, sex, age, religion, or with any handicapping condition are welcome to use and enjoy all facilities, programs, and services of the USDA. Discrimination in any form is strictly against agency policy, and should be reported to the Secretary of Agriculture, Washington, DC 20250.

TABLE OF CONTENTS

Final Environmental Impact Statement

	<u>Page</u>
SUMMARY	s-1
 CHAPTER 1. PURPOSE AND NEED	
A Purpose and Nature of Action	1-1
B Organization of This Document	1-4
C Location	1-4
D Need for Management Change	1-6
E Scope of Issues Addressed	1-6
 CHAPTER 2. ALTERNATIVES INCLUDING THE PROPOSED ACTION	
A Introduction	2-1
B Alternative Development Process	2-1
C Benchmarks	2-2
D Alternatives Considered But Eliminated From Detailed Study	2-10
E Alternatives Considered in Detail	
1 Introduction	2-22
2 Direction Common to All Alternatives..	2-22
3 Management Areas and Management Prescriptions	2-27
4 Individual Alternative Descriptions	2-33
5 Comparson of Alternatives	2-64
 CHAPTER 3. AFFECTED ENVIRONMENT	
A Introduction	3-1
B Description of the Forest	3-1
C Economic Environment	3-3
D Social Environment	3-7
E Resource Environment	3-10
1 Air Quality	3-10
2 Biomass	3-12
3 Cultural Resources	3-13
4 Energy	3-15
5 Facilities	3-17
6 Fire and Fuels.	3-21
7 Firewood	3-23
8 Fish	3-26
9 Forest Health	3-29
10 Geology and Groundwater	3-32
11 Lands	3-33
12 Law Enforcement	3-36
13 Minerals.	3-37
14 Range	3-43
15 Recreation	3-46
16 Sensitive Plants	3-53
17 Soils	3-55

18. Special Areas	3-61
a Experimental Forests.. . . .	3-61
b Research Natural Areas	3-62
c National Natural Landmarks	3-63
d Special Interest Areas	3-65
19 Timber	3-67
20 Vegetation and Diversity	3-73
a Vegetation	3-73
b Diversity of Plants and Animals	3-76
21 Visual Resources	3-78
22 Water and Riparian Areas.	3-83
a Introduction	3-83
b Water.. . . .	3-84
c Riparian	3-87
23 Wild and Scenic Rivers	3-89
24. Wilderness and Further Planning Areas.	3-91
25 Wildlife	3-96

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

A Introduction	4-1
B. Direct, Indirect, and Cumulative Environmental Consequences	4-2
Economic Consequences	4-2
Social Consequences	4-6
Resource Consequences	4-12
1. Air Quality	4-12
2 Biomass	4-16
3. Cultural Resources	4-18
4 Energy	4-23
5. Facilities	4-25
6. Fire and Fuels	4-31
7. Firewood	4-36
8 Fish	4-38
9 Forest Health	4-44
10 Geology and Groundwater	4-49
11 Lands	4-51
12 Law Enforcement	4-52
13 Minerals	4-53
14 Range	4-60
15 Recreation	4-64
16 Sensitive Plants.	4-69
17 Soils	4-72
18 Special Areas	4-78
1. Expenmental Forests	4-78
2 Research Natural Areas	4-79
3 National Natural Landmarks	4-79
4 Special Interest Areas	4-79
19 Timber	4-80
20 Vegetation and Diversity	4-92
21 Visual Resources	4-96
22 Water and Riparian Areas	4-103
Water	4-103
Ripanan Areas	4-104
23 Wild and Scenic Rivers	4-112

24 Wilderness and Further Planning Areas	4-115
25 Wildlife	4-119
C Adverse Environmental Effects That Cannot Be Avoided	4-134
D Relationship Between Short-Term Uses and Long-Term Productivity ...	4-137
E Irreversible or Irretrievable Commitment of Resources , .	4-138
F Possible Conflicts with Federal, Regional, State, and Local Use Plans, Including Indian Plans	4-139
G Energy Requirements and Conservation Potential	4-140
H. Other Disclosures	4-141
I Incomplete or Unavailable Information	4-142
CHAPTER 5. LIST OF PREPARERS	5-1
CHAPTER 6. DOCUMENT RECIPIENTS	6-1
CHAPTER 7. APPENDICES	
A. Issues, Concerns, and Opportunities	A-1
B. Modeling and Analysis Process	B-1
C. Further Planning Area Description and Analysis	C-1
D Economic Efficiency Analysis	D-1
E. Wild and Scenic Rivers Evaluation	E-1
F Research Natural Area Evaluation	F-1
G. National Natural Landmark Evaluation	G-1
H. Special Interest Area Evaluation	H-1
I Road Development Guidelines	I-1
J Road Maintenance Levels	J-1
K. Recreation Opportunity Spectrum.	K-1
L Trail Program	L-1
M Unroaded Area Prescriptions by Alternative	M-1
N. Identification of Lands Suitable for Timber Production	N-1
O Major Silvicultural Systems and Their Application	O-1
P Effect of Price Trends on Timber Harvest Levels	P-1
Q Visual Quality Objectives	Q-1
R Wildlife and Fish Species List	R-1
S. Distnbution & Population Estimates for Management Indicator Species	S-1
T Derivation of the Forest Deer Population Target	T-1
U Seral Stage Codes for Wildlife Habitat Relationships	U-1
V Forest Watershed Areas and Yields	V-1
W Regional Timber Supply-Demand Situation in California ,	W-1
X Budgets and Their Relationship to the Forest Plan	X-1
Y. No-Herbicide Use Analysis	Y-1
Z. Bibliography	Z-1
CHAPTER 8. GLOSSARY	8-1
CHAPTER 9. INDEX	9-1
CHAPTER 10. PUBLIC COMMENTS (Separate Document)	10-1

TABLES	Page
2-1 Average Annual Outputs by Decade for Benchmarks	2-3
2-2 Average Annual Outputs by Decade for Alternatives Not Considered in Detail	2-14
2-3 Average Annual Outputs by Decade for PRF Alternative	2-39
2-4 Average Annual Outputs by Decade for CUR Alternative . . .	2-46
2-5 Average Annual Outputs by Decade for EGP Alternative . . .	2-53
2-6 Average Annual Outputs by Decade for TGP Alternative . . .	2-60
2-7 Average Annual Outputs by Alternative for Decades 1 and 5 .	2-71
2-8 Acreage Allocation by Prescription and Alternative .	2-77
2-9 Further Planning Area Allocation by Alternative	2-78
2-10 Land Classification for Timber Management	2-79
2-11 Harvest Methods by Alternative	2-80
2-12 Comparison of Timber Management Practices	2-81
2-13 Summary Comparison of Economic Effects.	2-85
2-14 Present Net Value Comparison of Marginal Cost of Constraints . .	2-88
2-15 Present Net Value Comparison of Alternative Constraints	2-89
2-16 Average Annual Cash Flows and Non-Cash Benefits by Alternative	2-90
2-17 Tradeoffs Between Present Net Value & Major Non-Priced Benefits .	2-90
2-18 Indicators of Responsiveness to Major Issues and National Concerns	2-91
2-19 Summary Treatment of Issues and Concerns	2-92
2-20 Fish Outputs	2-102
2-21 Range Outputs	2-103
2-22 Timber Outputs	2-103
2-23 Visual Quality Objectives	2-104
2-24 Land Disturbance Index	2-104
2-25 Wildlife Populations	2-106
3-1 Racial and Ethnic Minority Population, 1990 Census	3-10
3-2 Local Biomass Facilities	3-13
3-3 Cultural Resource Summary (1990)	3-14
3-4 Road Mileage (1991)	3-17
3-5 Road Improvements Proposed	3-18
3-6 Trail System (Including Wilderness) 1990	3-19
3-7 Forest Service Owned Buildings (1990)	3-20
3-8 Anadromous Fish Runs on Forest Streams	3-28
3-9 Forest Acres by County and Administration (1982)	3-33
3-10 Non-Recreational Special Use Permits (1990)	3-34
3-11 Developed Recreation Facilities, 1990	3-46
3-12 Off-Highway Vehicle Recreation Opportunities	3-50
3-13 Developed Recreation Use, 1990	3-51
3-14 Place of Residence of Forest Recreationists	3-51
3-15 Projected Recreation Use by ROS Class	3-52
3-16 Forest Soils	3-58
3-17 Existing and Candidate Research Natural Areas	3-62
3-18 Potential National Natural Landmarks	3-64
3-19 Potential Special Interest Areas	3-66
3-20 Timber Size Class Distribution	3-68
3-21 Christmas Tree Sales	3-70
3-22 Timber Area and Volume	3-71
3-23 Riparian and Related Areas	3-88
3-24 Further Planning Areas.	3-94
3-25 Effect of California Wilderness Act on Roadless Areas	3-95
3-26 Management Indicator Species & Their Successional Stage and Special Habitat Preferences	3-97

TABLES (continued)

4-1	Companson of Alternatives' Economic Effects	4-3
4-2	Prescribed Fire for All Uses ..	4-13
4-3	Potential Loggmg Residue Available for Biomass Annually - Decade 1 ..	4-16
4-4	Cultural Resource Risk Analysis	4-20
4-5	Effects of Wilderness and Wild and Scenic Rivers Recommendations on Hydroelectric Development	4-24
4-6	New Construction and Reconstruction of Roads	4-26
4-7	Expected Average Annual Acreage Burned by Wildfire	4-33
4-8	Fire Management Protection Resources.	4-33
4-9	Potential Firewood Supply and Demand	4-37
4-10	Fishenes Resource Risk Analysis (for 50 Year Period)	4-39
4-11	Withdrawal of Locatable Mineral Resources by Mineral Potential and by Alternative	4-55
4-12	Withdrawal of Leasable Mineral Resources by Mineral Potential and by Alternative	4-56
4-13	Mineral Potential of Further Planning Areas	4-59
4-14	Expected Acres in Early Seral Stages and Range Use	4-61
4-15	Sensitive Plant Analysis	4-71
4-16	Timber Consequences of Each Alternative.	4-82
4-17	Large Sawtimber and Old Growth Maintained Under Each Alternative	4-87
4-18	Vegetation Diversity by Alternative	4-88
4-19	Acres of Existing and Future Visual Conditions	4-102
4-20	Water Resources and Ripanan Effects	4-111
4-21	Deer Winter Range Capability	4-125
B-1a	FORPLAN Prescriptions on Timbered Lands	B-9
B-1b	FORPLAN Prescnptions on Non-Timbered Lands	B-13
B-1c	FORPLAN Prescriptions That Do Not Involve Vegetation Manipulation	B-14
B-1d	FORPLAN Prescriptions Allocating Capital Investments	B-16
B-2	Outputs Used in the Analysis	B-17
B-3	Estimating Yield Coefficients Inside FORPLAN	B-20
B-4	Estimating Yield Coefficients Outside FORPLAN	B-24
B-5	Dollar Adjustment Factors	B-26
B-6	Timber Price and Cost Trends	B-26
B-7	Benefits Used in the Analysis	B-28
B-8	Recreation Demand Cut-Offs	B-30
B-9	Vegetative Diversity	B-33
B-10	Minimum Rotation Ages	B-33
B-11	Summary of Base Run Structure	B-39
B-12	Summary of Benchmark Run Specifications	B-40
B-13	Additional Constraints for Each Alternative Not Considered in Detail . .	B-42
B-14	Additional Constraints for Each Alternative Considered in Detail	B-61
C-1	Acres and Percent Allocated by Alternative and Prescription, Butt Mountain Further Planning Area	c-9
C-2	Average Annual Outputs Decades 1 and 5, Butt Mountain Further Planning Area	c-9
c-3	Acres and Percent Allocated by Alternative and Prescription, Heart Lake Further Planning Area	C-16

TABLES (continued)	Page
c-4 Average Annual Outputs Decades 1 and 5, Heart Lake Further Planning Area	C-16
c-5 Acres and Percent Allocated by Alternative and Prescription, Ishi (B) Further Planning Area	C-23
C-6 Average Annual Outputs Decades 1 and 5, Ishi (B) Further Planning Area.	C-24
c-7 Acres and Percent Allocated by Alternative and Prescription, Mill Creek Further Planning Area.	C-31
C-8 Average Annual Outputs Decades 1 and 5, Mill Creek Further Planning Area.	C-31
c-9 Acres and Percent Allocated by Alternative and Prescription, Trail Lake (B) Further Planning Area	C-38
c-10 Average Annual Outputs Decades 1 and 5, Trail Lake (B) Further Planning Area	C-38
C-11 Acres and Percent Allocated by Alternative and Prescription, Wild Cattle Mountain Further Planning Area	C-46
c-12 Average Annual Outputs Decades 1 and 5, Wild Cattle Mountain Further Planning Area	C-46
E-1 Identification and Description of River Segments, Mill Creek	E-4
E-2 Identification and Description of River Segments, Deer Creek	E-7
E-3 Identification and Description of River Segments, Antelope Creek	E-10
E-4 Outstandingly Remarkable Values Summary, Mill Creek River Segments	E-16
E-5 Outstandingly Remarkable Values Summary, Deer Creek River Segments	E-17
E-6 Outstandingly Remarkable Values Summary, Antelope Creek River Segments	E-18
E-7 Outstandingly Remarkable Values Summary, Other Creeks	E-19
E-8 Wild and Scenic Rivers Eligibility/Classification Analysis, Mill Creek	E-23
E-9 Wild and Scenic Rivers Eligibility/Classification Analysis, Deer Creek	E-24
E-10 Wild and Scenic Rivers Eligibility/Classification Analysis, Antelope Creek	E-25
E-11 Proposed Wild, Scenic, and Recreational River Classifications by Alternative, Mill Creek	E-26
E-12 Proposed Wild, Scenic, and Recreational River Classifications by Alternative, Deer Creek	E-26
E-13 Proposed Wild, Scenic, and Recreational River Classifications by Alternative, Antelope Creek	E-27
E-14 Effects of Designation, Mill Creek.	E-28
E-15 Effects of Designation, Deer Creek	E-31
E-16 Effects of Designation, Antelope Creek	E-34
E-17 Guidelines for Management of Wild and Scenic Rivers on National Forests.	E-37
F-1 Candidate Research Natural Areas	F-1
G-1 Potential National Natural Landmark Recommendations	G-2
G-2 Potential National Natural Landmarks by Alternative	G-5
H-1 Candidates for Special Interest Areas	H-2
H-2 Proposed Special Interest Areas by Alternative	H-4
M-1 Unroaded Area Prescriptions by Alternative	M-1
N-1 Minimum Stocking Levels	N-2

TABLES (continued)	Page
T-1 Deer Population Goals	T-1
W-1 California Timber Harvest by Ownership	W-6
W-2 Projected Timber Harvest, Growth, and Inventory on Private Land in the Four Major Timber Supply Regions of California	W-7
W-3 Average Annual National Forest Timber Sales Compared to Allowable Sale Quantities in Forest Plans	W-8
X-1 Lassen Forest Budget History	X-5
Y-1 Suitable Acres by Regulation Class	Y-3
Y-2 Estimated Acres of Regulation Class I and II Lands That Will Be Managed Intensively During Reforestation -PRF Alternative	Y-4
Y-3 Summary of the Estimated Effects on Allowable Sale Quantity	Y-5
10-1 Respondent Type	10-3
10-2 Form of Response	10-8

FIGURES

1-1 Planning in the Forest Service	1-3
1-2 Location of the Forest	1-5
2-1 Range of Alternatives (Selected Outputs)	2-12
2-2 Acreage Allocation by Prescription, PRF Alternative	2-35
2-3 Acreage Allocation by Prescription, CUR Alternative	2-43
2-4 Acreage Allocation by Prescription, EGP Alternative	2-50
2-5 Acreage Allocation by Prescription, TGP Alternative	2-57
2-6 Harvest Methods by Alternative	2-80
2-7 Comparison of Timber Management Practices	2-81
2-8 Key Comparisons Between Alternatives (First Decade)	2-82
3-1 Lassen National Forest	3-2
3-2 Cross-Section of the Forest Showing Elevation and Vegetative Types	3-3
3-3 Impact Counties	3-4
3-4 Impact Counties' Population, 1960-1990 (Exponential Projection to 2000) . . .	3-5
3-5 Unemployment Rates: U.S., California, Impact Counties	3-6
3-6 Forest Reserve Fund Payments to Impact Counties	3-7
3-7 Personal Firewood Use	3-25
3-8 Projected Personal Use Firewood Demand	3-26
3-9 Locatable Mineral Potential	3-40
3-10 Leasable Mineral Potential	3-41
3-11 Actual Range Use	3-45
3-12 Dispersed Recreation Use (Outside Wilderness), 1982	3-48
3-13 Recreation Opportunity Spectrum (ROS) Acreages (Incl. Wilderness), 1982	3-49
3-14 Timber Volume Sold and Harvested, 1961-1990	3-72
3-15 Vegetation Types, CALVEG Formations Classes	3-73
3-16 Vegetation Types: Wildlife Habitat Relationships (WHR)	3-76
3-17 Conifer Forest Successional Stages and Canopy Closure	3-77
3-18 Visual Variety Class	3-80
3-19 Inventoried Visual Quality Objectives (VQO), 1979	3-81
3-20 Existing Visual Condition (EVC), 1980	3-81

Figures (continued)

3-21	Visual Quality Objective (VQO) and Visual Condition (VC)	3-82
3-22	Miles of Stream by Stream Order.	3-85
3-23	Wilderness Use by Activity, 1982.....	3-93
4-1	Prescribed Burning (Decade 1)	4-35
4-2	Visual Quality Index (VQI), Decade 5	4-101
4-3	Visual Rehabilitation, Decade 1	4-101
4-4	Land Disturbance Index Components, PRF Alternative.	4-104
B-1	FORPLAN Analysis Groups	B-36
C-1	Further Planning Areas Location	C-2
c-2	Butt Mountain Further Planning Area	C-4
c-3	Heart Lake Further Planning Area	C-11
c-4	Ishi (B) Further Planning Area	C-18
C-5	Mill Creek Further Planning Area.	C-26
C-6	Trail Lake (B) Further Planning Area	C-33
c-7	Wild Cattle Mountain Further Planning Area	C-40
E-1	Location of River Segments.	E-2
E-2	River Segments of Mill Creek	E-5
E-3	River Segments of Deer Creek	E-8
E-4	River Segments of Antelope Creek.	E-11
F-1	Graham Pinery..	F-4
F-2	Green Island Lake	F-5
F-3	Indian Creek	F-6
F-4	Mayfield	F-7
F-5	Soda Ridge	F-8
F-6	Timbered Crater	F-9
G-1	Bogard Buttes	G-9
G-2	Deep Hole Crater	G-10
G-3	Devil's Parade Ground	G-11
G-4	Eagle Lake Area	G-12
G-5	Hat Creek Valley.	G-13
G-6	Murken Bench	G-14
G-7	Red Lake Mountain	G-15
H-1	Black Rock	H-13
H-2	Crater Lake	H-14
H-3	Deep Hole Crater	H-15
H-4	Deer Creek	H-16
H-5	Diamond Mountain	H-17
H-6	Eagle Lake Area	H-18
H-7	Hat Creek Valley	H-19
H-8	High Lakes	H-20
H-9	Homer/Deerheart	H-21
H-10	Lake Britton	H-22
H-11	Montgomery Creek Grove	H-23
H-12	Murken.	H-24
H-13	Rock Creek Falls	H-25

Figures (continued)	<u>Page</u>
H-14 Willow Lake Bog	H-26
J-1 Description of Road Maintenance Levels	J-1
O-1 Clearcutting and Group Selection Systems	O-4
O-2 Seed-tree System	O-5
O-3 Shelterwood System	O-6
O-4 Single-tree Selection System	O-7
O-5 Ratings of the Major Silvicultural Systems by Principal Biological Attributes	O-9
O-6 Ratings of the Major Silvicultural Systems by Key Management Attributes	O-12
X-1 Budget Process Flow Chart	X-2
ALTERNATIVE MAPS	Map Packet

Summary



SUMMARY

A. PURPOSE AND NEED

This Final Environmental Impact Statement (FEIS) identifies four alternatives for the management of the Lassen National Forest. It also describes the affected environment and the environmental consequences of the alternatives. The Preferred (PRF) Alternative forms the basis for the accompanying Lassen National Forest Land and Resource Management Plan (Forest Plan). This FEIS updates the Draft Environmental Impact Statement (DEIS) released for public comment in 1986.

The FEIS and the Forest Plan have been developed in compliance with statutory regulation. The Forest Plan is required by the Forest and Rangeland Renewable Resources Planning Act (RPA), as amended by the National Forest Management Act (NFMA). An environmental impact statement is required by the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ). The content, format, and planning actions are specified in the NEPA, CEQ regulations (40 CFR 1500-1508), and the implementing NFMA regulations (36 CFR 219).

The Forest Plan directs the management of the Forest for the next 10-15 years, but will be reviewed every five years to determine if revision or amendment is in order.

The Lassen National Forest is located in north-eastern California within parts of seven counties—Shasta, Tehama, Butte, Plumas, Lassen, Siskiyou, and Modoc. The Forest also administers small portions of the Shasta and Modoc National Forests. The Forest Plan covers all of the land administered by the Lassen National Forest, a total of 1,129,585 acres.

Public issues and management concerns gathered in 1979 helped focus the planning process. They fall into 26 socio-economic and resource categories: air quality, biomass, cultural resources, energy, facilities, fire and fuels, fire-

wood, fish, forest health, geology and groundwater, lands, law enforcement, minerals, range, recreation, Sensitive plants, soils, special areas, timber, vegetation and diversity, visual resources, water and riparian areas, Wild and Scenic Rivers, wilderness and further planning areas, wildlife, and socio-economics.

Public comments on the DEIS received in 1986 are shown in the FEIS Chapter 10, along with the Forest Service responses to them. Copies of Chapter 10 are available at all Ranger District offices and the Supervisor's Office.

B. ALTERNATIVES INCLUDING THE PREFERRED ALTERNATIVE

An alternative is a set of goals and objectives centered around a theme that guides the management of the Forest resources from the current condition to a desired future state. National Environmental Policy Act regulations (40 CFR 1502) mandate consideration of all reasonable alternatives to a proposed action, including identification and discussion of alternatives eliminated from detailed study. National Forest Management Act regulations (36 CFR 219) specify that the primary goal in formulating alternatives, beyond NEPA compliance, is to "provide an adequate basis for identifying the alternative that comes nearest to maximizing net public benefits." Appendix D describes the economic efficiency analysis and net public benefits.

The analysis revealed that in dollar terms, water is the most valuable output from the Forest. However, the Forest has very little ability to change the amount of water produced. Timber is the second most valuable output in an economic sense. Differences between alternatives, in present net value (PNV) and cash flows, can generally be explained by timber harvest levels. Exceptions to this are caused by limitations on timber harvest that affect the costs, but not the

volume, of timber harvested. Such limitations are usually related to amenity outputs such as mldhfe habitat and visual quality. As the level of amenities increases, the PNV tends to decline. All significant economic values are included in the analysis

The alternative development process included a benchmark analysis, which determined the minimum and maximum output levels for each resource. Alternative themes were then developed in response to the limits and opportunities defined by the benchmarks and the public issues and management concerns. This resulted in the analysis of 23 alternatives, 19 of which were eliminated from detailed consideration because of unacceptable responses to specific issues, insignificant differences from another alternative considered in detail, or an unacceptable schedule of outputs. The FEIS contains two new alternatives and one modified alternative from the DEIS. All alternatives include a set of minimum requirements to insure compliance with applicable laws and regulations.

The four alternatives considered in detail are displayed and compared in Chapter 2. Their themes are presented below

1. PRF (Preferred Alternative)

This alternative is a refinement of the PRF Alternative in the DEIS. It responds to both commodity and amenity demands by emphasizing a wide range of resources including moderate to high levels of resource protection, recreation opportunities, and commodity outputs. Important elements are: (1) Recommending a moderately high amount of additional wilderness while managing most remaining unroaded lands for semi-primitive recreation; (2) Regenerating a mix of well-stocked and poorly-stocked timber lands, and producing timber at a sustainable level in a cost-effective manner through both even- and uneven-aged management; (3) Protecting and enhancing habitat for a mixture of mldlife species that depend upon early and late successional stages; (4) Rehabilitating developed recreation facilities to partially meet the expected increase in demand, and (5) Maintaining desired and acceptable levels of visual quality when regenerating timber stands. Other resources will be managed to fit with these emphases

2. CUR (Current Alternative)

This alternative continues current management policies and practices. Important elements are: (1) Maintaining expenditures at the current level; (2) Providing no increase in recreational facilities; and (3) Maintaining current management policies and commodity outputs (e.g., timber harvests, forage for livestock, etc.) for most resources while allowing reductions in visual quality and in semi-primitive recreation opportunities. Other resources will be managed to fit with these emphases

3. EGP (Environmental Group Alternative)

This alternative emphasizes amenity outputs while maintaining commodity outputs on lands not needed for amenity values. Important elements are (1) Producing timber, range, and other commodities efficiently while conforming to "very high" visual quality objectives along State highways; (2) Using the group selection method of uneven-aged management; (3) Recommending a high level of wilderness expansion; (4) Providing recreational facilities to partially meet the expected increase in demand for developed recreation, and allowing for very extensive semi-primitive recreation; (5) Emphasizing wildlife habitat retention for species that depend on late successional stages, and (6) Maintaining range utilization at the current level except in areas of wildlife conflicts or water quality degradation. Other resources will be managed to fit with these emphases.

4. TGP (Timber Industry Group Alternative)

This alternative provides moderately high levels of commodity benefits while preserving amenity values at present levels. Important elements are (1) Increasing timber outputs, recreational facilities, and other commodities to maximize economic efficiency; (2) Regenerating a mix of well-stocked and poorly-stocked timber lands, and producing timber at a sustainable level in a cost-effective manner through both even- and uneven-aged management; (3) Managing other resources to conform to minimum acceptable levels of outputs; and (4) Providing for very little unroaded area recreation outside of existing wilderness. Other resources will be managed to fit these emphases

C. AFFECTED ENVIRONMENT

1. Biophysical Environment

The Lassen National Forest consists of about 1.1 million acres of forest and range lands in north-eastern California (see Figure 3-1). Three different geomorphic provinces meet within the Forest and contribute to its great diversity—the Sierra Nevada Mountains, the Southern Cascade Mountains, and the Modoc Plateau. Elevations range from 900 feet to 8,677 feet. Topography varies from deep river canyons to vast sagebrush flats and to sharp rocky peaks. Annual precipitation ranges from 16 inches to 90 inches. Summers are hot and dry; winters are cool and wet with rain in the foothills and snow at the higher elevations.

Most of the land of the National Forest was formed by volcanic activity. The center and western portions of the Forest are in the Southern Cascade Mountain province and include such volcanic features as volcanoes, cinder cones, craters, ash and mudflow layers, and recent lava flows of basalt and andesite. The northeastern edge of the Forest is in the Modoc Plateau province, a flat to undulating highland capped by recent lava flows and shield volcanoes. The southern edge of the Forest lies in the Sierra Nevada province. In contrast to the volcanic provinces, the Sierra Nevada is primarily composed of granitic and metamorphic rock and is much steeper.

Lakes and streams on the Forest are also diverse. Eagle Lake, the second largest natural lake entirely within California, is a closed basin at the junction of the three provinces. Lake Almanor is a large reservoir in the well-watered Feather River watershed. Lands east of the Cascade summit are relatively dry and drain eastward to closed basins by two main streams, Pine Creek (to Eagle Lake) and the Susan River (to Honey Lake). The dry lands of the Modoc Plateau drain westward to the Pit River, a tributary of the Sacramento River, as do Hat Creek and Burney Creek. The west side of the Forest is much wetter and has many stream systems that are tributaries to the Sacramento River. These include Battle Creek, Antelope Creek, Mill Creek,

Deer Creek, and the North Fork of the Feather River.

The vegetation of the Forest is determined by geology, soils, elevation, climate, slope, aspect, and fire occurrence. The six major vegetation categories are conifer forest, hardwood forest, chaparral, sagebrush shrub, herbaceous, and riparian.

2. Economic Environment

The Forest's primary zone of influence extends to five northeastern California counties: Butte, Lassen, Plumas, Shasta, and Tehama. These counties comprise the economic impact area for the Forest. The five impact counties are strongly affected by Forest Service employment and timber, range, wildlife, and recreation activities. Shasta and Butte Counties are the least affected because of their relatively large and diverse economies.

Population in the impact area from 1970-1989 grew at an annual rate of 3.7 percent. The major source of this growth was immigration. Historically, employment has centered around agriculture, manufacturing, and government. While government employment is still a key factor, services and wholesale/retail trade have been making an increasingly significant contribution to the economies of the impact area.

Other economic impacts of the Forest are direct employment (with 6.5 million dollars in disposable income per year), Forest Reserve Fund payments to the counties (varying from \$3 to \$9 million recently), and indirect effects from timber sales, livestock grazing, and recreation development.

3. Social Environment

Social impacts of Forest management most directly affect people living near the Forest. Interaction patterns and values help distinguish several social groups among the affected people. The most prominent groups are ranchers, timber industry workers, government workers, urban emigrants, and Native Americans.

4. Resource Environment

Air Quality

Air quality on the Forest is normally high throughout the year, and the Forest meets the National Ambient Air Quality Standards. The Caribou and Thousand Lakes Wildernesses and Lassen Volcanic National Park Wilderness area are class I areas. The balance of the Forest is class II. The primary source of pollutants related to Forest activities is prescribed fire. When necessary to meet air quality standards, burning is limited or postponed.

Biomass

Biomass, as used here, is all above-ground portions of trees, other than sawlogs. It is becoming an increasingly important fuel source for both homeowners and commercial users. The commercial users utilize biomass in wood-fired power plants for on-site consumption and to generate electricity to sell to the local utilities. Homeowners use biomass as a source of home heating. This potential conflict is addressed by the policy of giving preference to personal users. Estimated demand for biomass for wood-fired plants is currently 1,240,000 oven dry tons per year. Under current management, approximately ten percent of this demand will come from the Lassen National Forest.

Cultural Resources

The Forest's cultural resources provide information on the prehistoric and historic ethnic heritage. Prehistoric sites range from winter village complexes to scattered hunting stations. Historic sites include homesteaders' cabins, ranchers' line shacks, logging camps, and emigrant trails. About 48 percent of Forest lands have been inventoried for cultural resources and 1,788 properties identified (as of 1982). One Archaeological District (Lake Benton) is on the Register of Historic Places.

Energy

The major energy source associated with the Forest is hydroelectric. There are ten existing projects on, or partially dependent on, the Forest, which produce 694 megawatts of electricity—an amount less than two percent of California's total production. Wind and solar power potential is rated above average, but there has been no commercial interest expressed.

Facilities

The Forest maintains a developed road system of 3,472 miles, 465 miles of trails, 81 administrative buildings, and 19 small dams. New road construction has averaged around 30 miles per year since 1970. The local road system may need to be expanded to meet future activity demands.

Fire and Fuels

The Forest has responsibility for protection of 933,000 acres of National Forest land and 280,000 acres of private land. This is accomplished through an average expenditure of \$1.6 million, which funds several fire engines and suppression crews, an attack plane, air tanker facilities, a helitack crew, and a Regional Hot Shot crew (Lassen Hot Shots). Recent trends have included a declining emphasis on suppression forces and an increasing interest in fuels management activities. Prescribed fire use has steadily increased, with the Forest recently averaging 6,400 acres of prescribed burns per year.

Firewood

Personal use firewood is an area of great public interest on this Forest. The recent construction of wood-fired power plants near the Forest, coupled with a 500 percent increase in the number of personal use permits issued since 1973, creates a potential conflict for the same material. As a matter of policy, personal use firewood has priority over other uses. Firewood demand at the end of the next ten years is expected to be 30,000 cords.

Fish

Twenty-nine species of fish occur on the Forest. Chief among these (and indicators of habitat needs of other species) are the chinook salmon, steelhead trout, and rainbow trout. They occur in major lakes (53,200 total surface acres in Eagle Lake, Lake Almanor and Lake Benton), "pot hole" lakes, 350 miles of resident trout streams, and 86 miles of existing and potential anadromous fish habitat. The Forest is well known for its trout fishing, and provides a considerable amount of recreational angling. The anadromous fisheries receive no recreational use on the Forest due to angling restrictions. However, 30 percent of the total Central Valley spring-run chinook salmon are produced on the Forest. This fishery provides for both ocean sport and commercial harvest.

Forest Health

Forest pests have evolved during the course of the Forest's development and are an integral part of that environment. Integrated pest management is an attempt to control the effects of these insects, diseases, weeds, or destructive animals when management goals or public health is threatened.

Geology and Groundwater

The Forest is predominately volcanic in origin, with the exception of the southern portion which has granitic, metamorphic, and sedimentary rock. This southern portion can pose a stability hazard when slopes are steep, but the occurrence of landslides in the past has been of minor significance. The volcanic terrain presents a volcanic hazard, and the Forest has an active role in Lassen Volcanic National Park's volcanic emergency plan. The Forest's seismic hazard rating varies from low to medium, in correlation with known faulting. Groundwater quality is high, but the dry areas of the north and east have prompted a groundwater development program.

Lands

The lands program includes land ownership adjustments, special uses, right-of-way acquisition, and land line location. Land ownership adjustments principally take the form of land exchange. Currently, one large exchange is in progress and several small exchanges are being negotiated. More than 350 non-recreational special use permits are administered by the Forest. The right-of-way program functions primarily in support of timber sales and averages about 15 cases per year. Land line location is an ongoing program that is expected to be completed by the year 2020.

Law Enforcement

The Forest's four major law enforcement problems are: theft of timber, primarily firewood; vandalism and removal of cultural resources; facility security; and marijuana cultivation. The Forest deals with these problems according to a law enforcement plan completed in 1983 and in cooperation with other Federal, State, and local agencies.

Minerals

The primary mineral activities on the Forest are ongoing mining of the diatomite deposits in the

vicinity of Lake Butte, and geophysical exploration for geothermal or oil and gas resources in the central and northern portions of the Forest. The Forest encourages mineral development and is responsible for protecting surface resources through mitigation measures in Plans of Operation. Volcanic cinders are abundant on the Forest's volcanic terrain, and the high use level is expected to continue.

Range

The Forest has 61 active grazing allotments, and produces 49,700 AUMs per year on 410,000 acres. A 1980 assessment rated the range resource conditions as 28 percent good, 59 percent fair, and 13 percent poor. Overall, rangelands are in satisfactory condition, with a static to improving trend. The future trend is for permittees to assume more responsibility for maintaining and initiating range improvements, and for an increase in the use of transitory forage.

Recreation

The Forest supplied over 12 million recreation visitor days in 1990. Dispersed recreation accounts for 38 percent of this total and includes motorized recreation travel, dispersed camping, hunting, and fishing. Developed recreation accounts for 62 percent of the total. Most of this use occurs in campgrounds located along streams and lakes, and at developed beaches and boat ramps. Some occurs at recreation residence tracts on the Forest. Generally, the developed recreation sites are in good condition, and are expected to have sufficient capacity to accommodate increased use for 35 years. Use is expected to increase at a rate equal to the population growth rate of the impact area.

Sensitive Plants

Twelve Sensitive plant species are known to occur on the Forest: *Arabis constancei*, *Asplenium septentrionale*, *Calochortus longebarbatus*, *Eryngium mathiasiae*, *Lupinus dalescae*, *Gratiola heterosepala*, *Mimulus pygmaeus*, *Pentstemon personatus*, *Orcuttia tenuis*, *Scheuchzeria palustris* var. *americana*, *Sedum albomarginatum*, and *Senecio eurycephalus* var. *rosei*. Several other plant species with low population numbers have a high probability of occurring on the Forest. Any activities with a potential to degrade Sensitive plant habitat will be modified or mitigated to avoid the areas they occupy.

Soils

Most of the Forest soils have come from weathered volcanic rock material. Minor portions of the Forest have soils derived from granitics, nonmarine sediments, metavolcanics, and metasediments. Most of the soils have high percentages of rock fragments. Depth to bedrock varies widely from shallow (less than 20 inches) to very deep (more than 60 inches), but in most areas it is moderately deep to deep (20 to 60 inches). Erosion and compaction are the main cause of loss of soil and soil productivity, and are caused by timber harvesting, fires, livestock grazing, and vehicle use. Natural- or geologic- erosion occurs on the Lassen and can also lead to a loss of soil or soil productivity. A total of 252,000 acres on the Forest have a high erosion hazard rating, primarily because of their slope. Management direction on these areas is aimed at preserving the productivity of the soil.

Special Areas

The Forest has two Experimental Forests and two Research Natural Areas (RNA's). Six additional Research Natural Areas are candidates for designation, to fulfill Regional targets. Seven areas totaling more than 100,000 acres were studied as potential National Natural Landmarks, and 14 areas were studied as potential Special Interest Areas.

Timber

Approximately 770,000 acres of the Forest are potentially available and suitable for timber production. This land occurs in four major timber types: mixed conifer (57 percent), eastside pine (29 percent), red fir (10 percent), and lodgepole pine (4 percent). The size class distribution shows a preponderance (78 percent) in the pole and small sawtimber class. Timber harvest activities in the last 25 years have been guided by the 1960 and 1975 timber management plans, which in the last decade provided for an average annual sale volume of 179 MMBF. The objective of these plans was conversion from uneven-aged to even-aged management on appropriate sites through clearcutting, overstory removal, intermediate harvests, and modified timber harvest when necessary for other resource objectives. There are currently 18 mills in the impact area with an annual production of 871 MMBF. These mills bid on timber from the Forest. This high demand, coupled with high-value tree species

(Jeffrey, ponderosa, and sugar pines) and low logging costs, have caused the Forest to lead the Region's National Forests in timber receipts in several years.

Alternatives considered in detail assume that herbicides are available for reforestation purposes. Appendix Y analyzes the effects on Forest timber output (ASQ) if herbicides are not used. Briefly, output levels will be reduced approximately 14 percent without herbicide use in reforestation activities.

Vegetation and Diversity

In addition to the commercial forest land, the Forest supports other vegetative types on about 300,000 acres. These include western juniper, noncommercial conifers, hardwoods and woodlands, chaparral, sagebrush, and herbaceous vegetation. Interspersed among these types are 12,000 acres of riparian habitat. Seral stage diversity will be maintained in commercial conifer types by a policy that requires a minimum of five percent of each successional stage of each vegetative type.

Visual Resources

Historically the Forest has presented a largely undisturbed, natural landscape to public view. The visual resource condition, however, has been declining for the last 40 years. This is a direct result of the natural landscape being altered by wildfires, road construction, timber harvesting, structures, brush clearing, and utility corridors. This trend is expected to continue. The Forest manages the land in accordance with five visual quality objectives that provide guidelines on the acceptable amount of change to the natural landscape. Currently, 9 percent of the Forest is managed as Preservation, 15 percent as Retention, 39 percent as Partial Retention, 27 percent as Modification, and 10 percent as Maximum Modification.

Water and Riparian Areas

The Forest has 1,650 miles of streams that carry a total average stream flow of 1.3 million acre feet of runoff from Forest lands. Water quality is good in all major streams. Forest lands are watersheds for many lakes, including natural lakes such as Eagle Lake, and major reservoirs such as Lake Almanor, North Battle Creek Reservoir, and McCoy Flat Reservoir. Water quality

can be improved in a number of watersheds, but known problem areas are limited to about 1,500 acres overall. The ability to increase water quantity is very limited and is estimated to be only a marginal two percent more than current levels. The riparian areas on the Forest total about 12,000 acres, and are generally in good condition. Damaged areas are localized or limited in extent, and usually occur as a result of livestock grazing, recreation use, and wildfire.

Wild and Scenic Rivers

The Nationwide River Inventory, a list of streams potentially eligible for Wild and Scenic River status, includes three streams that cross Forest land. Several other streams have been identified on the Forest for study for possible inclusion in the Wild and Scenic Rivers System. The streams were reviewed against eligibility criteria and reduced to three candidate Wild and Scenic Rivers: Mill Creek, Deer Creek, and Antelope Creek. The total length of Mill Creek flowing on Forest-administered lands is 26.5 miles, and an additional 5.5 miles are within the Forest boundary on private land. Deer Creek runs for 3.1 miles on Forest-administered land and another 7 miles on private land within the Forest boundary. Antelope Creek flows for 14 miles within the Forest boundary, of which two miles are privately owned. The Forest Planning process evaluates these candidate streams and can recommend Wild and Scenic designation to Chief of the Forest Service, the President, and Congress.

Wilderness and Further Planning Areas

The Forest has three wildernesses within its boundaries: Thousand Lakes (16,335 acres), Caribou (20,625 acres), and Ishi (41,100 acres). Ishi was designated upon passage of the California Wilderness Act of 1984, which also specified that six areas, totaling 51,686 acres of Forest land, be studied in the Forest Planning process for possible inclusion in the Wilderness system. These further planning areas are Butt Mountain (8,300 acres), Heart Lake (9,289 acres), Ishi B (20,027 acres), Mill Creek (7,990 acres), Trail Lake B (1,115 acres), and Wild Cattle Mountain (4,965 acres). Both the Caribou and the Thousand Lakes Wildernesses have management plans guiding the administration of these areas. The Ishi Wilderness Implementation Plan was completed in 1989. A supplement will be pre-

pared to further address the issues of grazing and inholder access.

Wildlife

The Forest provides habitat for about 361 species of fish and wildlife. This includes Endangered species (bald eagle, peregrine falcon, and Shasta crayfish), Threatened species (northern spotted owl) and seven species classified as Sensitive by the Pacific Southwest Region of the Forest Service (California spotted owl, goshawk, fisher, marten, great grey owl, willow flycatcher, and Sierra Nevada red fox). Including these species, a total of 18 wildlife management indicator species were identified to represent the habitat needs of all species on the Forest. These and other indicators include species dependent on early successional stages (deer, pronghorn antelope, black bear), late successional stages (bald eagle, spotted owl, goshawk, fisher, marten), and a number of special habitat elements including snags (bufflehead, osprey, and pileated and hairy woodpeckers), down wood (marten, black bear, pileated and hairy woodpeckers), hardwoods (gray squirrel, deer, black bear), wetlands (mallard, bufflehead), and meadows and riparian areas (black bear, deer, pronghorn, rainbow trout and salmon). In order to insure viable populations of spotted owls and goshawks, a series of "habitat areas" were established in a network across the Forest. Habitat areas were also tentatively identified to contribute to the viability of marten and fisher. Other indicators are managed for by achieving habitat objectives through direct habitat improvement or by coordination with other resources. Demand for wildlife is high. Major wildlife activities include hunting for deer and other species, and viewing a variety of wildlife. There is also high interest in providing for recovery of Threatened and Endangered species, and in maintaining viability and diversity of all species on the Forest.

D. ENVIRONMENTAL CONSEQUENCES

Under each alternative, a different combination of theme, resource program direction, and land allocation to management prescriptions produces different resource outputs and uses. Although the consequences of each alternative fall within certain limits due to the inclusion of a common

set of management requirements and practices, each alternative would result in distinct environmental consequences. These are summarized by alternative below.

Since it takes a substantial period of time for many of the effects to be significant, decade 5 effects are usually shown. This is based on the assumption that the same management would be continued for five decades, even though the Plan will be revised in 10-15 years and direction will probably change before then. Therefore, decade 5 effects are potential and shown only for the purpose of comparison.

PRF Alternative

Socio-Economic In decade 1, the PRF Alternative would provide 1,624 jobs, and 25 percent receipt shares to the counties would be \$5.5 million per year.

Air Quality Air quality would be moderately affected in this alternative because of the prescribed burning program. This burning may only occur when there is no danger of violating air quality standards, but smoke impacts may be noticed in smoke-sensitive and/or Class I milder-nesses.

Cultural Resources Cultural resources would be managed to maintain their values or recover those values subject to loss. Some information would be acquired and provided for public benefit. Overall, the risk to cultural resources in this alternative is expected to be low.

Fish Potential production of fish would increase above present levels. A low level of watershed disturbance coupled with a moderate level of habitat enhancement for resident and anadromous fish would result in production increases by decade 5 of six percent and one percent, respectively.

Range Annual grazing use would decrease by two percent to 48,500 AUM's and remain there in each decade. Use of transitory range would increase.

Recreation Developed recreation facilities would be rehabilitated or new facilities con-

structed to meet demand through the third decade. Additional trails would be constructed.

Soils Soil impacts would be reduced due to decreased timber harvest and fewer acres being treated. Effects on soils from harvesting, road construction, and increased recreational use and site development would also be offset by watershed improvement projects.

Ember Average annual timber sale volume for decade 1 would be 96 million board feet from 596,341 acres of suitable timber land. Forty-three percent of this land would be managed to retain a continuous forest cover. Group selection harvest would apply to 500 acres a year, 1,600 acres would be clearcut each year, and an additional 1,100 acres would be harvested using the shelterwood and stand maintenance methods. Annual intermediate harvesting would be 4,000 acres of commercial thinning and 1,500 acres of sanitation harvest.

Vegetation and Diversity Acres of large saw-timber and late seral stands would decline 14 percent from the base year level during decade 2, and by decade 5 would increase to 243,000 acres or 98 percent above the base year level.

Visual Resources There would be a slight decline in visual quality from current conditions, but major roads and trails would continue to be protected.

Water Water quality would meet State standards. Watershed restoration would be completed in two decades.

Wild and Scenic Rivers A total of 76 miles on three creeks are recommended for Wild and Scenic Rivers. On Mill Creek, 32 miles are recommended, 30 miles are recommended on Deer Creek, and 14 miles are recommended along Antelope Creek.

Wilderness A total of 21,584 acres would be recommended for wilderness (Heart Lake, and parts of Mill Creek, Trail Lake B, and Wild Cattle Mountain further planning areas).

Wildlife Habitat for Sensitive, Threatened and Endangered species would be managed to insure population viability for each species. Manage-

ment areas for marten, fisher, goshawks and spotted owls would be established to provide sufficient habitat for reproduction and dispersal. Wildlife populations in general would be expected to remain similar to existing conditions.

CUR Alternative

Socio-Economic In decade 1, the CUR Alternative would provide 2,296 jobs, and 25 percent receipt shares to the counties would be \$7.8 million per year.

Air Quality Air quality would be affected to the highest degree in this alternative since it requires the largest prescribed burning program. Burning would only occur when air quality standards would not be violated, but smoke would flow into smoke-sensitive areas.

Cultural Resources Cultural resources would be managed to maintain their values or recover those values if subject to loss. The risk to cultural resources would be high.

Fish Fish production potential would decline for anadromous fish and resident fish. Increased watershed disturbance would be somewhat offset by fish habitat enhancement. By decade 5, resident and anadromous fish production would decline by two percent and eight percent, respectively.

Range Annual grazing use would remain constant at the base year level of 49,700 AUM's for decade 1.

Recreation Capacity of sites would diminish and demand would not be met for developed recreation beyond the third decade. Dispersed recreation opportunities would decrease from present because of development of unroaded areas and a low level of trail maintenance.

Soils Soil impacts would remain at the current level.

Timber Average annual sale volume for decade 1 would be 171 million board feet from 744,577 acres of suitable timber land. Twenty-seven percent of this land would be managed to retain a continuous forest cover. Clearcut harvests

would apply to 3,800 acres per year, 2,100 acres would be harvested using the shelterwood method, and 2,000 acres per year would be treated using stand maintenance harvests. An additional 19,000 acres per year would receive sanitation harvests.

Vegetation and Diversity Large sawtimber and late seral acres would increase to a projected 162,000 acres by decade 5.

Visual Resources There would be a noticeable decline in visual quality when compared to base year (1982) conditions. Only major highways and key county roads would be protected.

Water Water quality would meet State standards. Watershed restoration would occur at a low level.

Wild and Scenic Rivers No river segments would be recommended for wild, scenic, or recreational designation.

Wilderness No new wilderness would be recommended.

Wildlife Wildlife dependent on late seral stage coniferous stands, such as spotted owls, marten, goshawks and fisher would decline. Limited timber harvesting is permitted within SOHA's, marten and fisher management areas. Even-aged timber management may benefit species dependent on early stage vegetation such as deer. However, increased road construction and human disturbance may cause a decline in habitat suitability. Wildlife species dependent on snags, such as cavity nesting birds, would also be expected to decline.

EGP Alternative

Socio-Economic In decade 1, the EGP Alternative would provide 1,618 jobs, and 25 percent receipt shares to the counties would be \$5.9 million per year.

Air Quality Air quality would be moderately affected from the prescribed burning program. Burning would only occur when air quality standards would not be violated.

Cultural Resources Cultural resources are best protected by this alternative. All important properties would be identified by the end of the first decade, and less intensive land use would result in low **nsk** to cultural resources.

Fish Fish production potential by decade 5 would increase six percent for resident fish and one percent for anadromous fish. A low level of watershed disturbance would accompany habitat enhancement for resident and anadromous fish.

Range Annual grazing use would decrease two percent from the base year to **48,500** AUM's in decade 1, and remain at that level for the five decades.

Recreation Demand would be met through the third decade. Although developed recreation facilities would be expanded in decade 4, only 40 percent of demand would be met. Total dispersed use would increase, as high levels of unroaded recreation opportunities are maintained in semi-primitive areas and wilderness.

Soil Soil impacts would decrease to the lowest level in this alternative, due to the lower timber harvest level and use of group selection treatments.

Timber Average annual sale volume for decade 1 would be **94** million board feet from **585,881** acres of suitable timberland. Forty-four percent of this land would be managed to maintain continuous forest cover. The group selection harvest method would regenerate **3,100** acres per year, stand maintenance methods would be used to harvest an additional **900** acres per year, and no acres would be harvested by clearcut or shelterwood. Intermediate cutting would be **4,000** acres of commercial thinning and **1,500** acres of sanitation harvest.

Vegetation and Diversity Large sawtimber and late seral acres would decline from the base year in decade 2, but would increase to a projected **236,000** acres by decade 5, or **92** percent above the **1982** level.

Visual Resources Visual quality would be the highest among all the alternatives. Most foreground, middleground, and background views would appear natural to slightly-modified.

Water Water quality would meet State standards. Watershed restoration would be completed in decade 1.

Wild and Scenic Rivers A total of **76** miles on three creeks are recommended for Wild and Scenic Rivers. On Mill Creek, **32** miles are recommended; **30** miles are recommended on Deer Creek; and **14** miles are recommended along Antelope Creek.

Wilderness A total of **43,086** acres would be recommended for wilderness (Heart Lake, Ishi **B**, Mill Creek, Wild Cattle Mountain, and a portion of Trail Lake **B** further planning areas).

Wildlife Habitat for Sensitive, Threatened and Endangered species would be managed to maintain population viability for each species. Management areas for marten, fisher, goshawks and spotted owls would be established to provide sufficient habitat for reproduction and dispersal. Wildlife populations in general would be expected to remain similar to existing conditions.

TGP Alternative

Socio-Economic In decade 1, the TGP Alternative would provide **1,860** jobs, and **25** percent receipt shares to the counties would be **\$6.8** million per year.

Air Quality Air quality effects would be moderate in this alternative. The timber-related prescribed burning program is the second highest. Prescribed burning would only occur when air quality standards would not be violated, but smoke would flow into smoke-sensitive and Class **I** areas.

Cultural Resources Cultural resources management would be limited, and commodity production would increase the level of adverse impacts. The **nsk** to cultural resources would be moderate in this alternative.

Fish Fish production potential in decade 5 would increase four percent for resident fish, and decline by four percent for anadromous fish. Higher watershed disturbance would be somewhat offset by habitat enhancement for resident and anadromous fish.

Range Annual grazing use would decrease slightly to 48,500 AUMs in decade 1, and remain at that level for the five decades

Recreation Demand for developed recreation facilities would be met through the third decade. A limited range of dispersed recreation opportunities would be provided, and no semi-primitive areas would be retained

Soils Soil impacts would decrease below current levels due mainly to the lower timber harvest level.

Timber Average annual sale volume for decade 1 would be 118 million board feet from 633,796 acres of suitable timber land. Thirty-eight percent of this land would be managed to provide continuous forest cover. This alternative would regenerate 1,000 acres a year by the group selection harvest method, 200 acres a year by the shelterwood method, and 3,300 acres a year by clearcut. An additional 900 acres would be treated using stand maintenance harvest methods. Intermediate cutting would be 4,000 acres of commercial thinning and 1,800 acres of sanitation harvest

Vegetation and Diversity Large sawtimber and late seral acres would decrease from the base

year in decade 2, then increase to a projected 228,000 acres by decade 5, or 85 percent above the 1982 level

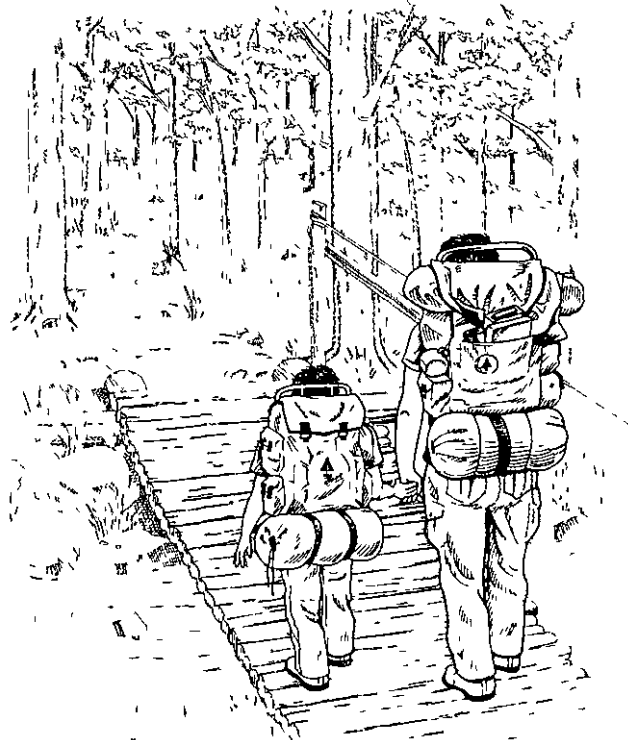
Visual Resources Visual quality would decline slightly below current conditions. The major use corridors would appear natural, while the general forest backgrounds would appear somewhat modified by timber harvest

Water Water yields would meet State standards. All watershed restoration projects would be completed in two decades

Wild and Scenic Rivers Small amounts of wilderness designation are recommended within the Ishi Wilderness. Eight miles each are recommended along Mill and Deer Creeks

Wilderness No additional acres would be recommended for wilderness

Wildlife Habitat for species dependent on late seral coniferous forests would be maintained to meet the minimum requirements for population viability. Management areas for marten, fisher, goshawks and spotted owls would be established to provide sufficient habitat for reproduction and dispersal. Wildlife populations in general would be expected to remain similar to existing conditions



Purpose and Need **1**



View of Lassen **Peak** from Butt Mountain

CHAPTER 1 - PURPOSE AND NEED

A. PURPOSE AND NATURE OF ACTION

Introduction

This final Environmental Impact Statement (hereafter referred to as FEIS) describes four alternatives, including a selected alternative, for the Land and Resource Management Plan (Forest Plan) for the Lassen National Forest. A “no action” alternative, called the Current Management (CUR) Alternative, is included in the analysis to depict outputs and environmental effects expected from the Continuation of present harvest levels.

The purpose of Forest management is to allow multiple use of lands and provide a sustained yield of goods and services in a manner that maximizes “net public benefits” and preserves environmental quality. Net public benefits are the overall, long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs), whether or not they can be quantified.

This FEIS describes the issues, concerns, and opportunities associated with management of the Lassen National Forest. It describes four alternative ways to serve the public while protecting the Forest, satisfying guiding legislation, and addressing local, regional, and national issues. The environment that will be affected, and the environmental consequences of implementing any alternative, are also described. A Preferred Alternative is presented in detail in the Forest Plan, an accompanying document.

Legislative Framework

In the 1970's Congress responded to the need for long-range planning of resource use within the National Forests by enacting

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

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

As this legislation required, implementing regulations were issued by the Secretary of Agriculture (and later revised), see 36 CFR 219. The legislation requires that comprehensive, long-range Forest Plans replace separate resource management plans and Ranger District plans. The legislation also requires investigation and public disclosure of

1. management alternatives that would address the range of Forest management issues and concerns,
2. the environment to be affected by the Plan, and
3. anticipated significant environmental consequences of the alternatives.

These are the major subjects in this Environmental Impact Statement, which complies with provisions of the National Environmental Policy Act (NEPA) and regulations of the Council on Environmental Quality (including the standard format of 40 CFR 1502.10), and the NFMA Regulations (36 CFR 219, published September 30, 1982). Notice of preparation of this Environmental Impact Statement (EIS) was published in the Federal Register on December 7, 1979.

The Forest Plan

The Forest Plan is published concurrently with this FEIS as a companion document. The Forest Plan

- 1 guides management and establishes output objectives of the Forest for 10-15 years (the “planning period”),
- 2 allocates land to the combination of management activities for which it is most suited.

- 3 shows potential resource outputs for the next 50 years if the Plan were continued for that long; these are shown for purposes of comparison and are likely to change as the Forest Plan is revised;
- 4 responds to major issues, management concerns, and resources opportunities,
- 5 will be revised at least every 15 years and ordinarily every 10 years, or whenever conditions or demands have significantly changed, and will be renewed every five years to determine need for more frequent revision,
6. may be amended by the Forest Supervisor at any time if the change is not significant and public notice is provided (provisions for amendment or revision of the Plan are in 36 CFR 219.10(f) and (g)),
- 7 will supersede or incorporate by reference individual plans now being used to manage the Forest. As necessary, the incorporated plans will be amended to be consistent with the Forest Plan. These Plans are

- (2) Annual Marijuana Eradication Plan
- (3) Antelope Herd Plan
- (4) Bald Eagle Territory Plans
- (5) Deer Herd Plans
- (6) Districts' Annual Operating Plans
- (7) Range Allotment Management Plans
- (8) Harvey Valley Experimental Range Plan 1954
- (9) Fishenes Habitat Management Plan 1967
- (10) Visitor Information Semce Plan 1969
- (11) Osprey Management Plan 1971
- (12) Lake Almanor Recreation Management Composite Plan 1972
- (13) Wild Horse Management Plan 1975 (proposed)
- (14) Canbou Wilderness Management Plan 1976
- (15) Forest Off-Road Vehicle Plan 1976
- (16) Thousand Lakes Wilderness Management Plan 1977
- (17) Long-Range Plan for the Operation of Swain Mountain Experimental Forest 1979
- (18) Long-Range Plan for the Operation of Black Mountain Experimental Forest 1980
- (19) Canbou Wilderness Fire Management Plan 1982
- (20) Pacific Coast Peregrine Falcon Recovery Plan 1982
- (21) Bizz Johnson Trail Management Plan 1983
- (22) Facilities Master Plan 1989
- (23) Ishi Wilderness Implementation Plan 1989
- (24) Vegetation Management for Reforestation 1989
- (25) Winter Off-Highway Vehicle Plan 1989

Existing Plans

a. Superseded by Forest Plan, no separate plan retained:

- (1) Almanor Ranger District Multiple Use Plan 1972
- (2) Eagle Lake Ranger District Multiple Use Plan 1972
- (3) Fire Management Plan 1972
- (4) Hat Creek Ranger District Multiple Use Plan 1972
- (5) Mineral Ranger District Multiple Use Plan 1972
- (6) Forest Timber Management Plan 1975
- (7) High Lakes Recreation Management Plan 1976

b. Review and update to be consistent with the Forest Plan as soon as possible:

- (1) Annual Cooperative Law Enforcement Plan

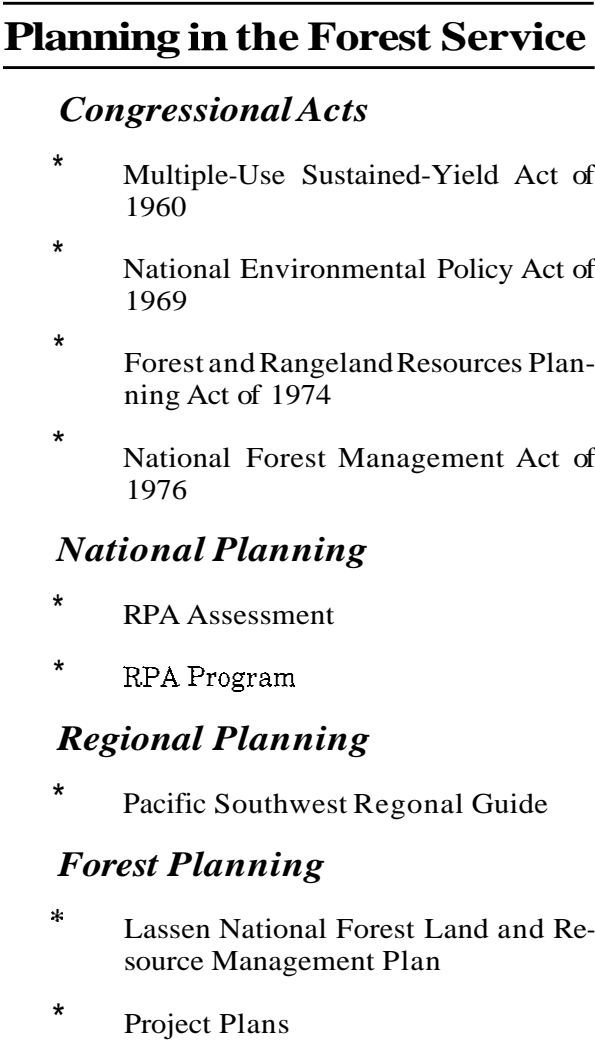
Forest Service Planning Process

Forest Plans are one part of a larger Forest Service planning effort. Based on information from the nine Forest Service Regions, the National RPA Recommended Program sets direction and assigns production targets to the Regions. Each Region in turn provides direction and a share of the production targets to its Forests through its Regional Guide. Each Forest Plan then validates or provides a basis for changing the production targets assigned by the Region.

Distnet Rangers carry out this planning direction through on-the-ground activities and projects. They will use Forest Plan direction and EIS analyses as a framework for local project environmental analyses and decisions. This process of “tiering” to the broader documents and incorporating the Plan and EIS by reference permits concentration on issues specific to each project. Similarly, the Forest Plan and EIS are tiered to the Pacific Southwest Regional Guide and EIS (1984), which are tiered to the National RPA Program and EIS.

In summary, Figure 1-1 shows the levels of Forest Semce planning, ongmating with Congress and extending d o m to the project level

Figure1-1



The Lassen National Forest Plan was prepared through an interdisciplinary approach with full public participation as required by NEPA and NFMA. See Chapter 5 for a list of the interdisciplinary team members. Public participation and the scoping of issues is discussed later in this chapter. The major steps in Plan preparation were as follows.

- 1 Identification of issues, concerns, and opportunities
- 2 Development of planning cnteria.
- 3 Inventory of data and collection of information
4. Analysis ofthe management situation
- 5 Formulation of alternatives
- 6 Estimation of effects of alternatives
7. Evaluation of alternatives
- 8 Identification of the preferred alternative, public renew, and amendment of the drafts
- 9 Plan approved by the Regional Forester
- 10 Plan implementation, and monitonng and evaluation

This FEIS presents the results of the first eight planning actions and identifies a Preferred Alternative. The Preferred Alternative serves as the basis for the final Forest Plan. Because of the number of changes made since the draft FEIS and Plan were released in 1986, there will be a 60-day public comment period on this FEIS and Plan. The Regional Forester will issue his decision approving a Forest Plan based on the analysis in the FEIS and the public comments received. Public comments should focus on new or additional factual information regarding the issues or where the analysis may have been incomplete. Reviewers of this FEIS and final Plan must structure their participation dunnng the public comment period so it alerts the Forest Service to the reviewers' position and contentions. This will allow the Regional Forester to meaningfully consider them and respond to them.

in the ROD. Modification of the Preferred Alternative may be considered pending review of public comments. The final plan will be approved under NFMA (36 CFR 219.12(j)).

Appeal Rights

Upon Regional Forester approval of the Lassen National Forest Plan in the Record of Decision, the Forest Service has an internal administrative review process available to members of the public who wish to challenge a Forest Service decision (36 CFR 217). Two copies of the notice of appeal should be sent within 90 days from the date the Record of Decision was published in the legal notice section of the *Sacramento Bee* to

Chief (1570)
USDA Forest Service
Auditor's Building
201 14th Street, SW
Washington, DC 20250

B. ORGANIZATION OF THIS DOCUMENT

The remainder of this chapter describes the location of the Forest, the need for management change, and the issues that guided the planning process.

Chapter 2 Alternatives defines the management alternatives, describes their development, and compares them. A summary comparison of the environmental consequences (from Chapter 4) is also included.

Chapter 3 Affected Environment describes the environment that would be affected by the alternatives including supply, demand, and management opportunities for the various resources.

Chapter 4 Environmental Consequences predicts the effects that each alternative would have on each of the Forest's resources described in Chapter 3.

A **Glossary** is located at the end of this document to aid readers unfamiliar with technical or agency

terminology. It also spells out acronyms used in the EIS.

The **Appendices A through Z** give more detailed analyses, information, or documentation of several aspects of Forest management.

The public may also review the Planning Records at the Forest Supervisor's Office, 55 South Sacramento Street, Susanville, CA 96130. These files contain details of the planning process and are hereby incorporated by reference into this EIS (36 CFR 219.10(h)). Specific parts of these Planning Records are referred to throughout the EIS and Forest Plan.

C. LOCATION

The Lassen National Forest is located in northeastern California within parts of five counties—Butte, Lassen, Plumas, Shasta, and Tehama. The Forest also administers small portions of the Shasta and Modoc National Forests lying in Siskiyou and Modoc Counties. The Forest Plan covers all of the land administered by the Lassen National Forest, a total of 1,129,585 acres ^{1/}. See Figure 1-2. The Forest surrounds Lassen Volcanic National Park, which is administered by the U.S. Department of the Interior, National Park Service.

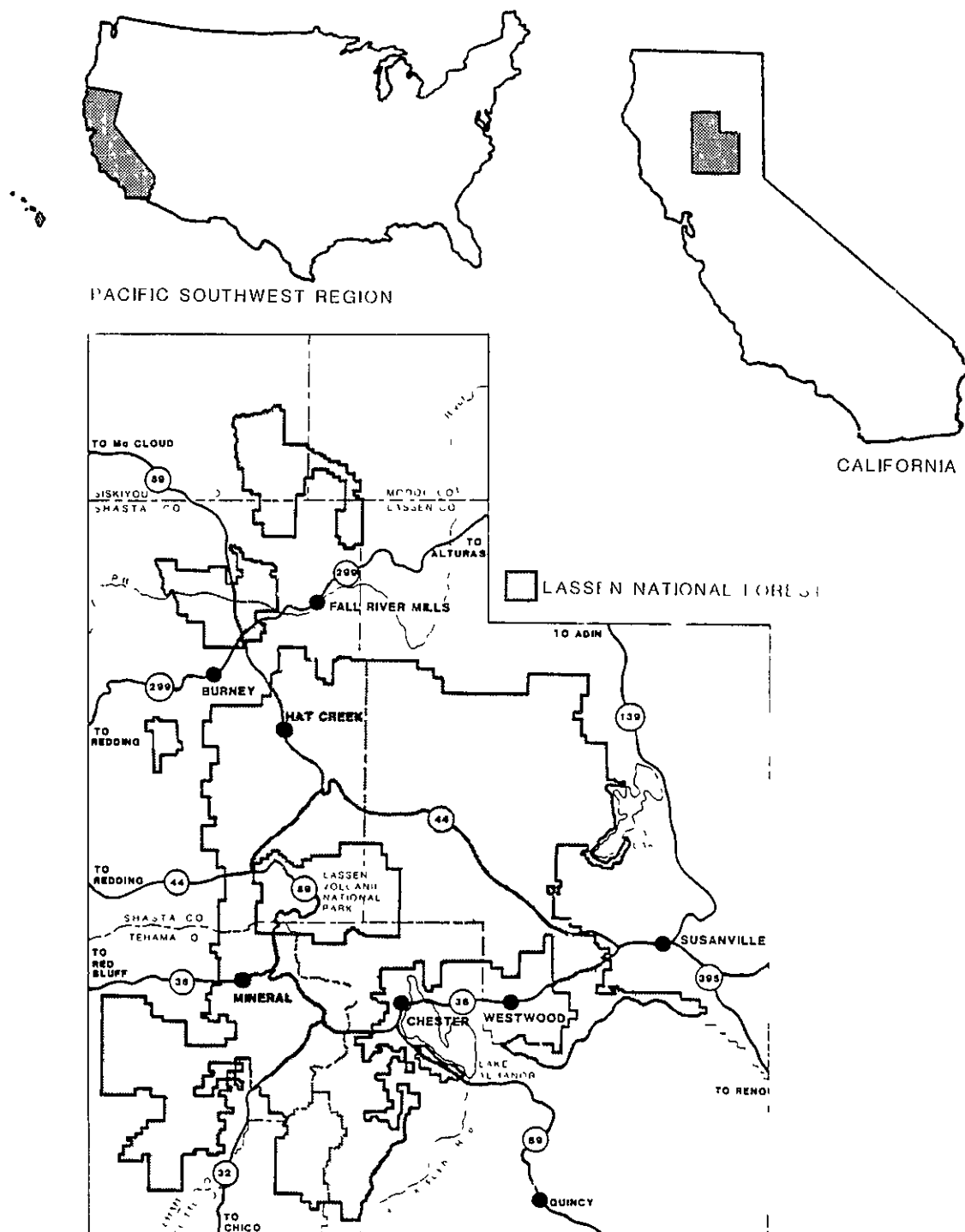
The Sacramento Valley population centers of Colusa, Red Bluff, and Redding lie west of the Forest. The community of Susanville lies to the east. Several small communities are scattered near and inside the Forest boundary, including Mineral, Old Station, Burney, Little Valley, Spalding Tract, Westwood, and Chester. About 206,700 people live within the Forest's five-county zone of influence.

The Forest is divided into three Ranger Districts. The Almanor Ranger District is the largest, comprising the southwest portion of the Forest. The Hat Creek Ranger District comprises the northwest portion, and the Eagle Lake Ranger District comprises the northeast portion.

^{1/} Actual National Forest acreage now totals 1,140,000 due to recent land exchanges and acquisitions since 1989 when final analysis began.

Figure 1-2

Location of the Forest



D. NEED FOR MANAGEMENT CHANGE

The Lassen National Forest dates back to 1905, but only in the last two decades has land management planning been done comprehensively. Prior to the 1970's, various resources of the Forest were managed according to separate plans such as the Lake Britton Deer Herd Plan, the Silver Lake Land Adjustment Plan, and the Eagle Lake District Fire Prevention Plan. These plans were not well coordinated with other resource uses or between Districts. Then, with the passage of the Multiple-Use Sustained-yield Act of 1960, the Forest developed Multiple-Use Plans for each Ranger District. They were revised in 1972-1975, and remain in effect today. These plans were not coordinated between Districts. The first Timber Management Plan became effective in 1960 and was revised in 1975. Although applicable to the entire Forest, it addresses the management of only one resource.

In 1976, the National Forest Management Act amended the Forest and Rangeland Renewable Resources Planning Act, calling for the Secretary of Agriculture to "form one integrated plan for each unit of the National Forest System." This land and resource management plan, to be prepared by an interdisciplinary team with full public participation and coordination with State, local, and other Federal agencies, would provide coordinated management direction for all resources and all areas of the Forest. The public and agency involvement for this planning process resulted in numerous questions and suggestions for change in current Forest management.

E. SCOPE OF ISSUES ADDRESSED

As noted earlier, the first step of the planning process was identification of public issues and management concerns. From November 1979 to January 1980, a total of 216 responses were received from the public, State agencies, and Lassen National Forest managers. These were condensed into 86 specific issues that could be addressed in the planning process and grouped into 16 resource areas. A summary issue for each resource area was formulated. In July 1981, the

results were circulated to the public in the Forest's Issues Package. Subsequent analysis and evaluation led to a total of 26 summary issues. (See Appendix A for a more detailed explanation of the issue and concern identification process.)

These issues establish the scope and depth of the analysis needed for this EIS, and they motivate the formulation of management alternatives. Thus, each alternative considered in this EIS addresses the issues differently. See the Summary Treatment of Issues and Concerns in Chapter 2, Table 2-21. (Chapter 2 of the Forest Plan also describes the issues and how they are addressed in the Preferred Alternative.)

The 26 issues and concerns for the Lassen National Forest are.

- 1. AIR QUALITY** - How should air quality be protected in various areas from activities on the Forest?
- 2. BIOMASS** - What kinds and amounts of biomass can be utilized for energy while meeting ecological needs?
- 3. CULTURAL RESOURCES** - How should the Forest most effectively provide for protection and interpretation of prehistoric and historical resources while managing its land for other uses?
- 4. ENERGY** - How should the Forest be managed and operated to best meet local and regional energy needs?
- 5. FACILITIES** - What transportation systems and other facilities should be established and maintained on the Forest to provide for management needs?
- 6. FIRE AND FUELS** - What fire management and fuel treatment programs will best protect life, property, and environmental quality while assisting in resource management?
- 7. FIREWOOD** - How can a sustained supply of firewood be provided and what should be the priorities in its allocation?
- 8. FISH** - How should the productivity, quality, and diversity of fish habitat be provided or protected?

9. FOREST HEALTH - What biological pests affect timber and other resources on the Forest and what pest management methods should be used?

10. GEOLOGY - What significant geological features are there on the Forest and how should they be developed, protected, or interpreted?

11. LANDS - How should the Forest coordinate land use practices with adjoining public and private landowners, and to what extent should it reduce possible conflicts with intermingled lands by implementing land ownership adjustments?

12. LAW ENFORCEMENT - What priorities and strategies should be followed in the enforcement of laws on the Forest?

13. MINERALS - How should mineral development be encouraged while protecting surface resources?

14. RANGE - Where, how, and with what range improvements should livestock grazing occur on the Forest?

15. RECREATION - What types of recreation facilities and opportunities should be provided on the Forest, and in what amounts, proportions, and locations?

16. SENSITIVE PLANTS - What Sensitive plants grow on the Forest and how should they be preserved?

17. SOILS - How should the Forest soil resource be protected and where should it be enhanced?

18. SPECIAL AREAS - Should management of existing special areas on the Forest be changed?

Should additional special areas be established for unique resources, and if so, where should they be located and how should they be managed?

19. TIMBER - Where and how should the Forest manage its timber resources, while providing for other resource values such as diversity and recreation?

20. VEGETATION AND DIVERSITY - Where and how should the Forest manage its vegetation resources over time, to maintain diversity while providing other resource outputs?

21. VISUAL QUALITY - What visual quality objectives should be maintained on the Forest?

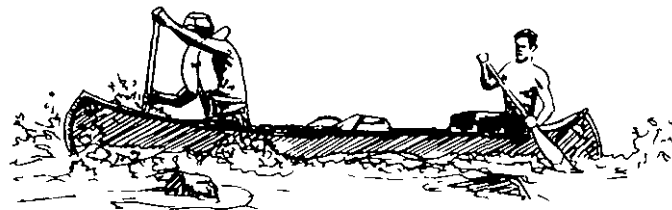
22. WATER AND RIPARIAN AREAS - How should watersheds on the Forest be managed to protect and enhance water quality and quantity?

23. WILD AND SCENIC RIVERS - What river segments should be recommended for inclusion in the Federal Wild and Scenic River System?

24. WILDERNESS AND FURTHER PLANNING AREAS - How should the Forest's three existing Wilderness Areas be managed to maintain their wilderness character; and how should the Forest's six further planning areas be allocated and managed?

25. WILDLIFE - What type, amount, and diversity of wildlife habitats should be provided through time on the Forest?

26. SOCIO-ECONOMIC - What are the costs, benefits, and socio-economic effects of management of the Forest?



Alternatives Including the Proposed Action

2



Dry Buttes Timber Sale

CHAPTER 2 -ALTERNATIVES INCLUDING THE PROPOSED ACTION

A. INTRODUCTION

This chapter documents the alternative development process and the comparison of the alternatives. Included are

- B. **Alternative Development Process** Gives background information, including mandatory requirements, and describes how the alternatives were formulated
- C. **Benchmarks** Describes the purpose and function of benchmarks and gives the analysis and conclusions for each
- D. ***Alternatives Considered But Eliminated From Detailed Study*** Describes the alternatives rejected and the rationale for eliminating them from further consideration
- E. **Alternatives Considered in Detail** Summarizes management direction common to all alternatives, describes and compares each of the alternatives

B. ALTERNATIVE DEVELOPMENT PROCESS

Definition of Alternative

An alternative is a set of goals and objectives centered around a theme that guides the management of Forest resources from the current condition to a desired future state. The National Environmental Policy Act (NEPA) regulations (40CFR 1502) mandate consideration of all reasonable alternatives to a proposed action, including identification and discussion of alternatives eliminated from detailed study.

The National Forest Management Act (NFMA) regulations (36 CFR 219) specify that the primary goal in formulating alternatives, in addition to NEPA compliance, is to "provide an adequate basis for identifying the alternative that

comes nearest to maximizing net public benefits" (219.12(f)). Net public benefits are the overall long term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. See Appendix D for further details. In addition, NFMA regulations specify requirements for analysis, for distribution between maximum and minimum resource potentials, and for meeting Resources Planning Act targets. Each alternative must use the most cost efficient combination of management prescriptions to meet its objectives. The measure of cost efficiency is Present Net Value (PNV).

Each alternative described in this chapter is based on a theme. A set of management prescriptions is applied to specific areas of land in a unique combination guided by that theme. A management prescription is a set of compatible practices used to manage certain lands and resources for a particular purpose, such as timber production or recreation.

Alternative Development Process

The development of alternatives is the culmination of steps 1 through 5 of the NFMA planning process, and is summarized here. Refer to Appendix B for a more detailed discussion of those actions related to FORPLAN.

1 Major public issues were identified through public involvement efforts. These issues were combined with management concerns to form an integrated list of issues and concerns (found in Chapter 1 and Appendix A). The issues were then grouped into resource categories and addressed in the various planning steps. Thus an issue may have indicated a data need, generated a planning criterion, or shaped an alternative.

2 The interdisciplinary (ID) team conducted an Analysis of the Management Situation (AMS) for each resource. Each AMS report addresses issues, concerns, and management opportunities for each resource, and includes changes

needed to resolve Forest conflicts. Where feasible, the AMS's project future demand for each resource

3 The ID team developed a list of activities that allowed for achievement of all of the resource opportunities noted in each AMS. The activities became an integral part of the linear programming model, FORPLAN, and are referred to as FORPLAN prescriptions.

4. The land base was divided into Analysis Areas, which are aggregations of land units with similar capabilities and responses to activities. Then the costs and outputs associated with applying various FORPLAN prescriptions to Analysis Areas were calculated. Finally, a suitability analysis was done. This analysis determined which activities could not occur on specific units of land because of statutory obligations, such as designated wilderness (no timber harvest), or research natural areas (no active management), or site limitations (no tractor logging on slopes greater than 35 percent).

5 The FORPLAN model was run to develop Benchmarks (see Section C following). These Benchmarks defined the feasible range of outputs for each resource by determining both its minimum uninduced output level and its maximum potential output level. Output levels for all alternatives were then selected from within this range, called the decision space.

6 Alternatives were developed in response to NFMA planning regulations and RPA direction to reflect a broad range of commodity outputs, amenity values, and funding levels within the range defined by the benchmarks. Any large gaps indicated a need for an additional alternative. Public issues and management concerns were compared to this set of alternatives to insure that all were adequately addressed.

7 The ID team used FORPLAN to determine the most cost efficient mix of prescriptions for each alternative. Minimum management requirements and projected demand levels for resources were incorporated into FORPLAN as restrictions in all alternatives. However, excess quantities of outputs above demand did not receive value in the FORPLAN model. Finally, the ID team added other limitations based on the unique goals of each alternative. These indi-

vidual restrictions, and a rationale for each, are discussed in Appendix B. FORPLAN then selected prescriptions to be applied to each analysis area based on PNV and other objectives.

The ID team ensured that the FORPLAN results for each alternative could be attained on the ground. When necessary, the team adjusted the restrictions to produce a feasible schedule of outputs and prescriptions within the theme of the alternative.

8 The management team divided the Forest into 48 Management Areas, each averaging 25,000 acres. The team assigned management prescriptions to land areas within the Management Areas, consistent with the FORPLAN solution.

9 The alternatives were compared in terms of PNV, output levels, and effects. One was chosen as the proposed action. This became the preferred alternative, which was presented as one of the seven alternatives in the Draft EIS. Public comments on the Draft EIS and changes in Forest Service management direction indicated a need to drop some alternatives from further study, to modify others, and to create new alternatives.

10 Four alternatives were evaluated again. One was chosen as the proposed action and is presented in this Final EIS as the Preferred Alternative (PRF). Final approval of an alternative as the Forest Plan will occur after a 60 day public comment period on this final EIS.

C. BENCHMARKS

Benchmarks are used to determine the maximum physical and biological capabilities of the Forest. They.

- display physical, biological, and technical capabilities
- are physically and technically feasible, although not necessarily operationally implementable
- provide an analytical base for developing alternatives and a reference point for comparing alternatives

Table 2-1
Average Annual Outputs By Decade for Benchmarks

Output/Activity	Base	Benchmark											
	Year	Decade	MLV	FLW	MMR	MKV	TBR	TBD	WLN	NON	RGN	H2O	OWL
Economics		a/											
PNV (MM\$) b/	N/A		1252	2866	2677	2447	2611	2239	2640	2677	2511	2654	2014
Total Cost (MM\$)	14.5	1	2.0	17.9	16.2	15.0	21.6	24.7	15.9	14.8	24.2	22.6	15.5
		2	19	13.8	17.1	16.0	19.8	22.2	16.9	16.6	17.3	16.9	13.1
		3	19	23.0	21.4	21.5	28.9	29.2	20.7	21.2	23.5	26.6	18.9
		4	1.9	36.3	29.1	24	30.2	28.8	28.6	28.8	27.4	27.1	20.6
		5	1.8	40.4	35.4	35.1	36.1	36.7	34.9	34.2	33.1	39.4	26.3
Fish													
Resident Fish (M pounds)	48	1	49	45	48	48	47	28	48	48	47	48	48
		2	50	43	47	47	46	27	48	47	46	47	48
		3	51	40	46	46	45	25	47	46	45	46	48
		4	52	37	45	45	43	24	46	45	43	44	48
		5	53	34	44	44	42	23	45	44	42	43	48
Anadromous Fish	100	1	100	94	99	99	98	60	99	98	99	99	100
Commercial		2	100	89	98	98	96	58	98	97	98	97	100
Harvest (M Pounds)		3	100	82	96	97	94	53	97	96	96	96	99
		4	103	78	95	95	92	50	96	95	95	94	98
		5	103	70	94	94	90	47	95	94	94	93	98
Anadromous Fish Sport Harvest (M pounds)	39	1	39	37	39	39	39	24	39	39	39	39	39
		2	39	35	39	39	38	23	39	39	39	39	39
		3	39	33	38	38	38	22	39	38	38	38	39
		4	40	30	38	37	37	20	39	37	37	37	38
		5	40	28	37	37	36	19	37	37	37	37	38
Resident Fish (M WFUD's)	19	1	19	18	19	19	18	12	19	19	19	19	19
		2	17	17	18	18	18	11	19	18	18	18	19
		3	15	16	18	18	18	10	19	18	17	18	19
		4	14	14	18	18	16	9	18	18	17	17	19
		5	14	13	17	17	16	9	18	17	17	17	19
Range													
Grazing (M AUM's)	49.7	1	0	63.5	54.3	56.1	57.0	59.1	51.0	54.0	81.4	51.7	55.9
		2	0	50.4	49.8	58.3	50.4	56.6	47.2	49.2	73.5	45.7	53.2
		3	0	37.7	45.3	54.0	46.5	48.1	47.0	44.8	59.0	46.0	47.9
		4	0	52.4	49.0	57.3	48.0	49.2	50.0	48.7	69.5	47.6	47.5
		5	0	52.3	49.2	58.5	47.6	49.2	50.8	48.9	65.0	40.3	48.9
Recreation													
Developed Recreation (M RVD's)	781	1	0	819	819	819	819	819	819	819	819	819	819
		2	0	916	916	916	916	916	916	916	916	916	916
		3	0	999	999	999	999	999	999	999	999	999	999
		4	0	1075	1075	1075	1075	1075	1075	1075	1075	1075	1075
		5	0	1186	1186	1186	1186	1186	1186	1186	1186	1186	1186
Dispersed Recreation (M RVD's - does not include WFUD's)	312	1	258	402	402	402	402	402	402	402	402	402	402
		2	294	451	451	451	451	451	451	451	451	451	451
		3	346	494	494	494	494	494	494	494	494	494	494
		4	381	533	533	533	533	533	533	533	533	533	533
		5	409	589	589	589	589	589	589	589	589	589	589

Table 2-1 (continued)

Average Annual Outputs By Decade for Benchmarks

	Base Year		Benchmark										
Output/ Activity	1982	Decade	MLV	FLW	MMR	MKV	TBR	TBD	WLN	NON	RGN	H2O	OWL
Timber													
Timber Harvest (MMBF)	171	1	0	182	145	149	197	264	139	146	168	161	95
		2	0	207	165	170	197	227	159	166	168	184	109
		3	0	232	188	189	197	195	181	189	168	184	124
		4	0	261	188	189	197	168	181	189	168	184	141
		5	0	224	188	189	197	145	181	189	168	184	141
Long Term Sustained Yield													
MMCF	30		0	37	35	35	35	35	34	35	34	35	33
MMBF	195		0	241	223	224	225	225	216	224	214	222	214
Water													
Water Yield (Million acre feet)													
All Water	131	1	131	132	131	132	133	134	132	131	133	133	132
(See Glossary)		2	129	131	131	131	132	131	131	131	130	132	131
		3	129	130	129	130	131	132	130	129	129	131	131
		4	129	132	131	131	131	132	131	131	130	132	131
		5	129	131	130	130	130	131	130	130	130	131	131
Use Water		1	.60	.60	.59	.59	.58	.55	.60	.59	.59	.59	.57
(See Glossary)		2	.63	.62	.62	.61	.61	.60	.62	.62	.62	.61	.60
		3	.63	.62	.63	.62	.62	.61	.63	.63	.63	.62	.61
		4	.63	.63	.63	.62	.62	.61	.63	.63	.63	.62	.61
		5	.63	.62	.62	.62	.60	.62	.63	.63	.63	.63	.61
Wilderness													
Wilderness (M Acres)	78.06	1	78.06	78.06	85.64	83.12	78.06	78.06	130.5	78.06	107.2	78.06	117.5
Wildlife													
Threatened & Endangered Species													
Bald Eagle	19	Each benchmark has 16 territories in each decade, except MLV which has 19 territories in each decade, and FLW which has 6 in decade 1, 3 in decade 2, and 2 in the remaining decades											
Peregrine Falcon	5	Each benchmark has 3 territories in each decade, except MLV which has 5 territories in each decade.											
Other Species													
Deer (M animals)	49	1	41	52	48	47	55	60	46	48	50	50	38
		2	37	49	49	49	54	57	47	50	50	50	41
		3	33	46	51	51	52	55	49	51	50	51	43
		4	29	43	52	52	49	50	51	53	50	52	45
		5	25	40	53	53	47	46	52	54	50	53	46
Spotted Owl		1	55	20	39	39	39	39	39	39	39	39	39
Habitat Areas		2	57	5	39	39	39	39	39	39	39	39	39
		3	59	3	39	39	39	39	39	39	39	39	39
		4	61	3	39	39	39	39	39	39	39	39	39
		5	63	3	39	39	39	39	39	39	39	39	39
Goshawk		1	200	125	160	160	130	113	160	160	140	150	180
Management		2	200	110	120	120	120	113	130	120	120	120	150
Areas		3	200	75	113	113	113	113	113	113	113	113	130
		4	200	60	113	113	113	113	113	113	113	113	120
		5	200	50	113	113	113	113	113	113	113	113	113

Table 2-1 (continued)

Average Annual Outputs By Decade for Benchmarks

Output/Activity	Base Year		Benchmark										
	1982	Decade	MLV	FLW	MMR	MKV	TBR	TBD	WLN	NON	RGN	H2O	OWL
<u>Wildlife & Fish User Days (M WFUD's)</u>													
Deer	191	1	162	204	181	18.3	20.4	233	17.7	18.1	194	191	149
		2	14.6	198	188	19.0	199	22.0	18.3	18.8	194	206	156
		3	13.0	186	194	196	190	207	190	194	19.4	206	164
		4	11.3	17.0	201	20.3	181	194	19.6	203	194	206	170
		5	9.7	15.4	207	20.7	17.3	18.1	20.3	20.9	194	20.6	178
All Other Species (Non-game, small game, waterfowl, etc.)	433	1	356	454	402	406	476	518	392	404	434	424	330
		2	320	428	418	420	458	490	410	420	434	432	446
		3	280	400	434	434	440	460	426	436	434	44.0	430
		4	240	370	450	448	422	430	442	456	434	450	412
		5	198	340	462	462	404	402	454	464	434	458	396

a/ Decade 1 is the period 1992 through 2001

Decade 2 is the period 2002 through 2011

Decade 3 is the period 2012 through 2021

Decade 4 is the period 2022 through 2031

Decade 5 is the period 2032 through 2041

b/ The Minimum Level Benchmark (MLV) shows naturally occurring benefits and fixed costs associated with maintaining the Forest in Federal ownership. In all other tables showing present net value (PNV), the PNV for the MLV is subtracted out so that the residual PNV shown gives a true indication of the value of Forest management. In this table the MLV PNV is not subtracted so that the other benchmarks can be compared with MLV. Before comparing with other tables, therefore, the MLV PNV would have to be subtracted from the amounts shown in this table.

This section describes the benchmarks and tells what was learned from each. A more complete discussion of how each benchmark was modeled is in Appendix B. Table 2-1 shows selected average annual outputs for each benchmark for decade 1. Potential outputs are shown for subsequent decades to indicate long-term effect.

Minimum Level Management (MLV)

The minimum level benchmark shows the unavoidable costs and benefits of public ownership of the Forest and establishes a basis for comparing the outputs, costs, benefits, and other impacts of the alternatives. Its objective function is to minimize cost. Management activities are limited to those needed to protect life, health, and safety, to prevent environmental damage, and to manage unavoidable land uses. Production activities such as timber harvest, developed recreation, and livestock grazing are not included. Therefore, it produces the lowest Present Net Value (PNV) \$1,252,000,000.

Unconstrained with Harvest Flow and Long-Term Sustained Yield Constraints (FLW)

This benchmark demonstrates the most economically-efficient level of resources that can be produced with no other management objectives. Only those requirements necessary to assure technical feasibility are included. It is also used as the basis for evaluating the effect of minimum management requirements or MMR's (see the MMR benchmark, below, and Section E.2.a for definitions of the MMR's). Its objective function is to maximize PNV.

This benchmark estimates the highest level of outputs under the fewest requirements and therefore it produces the highest PNV: \$2,866,000,000 (over twice that of the MLV benchmark). This maximum PNV can be used to determine the opportunity cost of implementing more constrained alternatives.

This benchmark demonstrates that if no other requirements were placed on the production of Forest outputs and activities, and no consideration were given to non-quantifiable benefits, the following conditions would result. In order to maximize the present net value:

- Developed and dispersed recreation opportunities would be provided at levels meeting projected demand for the entire planning horizon,
- No further planning areas would be allocated to wilderness,
- Livestock grazing would increase to 25 percent above current levels

Timber harvest is approximately 182 MMBF/year in decade 1, increasing to 261 MMBF/year by decade 4, and leveling off at about 224 MMBF/year in the fifth decade. Harvest is lower in the first two decades due to the interaction of price trends and the growth and age class distribution of the Forest inventory. Some harvest is delayed in order to maximize present net value. This hypothesis was verified by running the FLW benchmark both with and without price trends. With the price trends removed, the timber harvest would be 214 MMBF per year in each decade. When the price trends are included, the harvest is 15 percent lower in decade 1, three percent lower in decade 2, and higher thereafter. For a more detailed explanation of this phenomenon, see Appendix P. This effect is only noticeable when the timber harvest is not restricted and the objective function is to maximize **PNV**.

This benchmark does not meet minimum management requirements for water quality or wildlife diversity. Nor does it address issues related to visual quality and unroaded areas.

Minimum Management Requirements (MMR)

This benchmark demonstrates the opportunity cost of the minimum management requirements (MMR's) when they are considered collectively (MMR's are basic resource protection requirements derived from NFMA, Section E 2 a of this chapter defines MMRs). Therefore, it forms the basis for evaluating alternative outputs beyond

the minimum management requirements. Its objective function is to maximize **PNV**.

Imposing the MMR's results in a \$189 million, or seven percent, drop in PNV from the FLW benchmark. Virtually all of the decrease is due to a reduced timber harvest. In decade 1, timber harvest is reduced by 37 MMBF per year, a reduction of slightly more than 20 percent. By decade 5, 36,000 acres are managed to provide suitable habitat for spotted owls. A portion of the Heart Lake further planning area is recommended for wilderness to meet owl habitat needs, and to receive higher value for wilderness RVD's.

This benchmark responds to issues and concerns related to maintaining water quality, vegetative diversity, and viable population levels of wildlife species. It does not address issues regarding visual quality, Sensitive plants, wilderness or unroaded area allocation.

Market Values with Minimum Management Requirements (MKV)

This benchmark estimates the mix of resource practices and activities that maximizes the present net value of outputs having an established market price. Only timber, firewood, livestock forage, developed recreation, and anadromous fish production are valued. The objective function of this benchmark is to maximize **PNV**.

Compared to the MMR benchmark, in which both market and non-market outputs are valued, there is a slight increase in the timber harvest level and livestock forage. Developed recreation demand is met in both benchmarks. This suggests that, with the possible exception of livestock forage, there is very little conflict between the attainment of market and non-market outputs modeled in FORPLAN. Vegetative manipulation for forage production is significantly reduced in this benchmark, but since the value of wildlife is not considered, a greater proportion of the forage is made available for domestic livestock grazing. When only the value of domestic livestock grazing is considered, investments in range improvements decline significantly. The large drop in **PNV** from the MMR benchmark indicates the relative importance of non-market values on the Forest.

Although this benchmark responds to issues related to the production of market outputs and services, it does not provide for non-market benefits such as dispersed recreation and maintenance of visual quality

Maximize Timber Production for One Decade (TBR)

This benchmark defines the maximum possible timber output for decade 1, subject to minimum management requirements and timber policy constraints.

When compared with MMR, the timber output increased **52 MMBF (36 percent)** in decade 1 and **9 MMBF (5 percent)** in decade 3 and thereafter. The more significant difference in decade 1 is due primarily to the influence of the price trends on the MMR benchmark, an influence that is absent from the TBR benchmark because of the initial objective function of maximizing timber.

The PNV of the TBR benchmark is only \$66 million (about **2.5 percent**) lower than that of the MMR benchmark. This suggests that, given the high first decade price trend, there is a slight economic disadvantage to cutting a large volume of timber then. There is also a slight economic disadvantage to the **9 MMBF** increase in decade 3 and beyond. Because the harvest level is initially higher than MMR, there is more transitory forage available in the early decades and therefore higher numbers of deer and domestic livestock. The total water yield in decade 1 is higher in TBR because of the increase in the acres of regeneration, but the additional regenerated openings cause the snow to melt more quickly and runoff occurs during that period of the season when there is an excess of water. The result is less usable water during the dry months. Beyond that, TBR is similar to MMR.

Maximum Timber Production for One Decade Allowing Departure (TBD)

This benchmark defines the maximum possible timber output, subject only to the minimum management requirements and not subject to non-declining yield.

Compared to the TBR benchmark (which is the same as TBD except that TBR must meet non-

declining yield), the decade 1 harvest is **67 MMBF** per year higher. However, decade 1 costs are over three million dollars per year higher due to the increased harvest level. Timber harvest drops to **145 MMBF** annually by decade 5. The PNV of the TBD benchmark is **\$372 million** lower than that of TBR, indicating a very high cost for the additional decade 1 harvest.

Maximum Wilderness (WLN)

This benchmark demonstrates the consequences of recommending the Forest's further planning areas for wilderness. (See Appendix C for descriptions of each area.) Its objective function is to maximize PNV.

This benchmark would increase the wilderness acreage on the Forest from 78,060 to **130,490** acres, an increase of **52,430** acres. PNV would drop **\$37 million**, or **14 percent**, compared to the MMR benchmark. Timber output would drop by **6 MMBF** (four percent) in decade 1 and by **7 MMBF** (four percent) in decades 3 and beyond. The slightly reduced timber harvest is responsible for most of the reduction in PNV.

This benchmark specifically deals with the issue of new wilderness designation on the Forest. It does not address issues on Wild and Scenic River designation, vegetative diversity, or visual quality.

No Further Planning Areas to Wilderness (NON)

This benchmark estimates the impact of no additional wilderness allocations. It is similar to the MMR benchmark, except that in NON all of the Heart Lake further planning area is assigned to multiple use management. In MMR, 6,600 acres of the Heart Lake area are recommended for wilderness. The objective function of this benchmark is to maximize PNV.

PNV is essentially unchanged from MMR to NON, suggesting that the economic disadvantage of recommending Heart Lake further planning area for wilderness is insignificant. In NON, the timber volume increases by **1 MMBF** per year. Costs decrease by \$1,400,000 to \$14,800,000 per year in decade 1.

Maximum Range (RGN)

This benchmark estimates the maximum capability of the Forest to provide commercial livestock grazing over the next 50 years, subject only to minimum management requirements

The production of over 81,000 AUMs per year in decade 1 is a 50 percent increase over the MMR benchmark. Much of the production would come from transitory range. Timber production is 23 MMBF higher in decade 1, and 20 MMBF lower from decade 3 on, when compared to MMR. (The decade 1 cut is lower in MMR due to the effect of price trends.) Because more forage is being allocated to livestock, less will be available to wildlife. Unlike MKV, which simply allocates the available forage to domestic livestock grazing with only limited investments in range improvements, RGN invests heavily in range improvements. This maximizes domestic livestock production, but not necessarily PNV.

PNV in the RGN benchmark is \$166 million (6 percent) lower than that of the MMR benchmark, virtually all due to the rescheduling of timber harvests and to the investments in range improvements.

This benchmark responds to the livestock grazing issue, but not to most other issues.

Maximum Water (H20)

This benchmark estimates the maximum capability of the Forest to provide water over the next five decades, subject only to the minimum management requirements (MMR's).

It shows that the total average annual water yield can be increased, but only slightly. Compared to the water yield for the MLV benchmarks (naturally-occurring outputs), the most that the water yield can increase is about three percent. The water yield is increased through two types of vegetative manipulation: timber harvest and prescribed burning. The area of timber harvested is reduced by five percent in the first five decades, and clearcutting replaces shelterwood cutting as the predominant harvest method.

Investments in wildlife habitat improvement are increased to take advantage of the increased

water yield associated with prescribed burning. Table 2-1 shows that the H20 timber yield is 16 MMBF (11 percent) higher in decade 1 and 4 MMBF (2 percent) lower in decade 3, when compared to the MMR benchmark. The larger difference in decade 1 is due to the price trend effect on the MMR benchmark, which limits timber harvest in decade 1. The increased yield produced in the H20 benchmark does not occur during a time of year when it could be put to productive use. Maximizing total water yield actually reduces the yield produced during the summer when water could be utilized. This occurs because the vegetative manipulation that produces the high total yield also accelerates the snowmelt, producing faster spring runoff. A delayed snowmelt would cause more water to be available later when it could be diverted for irrigation downstream.

Maximum Spotted Owl Habitat (OWL)

This benchmark estimates effects of providing the maximum area of suitable habitat for spotted owls within the minimum network of territories over the next five decades, subject only to the minimum management requirements. This benchmark attempts to develop 1,000 acres of suitable habitat in the shortest possible time, with 650 acres of replacement habitat becoming suitable in later decades.

It shows that the Forest can produce only 25,500 acres of habitat that is mostly suitable in the first three decades. This is about 65 percent of the minimum management requirement for spotted owls. This total includes all well-stocked mature sawtimber and a portion of immature and poorly-stocked stands that would not be considered suitable owl habitat (see Appendix B for a discussion of suitable owl habitat). By decade 4, the Forest meets its minimum management requirement of 39,000 acres and, by decade 5, it produces about 45,300 acres of mostly suitable habitat. To meet the minimum management requirement for spotted owls in the shortest possible time, the Forest does not harvest 13,800 acres of well-stocked mature sawtimber in the mixed conifer and red fir stands for eight decades. By decade 9, other stands have grown into suitable owl habitat and can replace these stands.

This benchmark demonstrates that, within the minimum network, the Forest does not currently have sufficient habitat that meets defined planning standards to support 39 pairs of spotted owls. The earliest that a sufficient amount of habitat for 39 pairs can be achieved is decade 4.

The primary difference between this benchmark and the MMR benchmark is that MMR produces mostly suitable habitat for 39 pairs of owls in decade 5, and does not designate any replacement habitat for future use. It is not certain whether MMR will adequately support the minimum population over time. In order to produce the minimum habitat one decade sooner and to increase chances of long-term viability, the PNV in the OWL benchmark falls by \$663 million. Timber harvest is less than MMR levels by an average of 50 MMBF per year for five decades.

The OWL benchmark recommends 39,440 acres of further planning areas for wilderness, 31,860 acres more than the MMR benchmark. These acres are recommended for wilderness in order to meet owl habitat needs, and to receive the higher value for RVD's produced in wilderness.

Conclusions

Several conclusions can be drawn from the benchmark analysis. The greatest contribution to PNV on the Forest is from water yield, but most of that value is from naturally-occurring yield. Vegetative manipulation provides limited opportunity to increase water yields.

Timber harvest makes the second largest contribution to PNV. In the first decade, the maximum amount of timber production without a departure is 197 MMBF per year. This is 26 MMBF (15 percent) above the base year level of 171 MMBF annually. With a departure, the Forest could produce 264 MMBF per year in decade 1. However, harvests would begin to drop in decade 2 and, by decade 5, harvest would be reduced to 145 MMBF per year. The MMR benchmark is 145 MMBF per year, which is 26 MMBF per year lower in decade 1 than the current level, but it increases until decade 3. From then on, it is 17 MMBF (10 percent) higher than the current harvest (MMR is constrained only by minimum requirements, it is not necessarily responsive to the need for non-priced benefits).

Price trends interact with the age distribution and growth of the Forest's timber inventory in a manner that tends to delay some harvest in decade 1. Because of this particular interaction, timber harvest is low in decade 1, increases 20-25 MMBF in decade 2, and levels off in decade 3 and thereafter. A limit is imposed to avoid wide fluctuations in the harvest level from one decade to the next; this holds the increase in decade 2 to 20-25 MMBF. This occurs only when the timber harvest level does not have a limiting factor and the objective function is to maximize PNV. (See Appendix P for explanation of this price trend effect.)

Although prescribed burning in brush can also improve forage production for domestic livestock, in FORPLAN the majority of the prescribed burning is done for wildlife. This is because most of the benefits would accrue to wildlife. Developed and dispersed recreation opportunities are provided at levels that meet projected demand when the objective function is to maximize PNV. Production of recreation outputs is economically efficient. (The benefits are largely non-cash; cash receipts do not cover costs.)

Livestock grazing makes a relatively small contribution to PNV. The maximum amount that could be produced is about 32,000 AUMs (64 percent) above the current level of production (about 50,000 AUM's per year). The economically efficient level, as indicated by the MMR benchmark, is less than 10 percent above the current production level. However, this is a very rough estimate since the relative advantages of allocating forage between wildlife and domestic livestock are not completely understood. Wildlife habitat improvement projects are implemented as often as possible since the value of their benefits always exceeds the project costs.

Only a portion of one further planning area is recommended for wilderness in the MMR benchmark, suggesting that wilderness designation is not advantageous on economic grounds alone. On the other hand, the economic cost of allocating all further planning areas to wilderness is quite small (a one percent decline in PNV), and commodity outputs are reduced only slightly (Timber production in the WLN benchmark is four percent below the economically efficient level). This suggests that the selection of additional areas for wilderness designation must

consider non-quantifiable costs and benefits that are not addressed in the FORPLAN model

None of these benchmarks responds to the full range of issues (see Chapter 1). Each of them implies some resource management consequences and output levels that would not be responsive to some of the issues and concerns that were raised by the public and Forest managers. These issues and concerns are guiding the development of alternatives in this planning process.

Limitations to the Range of Alternatives

Physical characteristics and statutory or contractual obligations limited the possible range of alternatives. These limitations are

Classified Areas The Canbou, Ishi, and Thousand Lakes Wilderness areas (78,060 acres), the Blacks Mountain and Swam Mountain Experimental Forests (16,000 acres), and the Cub Creek Research Natural Area (4,000 acres) are not subject to change through this planning process.

Resource Needs Activity is limited on 10,618 acres due to the presence of Threatened and Endangered species. Streamside, lakeshore, and wetland requirements outside of classified areas limit activities on another 6,200 acres.

Barren/Rocky There are 45,400 acres that are barren, rocky, or otherwise not capable of producing manageable vegetative crops.

Range of Alternatives

As noted, the benchmarks define the range (decision space) within which every alternative must fall. Figure 2-1 illustrates the range (the shaded band) for each of five selected outputs, and shows where each alternative falls within the range. The left end of the range represents the benchmark that minimizes that resource, and the right end represents the benchmark that maximizes it. For example, the number of AUMs available per year ranges between 0, as in the MLV benchmark, and 81,000, as in the RGN benchmark. All the alternatives have AUM outputs somewhere in this range. Because some differences between alternatives do not appear

in the short-term, but become evident in later decades, Figure 2-1 shows most outputs as projected for decade 5.

The alternatives displayed are explained further in the subsequent sections of this chapter. Table 2-8 (on page 2-77) gives another picture of the range of alternatives by showing the acres allocated to each different management prescription for each alternative.

D. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

1. Introduction

Twenty-three alternatives were developed to respond to the issues. Each of these alternatives was modeled in FORPLAN to determine its outputs. Selected average annual outputs and potential outputs for alternatives eliminated from detailed study are shown in Table 2-2 (see page 14). Nineteen alternatives were eliminated from detailed study. They are summarized here, along with reasons why no further consideration is appropriate. The other four alternatives were studied in detail, and are described below in Section 2 of this chapter.

The discussions below refer to minimum management requirements (MMR's) and minimum implementation requirements (MIR's). These are defined below in Section E 2.a and E 2.b. Briefly, MMR's are basic requirements derived from NFMA, and MIR's are Regional Forest Service policies.

Since the DEIS was released in 1986, the modeling constraints in each of these alternatives no longer provide an appropriate response to current public issues and management concerns. Public comments on the DEIS, appeals, litigation, and compliance with Federal statutes have all resulted in changes of management direction. On the Lassen National Forest, the land base available for full timber management has been reduced to provide habitat for Threatened, Endangered, and Sensitive species such as the

northern spotted owl, California spotted owl, fisher and marten. In addition, public concern over increased levels of clearcutting, harvesting old growth stands, and protecting riparian areas has led to an emphasis on other silvicultural techniques to maintain forest cover and biodiversity. All of these constraints have impacted timber outputs, making each of the alternatives eliminated from detailed study no longer responsive to current issues.

2. Alternatives

Constrained Economically Efficient Alternative (CEE)

This alternative produces the most economically efficient levels of market and non-market goods, while meeting minimum management and minimum implementation requirements (MMR's and MIR's). Present Net Value is maximized throughout the planning horizon. Amenity outputs are minimized.

The CEE alternative is useful because it provides a basis for comparison with other alternatives. It does not respond to issues related to amenity outputs. If implemented, it would result in low levels of visual quality, semi-primitive recreation opportunities and very little additional wilderness. It is, therefore, not considered in detail.

Constrained Economically Efficient Alternative with Forest Constraints (CEF)

The theme of CEF is the same as CEE except that CEF has the additional objective of maintaining the inventoried Visual Quality Objectives for the Eagle Lake scenic backdrop (1,400 acres). The need for this is explained in Chapter 3, Section 21, Visual Quality. This is a Forest objective common to all alternatives except CEE.

The outputs of CEF are identical to those of CEE, indicating that there is no cost for meeting this visual quality objective for the Eagle Lake scenic backdrop. Like CEE, this alternative is driven by commodity outputs without ample consideration for amenity values. Because of this, CEF is not considered in detail.

Low Budget Alternative (LBU)

The goal of this alternative is to evaluate the effects of reducing the Forest's budget 25 percent below the 1982 level.

At the time this alternative was analyzed, the limited budget would not allow an adequate response to the local and national needs for recreation and resource protection. This alternative is not considered in detail because it does not meet the above needs.

High Productivity Alternative (PRO)

The goal of this alternative is to evaluate the effects of meeting very high timber targets (300 MMBF per year in decade 2 and 285 MMBF per year in decade 5).

The Forest is unable to meet the timber output targets, even after removing the MIR and MMR requirements. Non-market goods are produced at economically efficient levels. This alternative results in adverse consequences to water quality, visual quality, vegetative diversity, and viable wildlife populations. Removing the MMR's means that this alternative is not implementable. It is not considered in detail because the goals cannot be achieved and because there are serious environmental consequences as well.

High Amenity and High Commodity Emphasis Alternative (HHI)

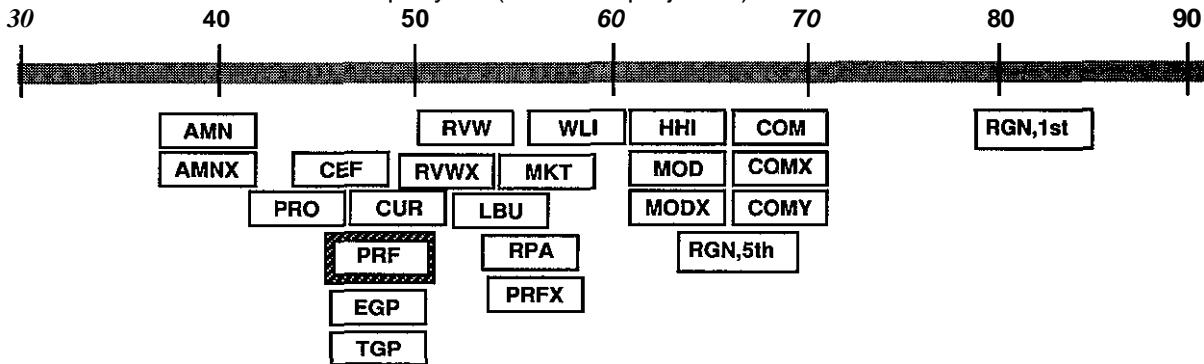
The goal of this alternative is to produce a high level of semi-primitive recreation opportunities, including additions to existing wilderness, and to produce a high level of commodities, especially timber.

Timber harvest levels would drop below current levels in the first two decades primarily due to the effect of the timber price trends (see discussion in Appendix P). In decade 3 and beyond, harvest levels would be essentially the same as current levels. Wilderness acreage would increase by 30 percent. This alternative forms the basis for the PRF Alternative. PRF was considered in detail, rather than HHI, because PRF provides a higher level of visual quality, more fish and wildlife habitat improvement, and is more responsive to issues related to clearcutting and biodiversity.

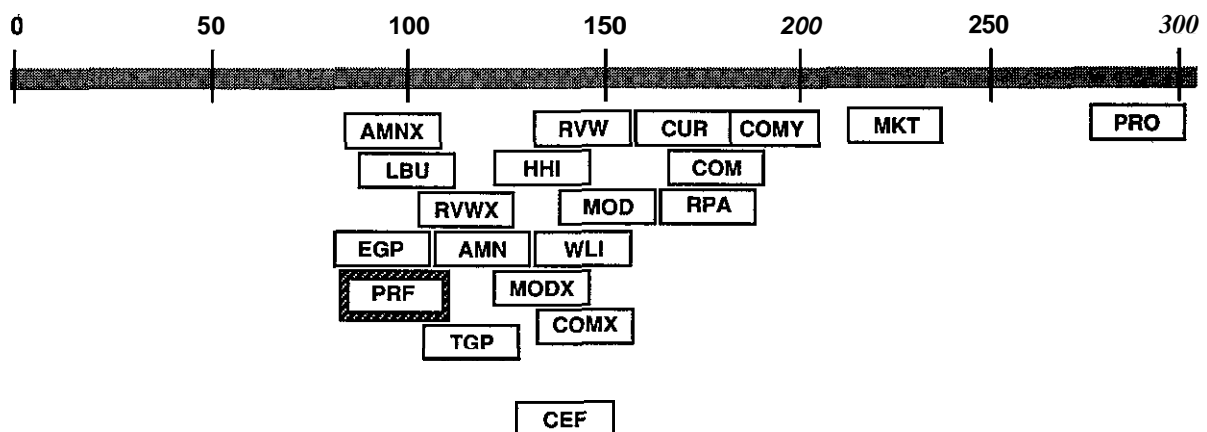
Figure 2-1

Range of Alternatives (Selected Outputs)

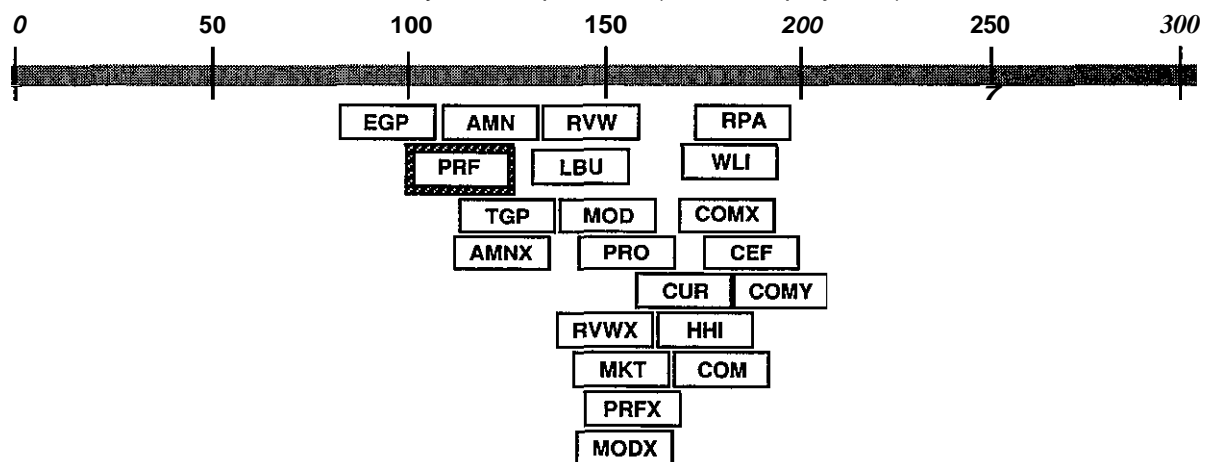
RANGE M AUM's available per year (Decade 5 projected)



TIMBER Allowable Sale Quantity, MMBF per Year (Decade 1)



TIMBER Allowable Sale Quantity, MMBF per Year (Decade 5 projected)

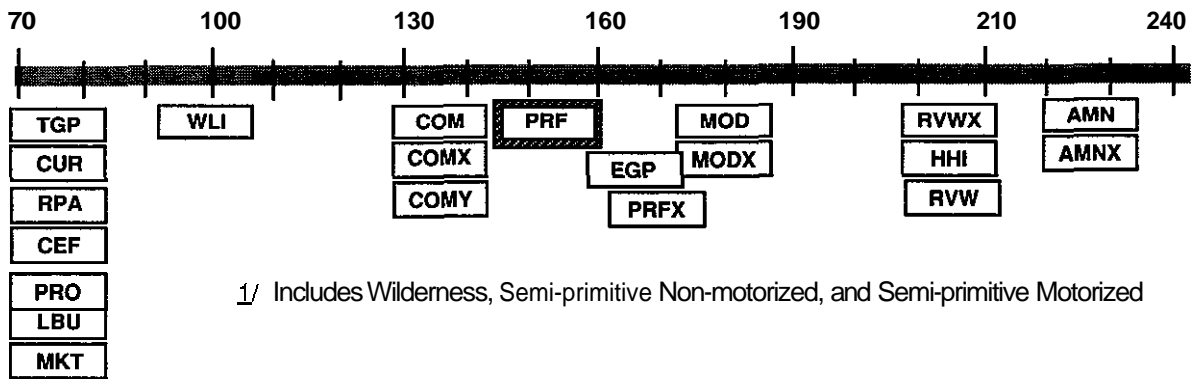


Note CEF and CEE are the same for all outputs.

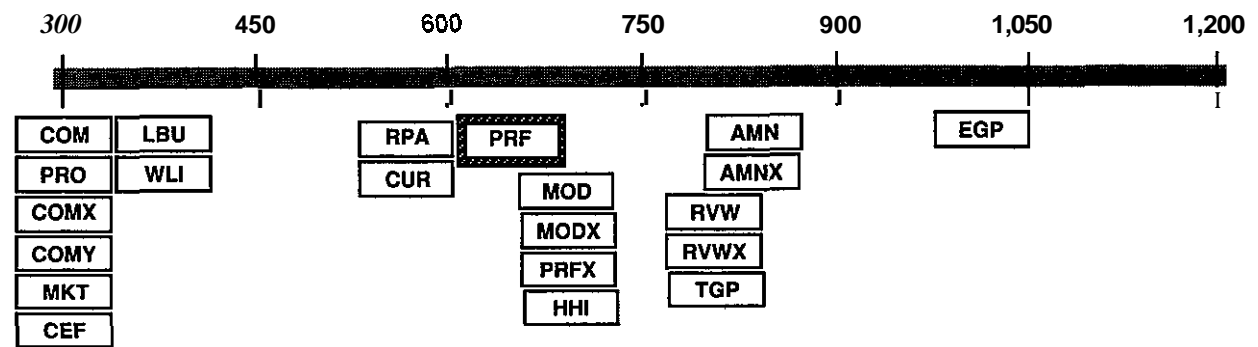
Figure 2-1 (continued)

Range of Alternatives (Selected Outputs)

RECREATION M Acres of Semi-primitive Recreation Opportunities ^{1/}



VISUAL QUALITY M Acres of Preservation, Retention, and Partial Retention



WILDERNESS Acres of Proposed New Wilderness Additions

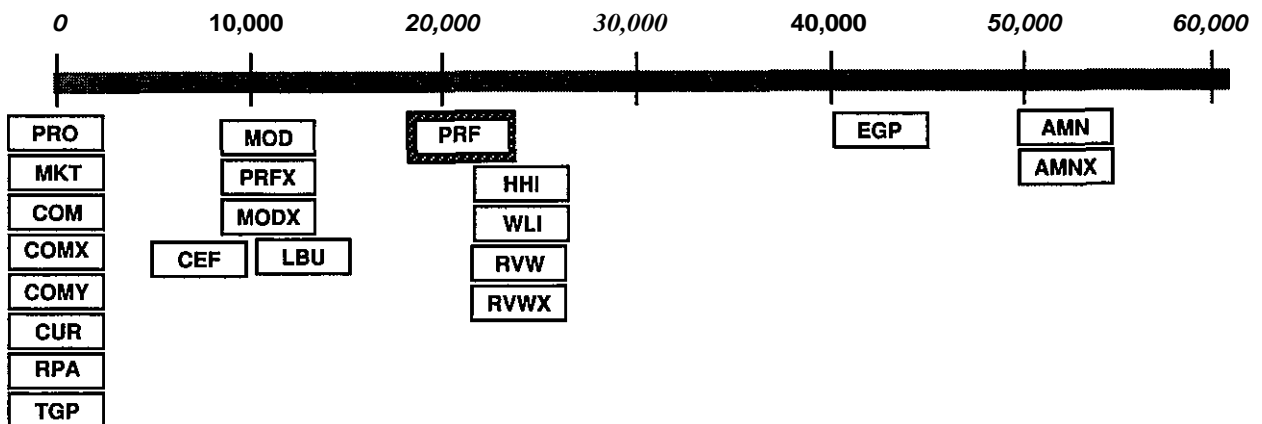


Table 2-2

Average Annual Outputs by Decade for Alternatives Considered But Eliminated From Detailed Study

Output/Activity	Base Year 1982	Decade a/	Alternative						
			CEE	CEF	LBU	PRO	MKT	WLI	HHI
ECONOMICS									
PNV (MM \$) b/			1396	1396	1268	1561	1382	1385	1341
Total Cost (MM \$)	145	1	162	162	118	245	215	158	155
		2	169	169	123	221	196	166	153
		3	213	213	157	286	259	208	209
		4	287	287	174	293	268	278	250
		5	360	360	195	301	362	355	342
FISH									
Resident Fish (M pounds)	48	1	48	48	48	27	46	48	48
		2	47	47	48	23	45	48	48
		3	47	47	48	23	43	48	48
		4	46	46	47	20	42	47	47
		5	46	46	47	19	42	46	46
Anadromous Fish Commercial Harvest (M pounds)	100	1	101	101	100	56	95	114	114
		2	100	100	100	51	93	112	112
		3	99	99	99	49	91	110	110
		4	97	97	99	46	89	109	109
		5	96	96	98	42	86	107	107
Anadromous Fish Sport Harvest (M pounds)	165	1	166	166	165	90	156	188	188
		2	161	161	165	85	153	185	185
		3	159	159	164	80	150	182	182
		4	159	159	163	75	147	179	179
		5	158	158	162	70	144	176	176
Resident Fish (M WFUD's)	90	1	90	92	90	56	85	90	90
		2	87	87	90	48	83	90	90
		3	86	86	89	45	81	89	89
		4	84	84	88	42	80	88	88
		5	82	82	88	39	78	87	87
RANGE									
Grazing (M AUM's)	49.7	1	543	6143	539	682	53.1	534	514
		2	494	4194	53.1	533	582	574	545
		3	446	44.6	559	390	568	570	579
		4	484	4184	544	436	57.7	590	624
		5	489	48.9	510	46.1	553	580	652

PRFX	RVWX	AMNX	COMX	MODX	PRFD	COMY	COM	MOD	RPA	RVW	AMN
1239	1175	1009	1393	1234	861	1066	1397	1219	1402	1175	1012
159	154	138	163	161	192	212	189	171	187	176	157
149	149	126	168	161	193	225	175	164	174	166	141
196	185	154	228	203	245	300	275	209	233	206	168
235	233	199	271	246	241	325	275	255	296	241	214
316	291	251	364	300	315	356	379	335	375	317	270
49	50	50	48	48	44	47	47	48	48	50	49
49	50	50	46	48	46	45	46	48	49	50	50
48	50	50	45	48	47	44	45	47	49	50	50
50	50	50	44	48	48	42	44	46	40	50	50
50	50	50	43	48	48	41	43	46	49	50	50
116	112	112	113	116	116	111	113	115	115	112	112
115	112	112	111	113	109	109	111	114	113	112	112
115	112	112	108	113	109	108	108	114	112	112	112
115	112	112	106	113	110	108	106	113	112	112	112
115	112	112	104	113	110	107	104	112	110	112	112
189	184	185	187	189	180	184	187	189	189	184	185
189	184	185	183	186	180	179	183	188	187	184	185
189	184	185	179	186	180	175	179	187	185	184	185
189	184	185	175	186	183	171	175	186	185	184	185
189	184	185	171	186	183	166	171	185	181	184	185
92	93	93	89	90	88	87	89	90	93	95	93
93	93	93	87	90	88	86	87	90	93	95	93
93	93	93	85	90	88	85	85	90	93	95	98
93	94	93	83	90	90	84	83	90	93	95	93
93	94	93	81	90	92	84	81	90	93	94	93
514	497	426	525	514	514	525	525	514	544	507	426
544	518	400	563	545	544	563	563	545	582	530	400
530	497	400	604	579	530	604	604	579	547	506	400
538	518	400	647	615	538	647	647	615	566	515	400
545	504	400	694	652	545	694	694	652	546	511	400

Average Annual Outputs by Decade for Alternatives Considered But Eliminated From Detailed Study

2-16 Chapter 2—Alternatives

PRFX	RVWX	AMNX	COMX	MODX	PRFD	COMY	COM	MOD	RPA	RVW	AMN
319	319	819	319	819	819	319	629	629	629	629	629
916	916	916	916	916	916	916	726	726	726	726	726
999	999	999	999	999	999	999	810	310	310	310	810
1075	1069	1063	1075	1069	1075	1075	886	830	836	880	373
1137	1147	1108	1137	1147	1187	1187	997	957	997	957	918
401	402	390	397	401	401	397	402	402	402	402	402
450	451	442	450	450	450	450	451	451	451	451	451
491	493	489	486	492	491	486	494	494	494	494	494
531	529	523	525	527	531	525	533	533	533	533	533
587	575	554	589	572	587	589	539	589	589	589	589
122	115	95	146	133	186	195	179	150	175	145	119
139	131	109	166	151	160	195	179	150	175	145	119
159	150	124	132	153	137	195	179	151	137	145	119
159	150	124	132	154	119	195	179	152	187	145	119
159	150	124	182	154	135	195	179	152	187	145	119
30	28	23	34	30	29	35	34	30	35	2%	23
192	179	148	216	195	183	223	217	195	223	179	147
130	131	131	130	130	130	130	132	132	132	131	131
130	130	130	130	130	130	130	130	130	130	130	130
129	129	129	130	130	130	130	130	130	130	130	130
130	130	130	130	130	130	130	130	130	130	130	130
130	129	129	129	129	129	129	130	129	130	130	130
89 2	102 2	130 0	78 06	89 2	89 2	73 06	78 06	89 2	78 06	1010	1300
16	16	16	16	16	16	16	16	16	16	16	16
19	19	19	16	19	19	16	16	19	16	19	19
19	19	19	16	19	19	16	16	19	16	19	19
19	19	19	16	19	19	16	16	19	16	19	19
19	19	19	16	19	19	16	16	19	16	19	19
5	5	5	3	5	5	3	3	3	3	3	3
5	5	5	8	5	5	3	3	5	3	5	5
5	5	5	3	5	5	3	3	5	8	5	5
5	5	5	3	5	5	3	3	5	3	5	5
5	5	5	3	5	5	3	3	5	3	5	5

Table 2-2 (continued)

Average Annual Outputs by Decade for Alternatives Considered But Eliminated From Detailed Study

Output/Activity	Base Year 1982	Decade	Alternative						
			CEE	CEF	LUB	PRO	MKT	WLI	HHI
WILDLIFE									
Other Species									
Deer (M animals)	49	1	52	52	39	36	42	50	50
		2	54	54	41	30	36	52	52
		3	56	56	44	24	32	53	54
		4	57	57	46	24	35	54	54
		5	59	59	46	28	42	55	55
Spotted Owl Habitat Areas	N/A	1	39	39	39	20	39	39	39
		2	39	39	39	12	39	39	39
		3	39	39	39	8	39	39	39
		4	39	39	39	4	39	39	39
		5	39	39	39	4	39	39	39
Goshawk Management Areas	N/A	1	160	160	200	80	100	170	165
		2	135	135	135	60	80	140	140
		3	113	113	115	45	65	115	115
		4	113	113	113	30	50	113	113
		5	113	113	113	20	40	113	113
Wildlife & Fish User Days (M WFUD's)									
Deer	19.1	1	18.7	18.7	14.3	25.5	21.8	18.4	18.4
		2	19.4	19.4	15.0	26.2	20.4	18.6	18.6
		3	20.2	20.2	16.1	21.1	18.7	19.3	19.4
		4	21.0	21.0	16.4	19.3	17.4	19.8	19.8
		5	21.6	21.6	16.7	17.8	17.6	20.0	20.0
All Other Species (Non-game, small game, waterfowl, etc)	43.3	1	416	416	317	566	482	409	409
		2	428	428	334	582	452	418	418
		3	439	439	358	469	414	429	429
		4	458	458	364	429	385	439	439
		5	480	480	37.1	394	392	446	446

a/ Decade 1 is the period 1992 through 2001

Decade 2 is the period 2002 through 2011

Decade 3 is the period 2012 through 2021

Decade 4 is the period 2022 through 2031

Decade 5 is the period 2032 through 2041

b/ The minimum level benchmark (MLV) shows naturally occurring background benefits and fixed costs associated with maintaining the Forest in Federal ownership. In order to display the true effects of management, minimum level PNV has been subtracted from the PNV of each alternative.

PRFX	RVWX	AMNX	COMX	MODX	PRFD	COM Y	COM	MOD	RPA	RVW	AMN
49	48	47	50	51	59	57	59	57	53	48	51
51	49	47	51	51	57	57	59	57	52	48	50
53	50	47	53	50	55	57	59	58	52	48	48
55	52	47	54	50	53	57	59	55	52	49	46
57	53	48	55	50	50	57	59	54	51	49	45
39	43	52	39	43	39	39	39	43	39	43	52
39	43	52	39	43	39	39	39	43	39	43	52
39	43	52	39	43	39	39	39	43	39	43	52
39	43	52	39	43	39	39	39	43	39	43	52
39	43	52	39	43	39	39	39	43	39	43	52
170	180	200	160	165	125	120	135	165	113	160	200
155	170	200	135	140	115	113	113	140	113	160	200
130	160	200	113	115	113	113	113	130	113	160	200
118	160	200	113	113	113	113	113	130	113	160	200
113	160	200	113	113	113	113	113	130	113	160	200
17.8	17.4	17.2	18.1	18.6	21.4	21.0	20.3	21.0	20.9	18.8	20.0
18 6	17.8	17.2	18.6	18.6	20.5	21.0	20.2	19.5	20.7	19.0	19.5
19 4	18.2	14 4	19.1	18.4	19.8	21.0	20 2	19.1	20 5	19.1	18.9
20 2	18.6	17.4	19.6	18.2	19 0	21.0	20.1	18 7	20.4	19.3	18.4
21.0	19 4	17 5	20.0	18.2	18.1	21.0	20 1	18 4	20.2	19.4	17.8
39 4	38.8	38 0	40 1	41 3	47 9	46 4	45 5	44 2	46 4	42.0	44 7
41 3	39 6	38 0	41 3	41.3	45 5	46 4	44 9	43 4	46 1	42 4	43 4
43 1	40 5	38 5	42.6	40 9	43 9	46 4	44 8	42 6	45 7	42 6	42 1
44 8	41 8	38 5	43 5	40 5	42 2	46 4	44 7	41 7	45 3	42 8	40 8
46 5	43 1	38 8	44 6	40 5	40 2	46 4	44 7	40 9	44 9	43 2	39 6

High Market Emphasis Alternative (MKT)

The goal of this alternative is to emphasize production of market resources. The timber targets are constrained to meet or exceed 225 MMBF in decade 1 and 255 MMBF per year in decade 5.

These goals cannot be met under sustained yield requirements. By allowing a five decade departure, the decade 1 goal of 225 MMBF is achieved, but the harvest level drops in the following decades and is only 156 MMBF per year in decade 5. Non-market outputs are produced at economically efficient levels. MKT is not considered in detail because the objective of this alternative cannot be met beyond decade 1. Overall, the objectives of multiple use management are **not better served by a departure**, as defined in 36 CFR 219.16.

Wilderness Emphasis with Capital Investment Emphasis to Mitigate for Lands Out of Production (WLI)

The objective of this alternative is to evaluate the potential for maintaining or increasing commodity outputs on the non-wilderness portion of the Forest through intensified management. Wilderness on the Forest is increased to 102,159 acres.

These objectives can only be met by setting visual quality objectives at the Modification and Maximum Modification level on all timbered non-wilderness acres except the Eagle Lake back-drop and State Highways 89 and 299. Because of this, and because the goal of WLI is similar to the goal of PRF, which has a higher level of visual quality, WLI was eliminated from detailed study in favor of PRF.

Preferred Alternative with Departure (PRFD)

The theme of this alternative is identical to the PRF presented in the FEIS in all respects, except that PRFD allows a departure from non-declining flow for five decades.

The departure alternative is not considered in detail because the attainment of overall objectives of multiple-use management is not enhanced. Specifically, timber age-class distributions would not be improved. There is no shortage of local, privately held timber that requires the Forest to provide an increased, temporary supplement through departure. The Forest already has a comparatively high percentage of young growth timber. A departure would increase this component of the Forest inventory, resulting in decade 5 growth that is five percent less than the growth that would occur under PRF. Thus, the criteria of 36 CFR 219.16 for considering departure are not met.

Commodity/Timber Emphasis Alternative (COMY)

The goal of this alternative is to examine the effects of providing a very high level of commodities, especially timber. The timber harvest is 195 MMBF per year. Range, recreational facilities, and non-market outputs are provided at a level that maximizes economic efficiency. Amenity outputs are de-emphasized. A low level of visual quality is provided. This is similar to other commodity oriented alternatives eliminated from detailed study, COMX and COM, except COMY has a timber harvest that is 49 MMBF higher than COMX and 16 MMBF higher than COM in decade 1. This higher timber harvest results in a \$327 million reduction in PNV. (That is a 35 percent reduction after minimum level costs and benefits are deducted.) Total costs in decade 1 are nearly \$5 million (32 percent) higher than COMX.

The theme of this alternative necessitates clearcutting on over 8,900 acres per year in decade 1. With limited windows of suitable conditions in which the site preparation and planting must be accomplished, there is a very high risk that the Forest could not regenerate this many acres. Because of this risk, and the reduced PNV and high cost associated with the additional timber harvest, the COMY Alternative is not considered in detail.

3. Alternatives Without the Decade 1 Harvest Constraint

At the time the DEIS was prepared, these alternatives were eliminated from detailed study because timber harvest levels were low in the early decades

- Preferred (PRFX)
- Recreation, Visual, Wildlife Emphasis (RVWX)
- Amenity (High Non-Market) Emphasis (AMNX)
- Commodity (COMX)
- Moderate Commodity and Moderate Amenity Emphasis (MODX)

In these alternatives, the harvest is low in decade 1 due to a complex interaction involving price trends, timber growth rates, and the discount rate. For further discussion of this interaction, see Appendix P.

Each of these alternatives is a counterpart to an alternative considered in detail in the DEIS. The character identifiers differ in that the alternatives considered in detail have three characters (PRF, for example) while their counterparts eliminated from detailed study have identifiers ending with "X" (PRFX). The goals of corresponding alternatives are identical except that the versions considered in detail have a decade 1 timber harvest volume aimed at stabilizing harvest levels. Timber harvest volume in the eliminated alternatives is low (compared to the base year and later decades) in decade 1. In decade 2, the harvest volume increases by approximately 18 MMBF, increases again in decade 3, and generally levels off for the next several decades.

4. Alternatives Eliminated After the DEIS

Five alternatives were eliminated from consideration after public review of the Draft EIS. Few public comments supported them, and the issues were better resolved with the formulation of other alternatives in this Final EIS. In particular, public comments focused on the substantially higher levels of clearcutting proposed with each of these alternatives. Old growth retention

for late successional wildlife species has also become an issue since the DEIS was released. Three new alternatives were created in response to concerns about population viability and distribution of habitat. Recent management guidelines have also called for reduced clearcutting and maintaining continuous forest cover to benefit wildlife habitat, recreation, visual quality, water quality and soil productivity.

RPA Alternative (RPA)

This alternative responds to goals of the 1980 RPA Program by providing commodity and amenity benefits to meet or exceed the targets established for the Lassen National Forest. Important elements are: (1) Maintaining expenditures within the RPA specified budget (no more than 20 percent above the current budget), (2) Harvesting slightly higher amounts of timber than the current level while conforming to "low" visual quality objectives, (3) Providing recreational facilities to meet projected demand, and managing for a low level of semi-primitive recreation, and (4) Increasing range productivity and permitted use gradually. The resources without existing RPA targets will be managed to fit with the Emphasized (RPA target) resources.

This alternative did not respond to issues related to dispersed recreation, wilderness, clearcutting, and late seral habitat for wildlife.

Recreation, Visual, Wildlife Emphasis Alternative (RVW)

This alternative emphasizes the production of three amenity outputs (recreation, visual quality, and wildlife) while maintaining commodity outputs on lands not needed for amenity values. Important elements are: (1) Producing timber, range, and other commodities efficiently (economically) while conforming to "high" visual quality objectives; (2) Recommending a moderately high level of wilderness expansion, (3) Providing recreational facilities to meet 70 percent of the expected increase in demand for developed recreation, and allowing for extensive semi-primitive recreation, and (4) Emphasizing wildlife habitat improvements, and providing for high levels of wildlife species that depend on early seral stage habitat. Other resources will be managed to fit with these emphases.

This alternative was subsequently eliminated from further study as it did not respond to the clearcut issue, 5,600 acres were proposed in decade 1

Amenity Emphasis Alternative (AMN)

This alternative emphasizes amenity outputs while maintaining commodity outputs on lands not needed for amenity values. Important elements are (1) Producing timber, range, and other commodities efficiently while conforming to "very high" visual quality objectives, (2) Recommending a high level of wilderness expansion, (3) Providing recreational facilities to 40 percent of the expected increase in demand for developed recreation, and allowing for very extensive semi-primitive recreation, (4) Emphasizing wildlife habitat retention for species that depend on late seral stages; and (5) Within decade 1, decreasing range utilization by 20 percent of the current level in areas of wildlife conflicts or water quality degradation. Other resources will be managed to fit with these emphases. As with many of the other alternatives, AMN did not respond to the issue of clearcutting (3,100 acres proposed) and was eliminated from further study. The EGP alternative provides many of the same values as AMN, but emphasizes uneven-aged management.

Commodity Emphasis Alternative (COM)

The goal of this alternative is to maximize commodity benefits while preserving amenity values at minimum levels. Timber and livestock grazing are at high levels, while the visual program is at minimum levels and very little unroaded recreation is provided except in existing wilderness. This alternative has a high level of timber output (179 MMBF), and maintains a high PNV. However, the large number of clearcut acres, 7,000 per year, led to the creation of the TGP alternative, which lowers the amount of proposed clearcuts. Thus this alternative was eliminated from further consideration.

Moderate Emphasis Alternative (MOD)

The goal of this alternative is to provide a mix of commodity and non-commodity benefits. Late

successional stage habitat is provided to exceed viability levels, and the visual program calls for meeting inventoried visual quality objectives. The outputs of this alternative are not significantly different from other alternatives. Timber, for example, is produced at a level of 150 MMBF per year. This alternative was dropped from further consideration as it is less responsive than PRF to issues related to fisheries, wilderness, and clearcutting.

E. ALTERNATIVES CONSIDERED IN DETAIL

1. Introduction

This section 1) presents direction common to all alternatives, 2) explains the concept of Management Prescriptions and their relationship to Management Areas, 3) presents each alternative and tables showing acreage allocations, outputs, and costs for each; and 4) compares the alternatives.

2. Direction Common to all Alternatives

Six types of constraints are common to all alternatives: a) Minimum Management Requirements, b) Minimum Implementation Requirements, c) Timber Policy Constraints, d) Regional Herbicide Policy, e) Forest-wide goals, standards and guidelines, and Forest objectives.

a. Minimum Management Requirements (MMR's)

The Minimum Management Requirements are designed to meet basic requirements taken from the NFMA Regulations (36 CFR 219.27) for the management of National Forest land. The Forest Service does not have the authority to change these requirements because they are based on statutes and regulations rather than agency policy. They are in all alternatives and in most benchmarks. Below is a list of the MMR's. For a more complete description, see Appendix B, "Modeling and Analysis Process."

(1) **Suitable Lands** Consider lands suitable for timber production if:

- (a) The land is forested and is currently producing, or is capable of producing, crops of industrial wood.
- (b) The land has not been withdrawn from timber production by Congress, the Secretary of Agriculture, or the Chief of the Forest Service.
- (c) Technology and knowledge are available to insure timber production without irreversible damage to soils, productivity, or watershed conditions
- (d) Existing technology and knowledge provide reasonable assurance that adequate restocking can be attained within five years after final harvest.
- (e) Adequate information is available to predict responses to timber management activities.

(2) **Threatened and Endangered Species** Prevent the destruction or adverse modification of critical habitat for Threatened and Endangered species. The only Threatened and Endangered species known to exist on or near the Forest are the bald eagle, peregrine falcon, Shasta crayfish and the northern spotted owl. Threatened and Endangered species population targets, assigned to the Forest as portions of species' overall recovery goals, are 16 pairs for bald eagles and three pairs for peregrine falcons

Bald eagles require a continual supply of large nest trees near water. Long timber rotations are needed to provide this kind of habitat.

Peregrine falcons require suitable cliffs for nesting, freedom from disturbance, and an adequate prey base. These requirements are handled through Forest Standards and Guidelines.

Shasta crayfish habitat is found in the Fall River and Hat Creek drainages, and that portion of the Pit River which connects them. An inventory was conducted in 1990 to determine if this species occurs on the Forest, but no populations were found. Its habitat requirements are provided through Forest Standards and Guidelines

The northern spotted owl was listed as Threatened throughout its range in June 1990. Management requirements are met through Forest Standards and Guidelines. Habitat acres for this sub-species were modeled in FORPLAN for the PRF, EGP and TGP Alternatives only.

(3) **Viable Populations** Provide adequate fish and wildlife habitat to maintain viable populations of existing native vertebrate species. For the California spotted owl, maintain habitat for at least 39 pairs of owls distributed in a network throughout their potential range on the Forest. See Appendix S in the accompanying Forest Plan for a complete discussion on how the spotted owl requirements were analyzed. For goshawks, maintain a network of 113 territories in forested habitat across the Forest.

(4) **Diversity** Provide a threshold level of vegetative types and seral stages found within the Forest to insure at least a minimum level of diversity of plant and animal communities. This minimum is established as five percent of the Forest in each vegetative type in each seral stage, as per the Pacific Southwest Regional Guide (1984)

(5) **Riparian Areas** Protect streams, streambanks, shorelines, lakes, wetlands, and other areas in or near water.

(6) **Soil and Water Productivity** Conserve soil and water resources and do not allow significant or permanent impairment of the productivity of the land.

b. Minimum Implementation Requirements (MIR's)

The Minimum Implementation Requirements insure that alternatives are minimally acceptable and implementable, and embody Regional Forest Service policy beyond statutory requirements. The MIR's are applied to all alternatives, but not to the benchmarks. They are:

- (1) Manage Sensitive plants to insure that species do not become Threatened or Endangered because of Forest Service actions
- (2) Adopt a Partial Retention visual quality objective in the foreground and middle

ground as viewed from State Highways 89 and 299. Both of these highways are candidates for State Scenic Highway designation. Highway 44 receives the same Visual Quality Objectives as Highway 89, where it coincides with Highway 89. This is a distance of about 11 miles from their northern intersection at Cave Campground to the western entrance to Lassen Volcanic National Park

- (3) Limit clearcutting to no more than 18 percent of the total suitable acres per decade.

c. Timber Policy Constraints

Timber policy constraints *are* needed to insure that timber harvest meets sustained yield, harvest occurs at culmination of mean annual increment (CMAI), and harvest areas are sufficiently dispersed. They are:

- (1) Assure that all even-aged stands scheduled for final harvest will have generally reached culmination of mean annual increment of growth
- (2) Provide a range of rotation ages
- (3) Insure that long-term sustained yield, as defined for each alternative, is perpetuated through the end of the planning horizon.
- (4) Prevent regeneration units that are still considered "openings" from having more than 15 percent of their boundaries in common with other openings, as specified in the Regional Guide. Disperse units in such a way as to leave logical harvest units between openings.

d. Regional Herbicide Policy

(This section summarizes Appendix Y, No Herbicide Use Analysis.) In March 1989, the Pacific Southwest Region of the USDA - Forest Service issued a Final Environmental Impact Statement (FEIS) for *Vegetation Management for Reforestation*. It included detailed discussions and analyses of a preferred alternative (continuation of the current policy), alternatives to the preferred (including no vegetative management, no applica-

tion of herbicides, and no aerial application of herbicides), and the consequences of these alternatives on the environment. Based on the preferred alternative in the vegetation management FEIS (hereby incorporated by reference to this FEIS and Forest Plan), all alternatives in this FEIS (except EGP) are predicated on the continued use of a full range of vegetative treatment methods. The proposed Forest Plan (*see* Forest Standards and Guidelines for "Timber") 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

Except for the EGP Alternative, all alternatives in this FEIS assume continued use of the full range of vegetative management methods for reforestation and timber stand improvement, including mechanical, biological, chemical, and prescribed fire methods. If the current policy on the use of herbicides were to change to either disallow or restrict their use, then the timber yield and the vegetative management (site preparation and release) costs would vary for each alternative presented here. In response to public comments, more information on the effects of alternative herbicide and vegetative management policies has been added. See Appendix Y, No Herbicide Use Analysis

A detailed discussion on the effects such a policy change would have on the alternatives considered in detail can be found in Appendix Y. This shows that under a no herbicide policy regime the ASQ would decrease by 14 percent.

e. Lassen National Forest Standards and Guidelines Common to all Alternatives

In addition to the above, the Lassen National Forest has developed Forest Standards and Guidelines to assure efficient and ecologically based management of Forest resources. A summary of those that apply to all alternatives

follows (See Chapter 4 of the Plan for the complete set of direction items that define the Preferred Alternative)

(1) Air Quality

Maintain air quality to meet or exceed legal requirements of appropriate levels of government

Minimize encroachment of prescribed fire smoke on population centers.

(2) Biomass

Provide for the use of the biomass that is surplus to ecological, silvicultural, and personal firewood gathering needs.

Provide biomass from thinnings in both plantations and wild stands to offset the costs of Forest Timber Stand Improvement programs.

(3) Cultural Resources

Protect, preserve, inventory, and evaluate important cultural resources.

Insure that Forest actions are not detrimental to traditional Native American religious rights and practices.

Provide information about cultural resources for public education and enjoyment.

(4) Energy

Provide energy efficient facilities through state-of-the-art design for both new construction and retrofit.

Encourage energy-efficient vehicle operations through use of fuel efficient vehicles for the Forest fleet.

(5) Facilities

Provide a stable and cost-efficient road system through appropriate construction, reconstruction, and/or maintenance.

Cooperate with Federal and State agencies, counties, and private entities to obtain needed modifications of roads under their jurisdiction.

Provide a stable and cost-efficient trail system through appropriate construction, reconstruction and/or maintenance.

Provide administrative sites and facilities that effectively and cost-efficiently serve the public and the Forest Service workforce.

(6) Fire and Fuels

Rely on fuel reduction and an effective fire protection organization to minimize wildfire losses.

Promote fire prevention commensurate with resource values at risk

Reduce fuels by prescribed burning and allowing biomass use while maintaining soil and water quality

(7) Firewood

Provide a sustained supply of firewood, giving priority to personal use

(8) Fish

Maintain or improve habitat for all native and compatible non-native species

(9) Forest Health

Reduce impacts of forest pests on all resources to acceptable levels through integrated pest management.

(10) Geology and Groundwater

Conduct geologic inventories needed for assessments of proposed projects.

(11) Lands

Initiate land ownership adjustments to achieve ownership patterns facilitating Forest management and minimizing administrative costs.

Survey and mark property boundaries prior to Forest activity adjacent to them.

Acquire rights-of-way needed to efficiently manage Forest resources and provide public access.

Pursue land withdrawals from mineral entry or disposal when needed to protect Forest improvements and areas of special significance.

Issue special use permits if a net public benefit will result, in conformance with Management Area Direction.

Avoid the proliferation of separate utility rights-of-way.

Resolve unauthorized occupancies of National Forest land.

Continue to coordinate with concerned agencies to preserve unique resources in the Eagle Lake, Lake Britton, and Lassen Volcanic National Park areas.

Designate the following as multi-user electronic sites: Turner Mountain, Hamilton Mountain, Morgan Summit, Keddie Ridge, Colby Mountain, and Halls Flat.

(12) Law Enforcement

Protect Forest resources to insure public safety and retain resource values.

(13) Minerals

Provide for mineral exploration and development while protecting surface resources.

(14) Range

Provide for long-term rangeland productivity for fisheries, wildlife, soil, water, timber, and livestock forage values.

Revise allotment management plans as necessary to meet management direction and vegetative management goals.

Establish Forest standards for vegetative utilization until site specific utilization standards are in place.

Manage streamside and other riparian areas forest-wide to reach natural or achievable site potential and desired ecological conditions. Desired ecological conditions, where site potential exists, are late seral communities in good or better condition.

(15) Recreation

Provide a wide range of outdoor recreation opportunities to meet public demand by furnishing different levels of access, service, facilities, and information.

Provide interpretive services and facilities to inform the public about Forest resources and management.

Provide diverse opportunities for off-highway vehicle recreation.

Provide diverse opportunities for winter sports.

Manage recreational residences as components of the overall National Forest recreation program. Work in partnership with the holders of recreation residence permits to utilize the recreational benefits of these residences.

Continue private operations of National Forest developed recreation sites where it best serves public recreation needs.

Work in partnership with local communities to expand recreational facilities, programs and trails on both public and private land.

(16) Sensitive Plants

Maintain habitat and viable populations to contribute towards eventual delisting of all Sensitive plants that occur on the Forest.

Manage Sensitive plants to insure that species do not become Threatened or Endangered because of Forest Service actions.

(17) Soils

Prevent irreversible loss of soil productivity.

Restore all substantial areas of significantly degraded soil.

(18) Special Areas

Protect areas of outstanding scientific, scenic, botanic or geologic value.

(19) Timber

Provide a sustained quantity of forest products by selecting silvicultural practices from the full range available on an individual stand basis, in accordance with biological requirements, economic efficiency, and Forest Goals for other resources.

(20) Vegetation and Diversity

Provide vegetative diversity to maintain scenic quality, viable plant and wildlife populations, and to minimize loss from wildfire.

(21) Visual Resources

Throughout the Forest, maintain visual quality objectives commensurate with other resource needs. Adopt and apply specific Visual Quality Objectives (VQOs) for all areas of the Forest.

Where past management activities do not meet adopted visual quality objectives, use visual rehabilitation to return visual quality to an acceptable level

(22) Water and Riparian Areas

Provide water of sufficient quality and quantity to meet current needs. Meet additional future demand where compatible with other resource needs

Limit individual project impacts as needed to avoid significant, adverse cumulative effects on water quality and fisheries

Comply with Federal, State, Regional and local water quality regulations, requirements, and standards

Maintain or improve riparian-dependent resources in and around wetlands, stream corridors (including ephemeral and intermittent streams), lakes, seeps, springs, and wet meadows

Evaluate riparian zones forest-wide and manage to reach natural or achievable site potential and desirable future conditions. Desired future conditions, where site potential exists, are late seral communities in good or better condition.

(23) Wild and Scenic Rivers

Recommend eligible, suitable rivers for federal Wild and Scenic River designation

Protect and enhance outstandingly remarkable values and the free-flowing condition of recommended and designated Wild and Scenic Rivers

(24) Wilderness and Further Planning Areas

Protect wilderness character in designated and recommended wilderness

(25) Wildlife

Assist in recovery efforts for Threatened and Endangered species

Provide for viable populations of California spotted owls and goshawks through coordinated management of an established network of nesting territories in appropriate habitat

Contribute towards the population viability of marten and fisher through coordinated management areas in appropriate habitat

Create desirable habitat size, shape, and distribution to provide both forage and cover for deer populations

Provide sufficient habitat for species dependent on snags, nest cavities, and dead and down wood

Enhance ecotones and provide other special habitat elements to maintain or increase species diversity.

Cooperate with Federal, State and local agencies in improving wildlife habitat for all species

Coordinate wildlife management programs with other resource management programs to meet habitat or population objectives established for Management Indicator Species

Manage habitat for Sensitive wildlife species to insure that these species do not become Threatened or Endangered due to Forest Service actions

f. Forest Objectives Common to All Alternatives

In all alternatives considered in detail, the Eagle Lake backdrop will be managed to meet Inventoried Visual Quality Objectives. This level of protection is commensurate with the current level of visual protection required on adjacent private lands in the Eagle Lake Planning Area (see Chapter 3, section 21, Visual Quality).

3. Management Areas and Management Prescriptions

For management and monitoring purposes, the Forest has been divided into 48 geographic subdivisions called Management Areas, the boundaries of which are constant in all alternatives. These allow specific management goals and objectives to be specified for each locale. Several prescriptions may be applied to different parts of each Management Area, depending on the alternative theme.

Management Prescriptions describe the management direction that can be applied to given areas of the Forest to facilitate some particular use. They describe what resources are to be emphasized, how all resource uses and activities are to be managed for that emphasis, and which kinds of lands can be considered for application. In each alternative, every acre of the Forest is allocated to a prescription.

Prescriptions used are summarized below. The full prescriptions are described in the accompanying Forest Plan (Chapter 4) and Plan Appendix E, Management Practices.

A - Non-Timber Wildlife Prescription

This prescription maintains or improves habitat for species that are at least partially dependent on non-forest land or non-commercial forests. The prescription will provide high habitat capability for deer, black bear, pronghorn antelope, hairy woodpecker, and gray squirrel. The prescription is based on active habitat manipulation and modification of other resource activities so as to enhance the habitat quality for wildlife and fish. Snag, riparian, and hardwood habitat will be managed to produce moderate to high habitat capability. Where conflicts occur over forage, wildlife will have priority over domestic livestock. No timber harvest will be scheduled under this prescription.

Emphasized management practices are:

- Fuels Management
- Fire Management
- Range Administration and Management
- Visual Resource Management
- Wildlife Habitat Management -
 - Threatened and Endangered Species
 - Wildlife Management - Harvest Species
 - Wildlife Habitat Management -
 - Other Management Indicator Species and Special Habitats
- Fish Habitat Management

Permitted management practices are:

- Facility Construction/Reconstruction
- Road Maintenance
- Road Closure
- Road Obliteration
- Restricted Off-Highway Vehicle Use
- Minerals Management

- Range Structural Improvement and Maintenance
- Range Nonstructural Improvement
- Interpretive Facilities and Services
- Watershed Restoration and Improvement

B - Rangemildlife Prescription

This prescription provides forage for livestock and wildlife, and provides for improved soil and vegetative conditions. Plant and soil conditions are to be improved through direct vegetation and soil restoration, improved livestock management, and regulation of other resource uses. Investment in improvements will be moderate, benefiting livestock, watershed, and wildlife. Forage utilization is managed to provide for both livestock and wildlife needs. No timber harvest will be scheduled under this prescription.

Emphasized management practices are:

- Fuels Management
- Fire Management
- Range Administration and Management
- Range Structural Improvements and Maintenance
- Range Nonstructural Improvement
- Visual Resource Management
- Watershed Restoration and Improvement
- Wildlife Habitat Management -
 - Threatened and Endangered Species
 - Wildlife Habitat Management -
 - Harvest Species
 - Wildlife Habitat Management -
 - Other Management Indicator Species and Special Habitats
- Fish Habitat Management

Permitted management practices are:

- Facility Construction/Reconstruction
- Road Maintenance
- Road Closure
- Road Obliteration
- Minerals Management
- Interpretive Facilities and Services
- Restricted Off-Highway Vehicle Use
- Limited Timber Management

C - Firewood Prescription

This prescription makes firewood available for personal and commercial use. All timber management practices and most other resource activities are compatible, but sawlog production is not intended. No timber harvest will be scheduled.

uled under this prescription This prescnption provides for maintenance of wildlife habitat, species viability, significant cultural resources, and water quality

Emphasized management practices are
Facility Construction/Reconstruction
Road Maintenance
Fuels Management
Fire Management
Modified Timber Management

Permitted practices are
Road Closure
Road Obliteration
Minerals Management
Range Administration and Management
Range Structural Improvement and Maintenance
Range Nonstructural Improvement
Visual Resource Management
Interpretive Facilities and Services
Restncted Off-Highway Vehicle Use
Limited Timber Management
Watershed Restoration and Improvement
Wildlife Habitat Management -
Threatened and Endangered Species
Wildlife Habitat Management -
Harvest Species
Wildlife Habitat Management -
Other Management Indicator Species and Special Habitats
Fish Habitat Management

D - Developed Recreation Prescription

This prescnption facilitates quality recreation experiences at campgrounds, picnic areas, trail-heads, vlsitor information stations, and water-based facilities, whether they are Forest Semce sites or recreation sites operated by the pnvate sector under special use permits It applies to existing sites and designated future sites (see Appendix L of the Forest Plan). Recreation amenities in and adjacent to future sites are to be conserved Development levels (see Appendix K) range from 1 to 4 and correspond to the five Recreation Opportunity Spectrum classes **Sup-**port systems, such as water and sanitation facilities, roads, trails, and signs, may be dominant but must harmonize with the natural setting. Vegetative management may be necessary to mamtain the health of the vegetation and to

protect the users, but no timber harvesting will be scheduled under this prescnption Livestock grazing is to be excluded from development level 3 and 4 campgrounds and developed lakefront sites All sites are to be recommended for withdrawal from locatable mineral entry.

Emphasized management practices are
Facility Construction/Reconstruction
Road Maintenance
Fuels Management
Fire Management
Visual Resource Management
Interpretive Facilities and Services
Restricted Off-Highway Vehicle Use

Permitted management practices are.
Road Closure
Road Obliteration
Range Administration and Management
Limited Timber Management
Watershed Restoration and Improvement
Fish Habitat Management

E - Early Successional Prescription

This prescnption maintains or improves forage to provide high habitat capability for wildlife species that are partially-dependent on early seral stages offorest types It is also intended to provide transitory range for domestic livestock and to improve plant and animal diversity. Livestock use will be compatible with wildlife needs Early seral stage wildlife species include black bear, deer, and pronghorn antelope Timberharvest will be scheduled under this prescription Treatment of forest vegetation to provldre desired wildlife habitat charactenstics is the primary method to achieve the habitat goals Cutting unit sizes and locations, timing of stand entries, and the intensity of site preparation, release, and thinning are modified from normal silvicultural practices to perpetuate desirable wldhife forage and cover conditions

Emphasized management practices *are*
Facility Construction/Reconstruction
Road Maintenance
Fuels Management
Fire Management
Range Administration and Management
Range Structural Improvements and Maintenance
Range Nonstructural Improvement

- Restricted Off-Highway Vehicle Use
- Modified Timber Management
- Wildlife Habitat Management - Harvest Species

Permitted management practices are.

- Road Closure
- Road Obliteration
- Minerals Management
- Visual Resource Management
- Interpretive Facilities and Services
- Watershed Restoration and Improvement
- Limited Timber Management
- Wildlife Habitat Management - Threatened and Endangered Species
- Wildlife Habitat Management - Other Management Indicator Species and Special Habitats
- Fish Habitat Management

F - Riparian/Fish Prescription

This prescription maintains and improves riparian-dependent resources, including (1) water quality, (2) fish habitat, especially for anadromous fish, (3) wildlife habitat, (4) water-associated aesthetics, and (5) riparian hardwoods and other vegetation. Timber harvest will be scheduled under this prescription, but at limited Regulation Class III levels (no more than 25 percent of the standing inventory may be harvested in any one decade).

Emphasized management practices are

- Road Obliteration
- Fuels Management
- Visual Resource Management
- Watershed Restoration and Improvement
- Limited Timber Management
- Wildlife Habitat Management - Threatened and Endangered Species
- Wildlife Habitat Management - Other Management Indicator Species and Special Habitats
- Fish Habitat Management
- Dispersed Recreation Activities

Permitted management practices are

- Facility Construction/Reconstruction
- Range Administration and Management
- Road Maintenance
- Road Closure
- Restricted Off-Highway Vehicle Use
- Fire Management

- Minerals Management
- Developed Recreation at Designated Sites
- Range Structural Improvement and Maintenance
- Range Nonstructural Improvement
- Interpretive Facilities and Services
- Trail Construction
- Wildlife Habitat Management - Harvest Species

G - Old Growth/Goshawk Prescription

This prescription provides for vegetative diversity through maintenance of old growth ecosystems, and maintains or improves high habitat capability for goshawks and bald eagles. The maintenance of visual quality is also compatible with this prescription. Timber management will focus on long rotations with a range of size classes and proper spatial distribution of stands to provide desired habitat conditions. Treatment through timber harvesting may be needed to achieve this. Limited timber management is expected to occur. Salvage harvesting may be appropriate in certain circumstances to remove heavy concentrations of insect or drought killed timber, and to protect stands against catastrophic wildfire losses.

Emphasized management practices are

- Road Maintenance
- Fuels Management
- Fire Management
- Visual Resource Management
- Limited Timber Management
- Restricted Off-Highway Vehicle Use
- Wildlife Habitat Management - Threatened and Endangered Species
- Wildlife Habitat Management - Other Management Indicator Species and Special Habitats

Permitted management practices are

- Facility Construction/Reconstruction
- Road Closure
- Road Obliteration
- Mineral Management
- Range Administration and Management
- Range Structural Improvement and Maintenance
- Interpretive Facilities and Services
- Watershed Restoration and Improvement

Wildlife Habitat Management -
Harvest Species
Fish Habitat Management

K - Rocky/Sparse Timber Prescription

This prescription maintains timber stands on rocky, unplatable (by artificial means) land and on lands with sparse to poorly stocked east-side pine. Investments will be made in reforestation, in the form of site preparation and release for naturally regenerated stands, stand improvements, and resource protection. Timber harvest will be scheduled under this prescription.

Emphasized management practices are:

Visual Resource Management
Limited Timber Management
Wildlife Habitat Management -
Threatened and Endangered Species
Wildlife Habitat Management -
Harvest Species
Wildlife Habitat Management - Other
Management Indicator Species
and Special Habitats
Fish Habitat Management

Permitted management practices are

Facility Construction/Reconstruction
Road Maintenance
Road Closure
Road Obliteration
Fuels Management
Fire Management
Minerals Management
Modified Timber Management
Range Administration and Management
Range Structural Improvements and
Maintenance
Range Nonstructural Improvement
Interpretive Facilities and Services
Restricted Off-Highway Vehicle Use
Watershed Restoration and Improvement

L - Late Successional Prescription

This prescription maintains or improves habitat to provide high habitat capability for species that are at least partially dependent on late successional timber stands with large diameter trees and obvious stand decadence. These species include spotted owl, pileated and hairy wood-

peckers, marten and fisher. No timber harvest will be scheduled under this prescription.

Emphasized management practices are.

Road Closure
Road Obliteration
Road Maintenance
Fuels Management
Fire Management
Visual Resource Management
Wildlife Habitat Management -
Threatened and Endangered Species
Wildlife Habitat Management -
Other Management Indicator Species
and Special Habitats

Permitted management practices are

Facility Construction/Reconstruction
Restricted Off-Highway Vehicle Use
Minerals Management
Range Administration and Management
Range Structural Improvement and
Maintenance
Range Nonstructural Improvement
Interpretive Facilities and Services
Limited Timber Management
Watershed Restoration and Improvement
Wildlife Habitat Management -
Harvest Species
Fish Habitat Management

M - Semi-primitive Motorized Prescription

This prescription is derived from the Recreation Opportunity Spectrum (ROS) class of Semi-Primitive Motorized (SPM). It is intended to facilitate dispersed, motorized recreation, such as snowmobiling, four-wheel driving, and motorcycling in areas essentially undisturbed except for the presence of four-wheel drive roads and trails. Non-motorized activities such as hiking, fishing, hunting, picnicking, and cross-country skiing are also possible. Motorized travel may be seasonally prohibited or restricted to designated routes to protect other resources. Although timber harvest will not be scheduled in these areas, timber may be selectively removed to protect recreational values. Management activities are not to be visually evident, and natural-appearing landscapes are to be maintained. The prescription will provide high habitat capability for species dependent on snags, dead and down wood, and late successional stands.

Emphasized management practices are

- Road Maintenance
- Road Closure
- Fuels Management
- Fire Management
- Range Administration and Management
- Visual Resource Management
- Interpretive Facilities and Services
- Restricted Off-Highway Vehicle Use
- Wildlife Habitat Management -
 - Threatened and Endangered Species
- Wildlife Habitat Management -
 - Harvest Species
- Wildlife Habitat Management -
 - Other Management Indicator Species and Special Habitats
- Fish Habitat Management

Permitted management practices are

- Facility Construction/Reconstruction
- Road Obliteration
- Minerals Management
- Range Structural Improvement and Maintenance
- Range Nonstructural Improvement
- Limited Timber Management
- Watershed Restoration and Improvement

N - Semi-primitive Non-Motorized Prescription

This prescription is derived from the Recreation Opportunity Spectrum (ROS) class of Semi-Primitive Non-Motorized (SPNM). It is intended to facilitate dispersed recreation, such as hiking, mountain bicycling, horseback riding, hunting, and cross-country skiing, in unroaded, essentially undisturbed areas outside of existing and proposed wilderness areas. Although timber harvest will not be scheduled in these areas, timber may be selectively removed to protect semi-primitive recreational values. Management activities are not to be visually evident, and natural appearance and landscapes are to be maintained. The prescription will provide high habitat capability for species intolerant of human disturbance or dependent on snags, dead and down wood, and late successional stands. Recreation, visual, wildlife, fisheries, and riparian resource values are emphasized.

Emphasized management practices are

- Range Administration and Management
- Road Closure

- Road Obliteration
- Restricted Off-Highway Vehicle Use
- Fire Management
- Interpretive Facilities and Service
- Visual Resource Management
- Wildlife Habitat Management -
 - Threatened and Endangered Species
- Wildlife Habitat Management -
 - Harvest Species
- Wildlife Habitat Management -
 - Other Management Indicator Species and Special Habitats
- Fish Habitat Management

Permitted management practices are

- Facility Construction/Reconstruction
- Road Maintenance
- Fuels Management
- Minerals Management
- Range Structural Improvements and Maintenance
- Range Nonstructural Improvement
- Limited Timber Management
- Watershed Restoration and Improvement

R - Range Prescription

This prescription provides rangelands that are managed to meet vegetative management objectives, desirable wildlife habitat, clean water, healthy riparian ecosystems, stable soils and forage for domestic livestock. The goal is to maintain rangeland condition at or above the satisfactory level with stable or upward trends. Rangeland condition is to be maintained or enhanced through forage improvement, livestock management, and coordination with other resource uses. Investment in range improvements will be moderate to high. No timber harvest will be scheduled under this prescription.

Emphasized management practices are

- Fuels Management
- Fire Management
- Range Administration and Management
- Range Structural Improvement and Maintenance
- Range Nonstructural Improvement
- Visual Resource Management

Permitted management practices are.

- Facility Construction/Reconstruction
- Road Maintenance
- Road Closure
- Road Obliteration

- Minerals Management
- Interpretive Facilities and Services
- Restricted Off-Highway Vehicle Use
- Limited Timber Management
- Watershed Restoration and Improvement
- Wildlife Habitat Management -
 - Threatened and Endangered Species
- Wildlife Habitat Management -
 - Harvest Species
- Wildlife Habitat Management -
 - Other Management Indicator Species and Special Habitats
- Fish Habitat Management

S - Special Areas Prescription

This prescription preserves areas with unusual historical, geological, botanical, zoological, paleontological, or other special characteristics, for public enjoyment or research. Experimental Forests, Research Natural Areas (RNA's), Special Interest Areas (SIA's), and Wild and Scenic Rivers are included. These areas are managed primarily to produce benefits other than timber, range, forage, minerals, and other commodities. Timber harvest will not be scheduled under this prescription.

For ***Research Natural Areas***:

Emphasized management practices are

- Fire Management
- Visual Resource Management

Permitted management practices are

- Road Closure
- Road Obliteration

For all ***other types of special areas***, the above practices apply as well as the following

Permitted management practices are.

- Facility Construction/Reconstruction
- Interpretive Facilities and Service
- Road Maintenance
- Minerals Management
- Range Administration and Management
- Range Structural Improvement and Maintenance
- Range Nonstructural Improvement
- Restricted Off-Highway Vehicle Use
- Limited Timber Management
- Modified Timber Management

- Watershed Restoration and Improvement
- Wildlife Habitat Management -
 - Threatened and Endangered Species
- Wildlife Habitat Management -
 - Harvest Species
- Wildlife Habitat Management -
 - Other Management Indicator Species and Special Habitats
- Fish Habitat Management

T - Timber Prescription

This prescription emphasizes wood production and utilization while maintaining other resource values. Investments will be made in road construction, fuels management, reforestation, vegetative management, and timber stand improvement. Vegetative management may include biological, chemical, mechanical, and/or hand treatment methods. Timber management practices must be compatible with Forest Standards and Guidelines, and Management Area Direction, and the provisions of this prescription.

Emphasized management practices are

- Facility Construction/Reconstruction
- Road Maintenance
- Fuels Management
- Fire Management
- Full Timber Management

Permitted management practices are'

- Road Closure
- Road Obliteration
- Minerals Management
- Range Administration and Management
- Range Structural Improvement and Maintenance
- Range Nonstructural Improvement
- Visual Resource Management
- Interpretive Facilities and Services
- Restricted Off-Highway Vehicle Use
- Modified Timber Management
- Watershed Restoration and Improvement
- Wildlife Habitat Management -
 - Threatened and Endangered Species
- Wildlife Habitat Management -
 - Harvest Species
- Wildlife Habitat Management -
 - Other Management Indicator Species and Special Habitats
- Fish Habitat Management

V - View/Timber Prescription

This prescription provides scheduled timber harvests while maintaining and enhancing scenic qualities in areas that are visually sensitive or have high scenic value. Timber management and transportation development that meet the adopted visual quality objectives are permitted. The visual quality objectives are Retention and Partial Retention (distributed as shown on the Adopted Visual Quality Objectives Map).

Emphasized management practices are:

- Road Obliteration
- Fuels Management
- Fire Management
- Range Administration and Management
- Visual Resource Management
- Interpretive Facilities and Services
- Limited Timber Management
- Modified Timber Management

Permitted management practices are:

- Facility Construction/Reconstruction
- Road Maintenance
- Road Closure
- Minerals Management
- Range Structural Improvement and Maintenance
- Range Nonstructural Improvement
- Restricted Off-Highway Vehicle Use
- Watershed Restoration and Improvement
- Wildlife Habitat Management -
 - Threatened and Endangered Species
- Wildlife Habitat Management -
 - Harvest Species
- Wildlife Habitat Management -
 - Other Management Indicator Species and Special Habitats
- Fish Habitat Management

W - Wilderness Prescription

This prescription protects natural landscapes, plant and animal communities, and natural biological processes, and facilitates compatible public use in designated or recommended wilderness areas. The prescription specifies management direction in accordance with the Wilderness Act of 1964, assuring no permanent or long-lasting evidence of human use. In each area, the prescription will be implemented through specific wilderness implementation plans. No timber harvest is allowed.

Emphasized management practices are:

- Fire Management
- Visual Resource Management

Permitted management practices are:

- Facility Construction/Reconstruction
- Fuels Management
- Road Obliteration
- Range Administration and Management
- Range Structural Improvement and Maintenance
- Range Nonstructural Improvement
- Wildlife Habitat Management -
 - Threatened and Endangered Species

Z - Minimal Management Prescription

This prescription protects and maintains existing characteristics of certain lands through low intensity management. Timber harvest will not be scheduled under this prescription.

Emphasized management practices are:

- None

Permitted management practices are:

- Fuels Management
- Fire Management
- Minerals Management
- Range Administration and Management
- Limited Timber Management
- Visual Resource Management
- Watershed Restoration and Improvement
- Wildlife Habitat Management -
 - Threatened and Endangered Species
- Wildlife Habitat Management -
 - Harvest Species
- Wildlife Habitat Management -
 - Other Management Indicator Species and Special Habitats
- Fish Habitat Management

4. Individual Alternative Descriptions

Each of the four management alternatives considered in detail is described in terms of its (1) acreage allocation by prescription, (2) theme, (3) resource program direction, (4) environment to be created, and (5) outputs and effects. Outputs are planned for decade 1; potential outputs are shown for subsequent decades for long-term comparison and disclosure of environmental consequences.

1. PRF (PREFERRED ALTERNATIVE)

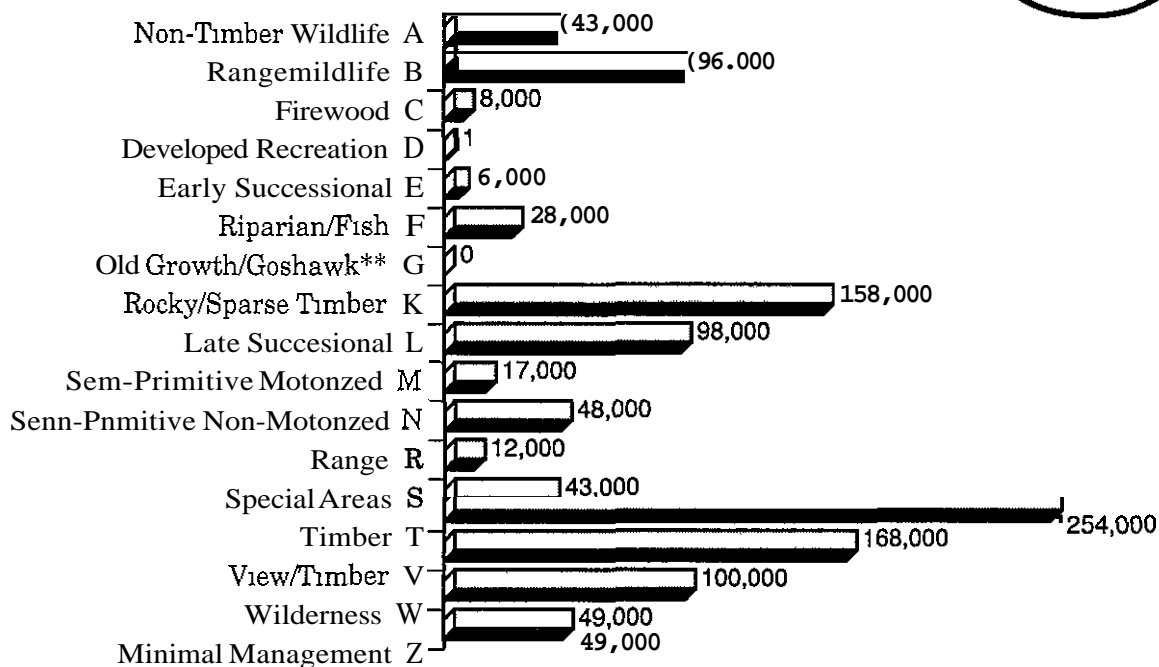
a. Theme

This alternative responds to both commodity and amenity demands by emphasizing a wide range of resources including moderate to high levels of resource protection, recreation opportunities, and commodity outputs. Important elements are: (1) Recommending a moderately high amount of additional wilderness while managing most remaining unroaded lands for semi-primitive recreation; (2) Regenerating a

mix of well-stocked and poorly-stocked timber lands, and producing timber at a sustainable level in a cost-effective manner through even- and uneven-aged management; (3) Protecting and enhancing habitat for a mixture of wildlife species that depend upon early and late successional stages; (4) Rehabilitating developed recreation facilities and providing a moderate increase in capacity in the first four decades, and (5) Maintaining acceptable levels of visual quality when regenerating timber stands. Other resources will be managed to fit with these emphases. Figure 2-2 shows acreage allocations (rounded) by prescription, Table 2-3 (page 39) indicates average annual outputs by decade.

Figure 2-2

Acreage Allocation by Prescription*



* Prescriptions represent general management intent. Final land allocations will be done at the project level, after a site-specific environmental analysis has been completed. Prescription maps do not generally display areas smaller than 200 acres. More than one prescription may apply to an area. See Prescription Application Priority in the Plan Chapter 4, section F, for a listing of which prescriptions take precedence.

** G Prescription acres were modeled, but not field verified. They do not appear on present prescription maps. When mapped, the number of acres in this bar will change, representing acres not allocated to more restrictive prescriptions. Other prescription acreages may be reduced when G acreage is adjusted.

b. Resource Program Direction

Cultural Resources Identify Forest cultural resources in the first decade. By the end of the decade, determine the eligibility of **20** percent of the cultural properties for inclusion on the National Register of Historic Places. If determined eligible, recover or protect and preserve their values. Nominate eligible cultural resources for inclusion on the National Register. Insure that Forest actions are not detrimental to Native American religious rights and practices. Provide information on the cultural heritage of the Forest for public education and enjoyment.

Facilities Maintain local roads not serving resource management activities at level **1**. Maintain all other roads at level **2** unless management activities require a higher level. (See Appendix J for a description of road maintenance levels.)

Fire and Fuels The fire management program emphasizes wildfire suppression. The budget, **20** percent higher than the **1991** level, will be divided among the following programs: Prevention, **14** percent; Detection, **6** percent; Suppression, **68** percent; and Fuels, **12** percent. On a **10**-year average, about **760** acres of forest will burn from wildfire annually. Each year prescribed fire will be used on approximately **1,300** acres for range and wildlife habitat improvement and **3,600** acres for timber site preparation. Fuel treatment with prescribed fire would average **1,150** acres per year. Additionally, prescribed fire from unplanned ignition can be used on **99,644** acres of wilderness based on site specific fire management plans.

Firewood Provide firewood to meet personal use and commercial demand. Use **8,200** acres of the lodgepole pine type for firewood production rather than for sawtimber production.

Fish, Resident Improve three acres of stream channel and install **30** habitat improvement structures per year through decade **1**.

Fish, Anadromous Improve three acres of stream channel and install **20** habitat improvement structures per year through decade **1**.

Forest Health The moderate levels of vegetative management and resource outputs provide

both the opportunity and need for a moderate level of pest management.

Range Decrease decade **1** permitted use to **48,500** AUM's, intensify allotment management and increase investment in range and wildlife habitat improvements. Provide for livestock grazing while emphasizing water quality, wildlife, and riparian area protection

Recreation, Developed Construct new campgrounds and other developed recreation facilities to meet estimated future demand. Demand is expected to exceed capacity in decades **4** and **5**. Consider some new construction or expansion of existing sites during the first three decades only in areas of particularly high demand where use cannot be transferred to other less used sites. Provide opportunity for future downhill ski development of Butt Mountain by assigning **2,490** acres to the Minimal Management Prescription. Rehabilitate existing developed sites as the highest priority in decade **1** and manage all sites at the standard service level. Continue existing interpretive services and expand to each Ranger District. Construct Forest entrance stations and interpretive facilities

Recreation, Dispersed Provide for a full range of dispersed recreation opportunities. Assign **47,590** acres to the Semi-Primitive Non-Motorized Prescription, and **17,400** acres to the Semi-Primitive Motorized Prescription. Maintain trails to standard level and construct or reconstruct **3.5** miles of trail annually. Implement the Forest Off-Road Vehicle Plan, keeping the Forest open to summer off highway vehicles on **763,000** usable acres

Soil, Water, and Riparian Areas Restore all known areas of deteriorated watershed in two decades (**75** acres per year). Inventory and monitor water quality to establish baselines and to identify maintenance or improvement needs for major streams. Maintain a water use and needs inventory. Analyze cumulative watershed impacts of projects affecting Class I streams. Develop soil plans for land-disturbing activities such as timber harvesting, road building, livestock grazing, recreation activities, or wildlife projects (Three plans are envisioned erosion prevention, compaction prevention, and preservation of soil productivity in Forest activities.) Conduct an Order **2** soil resource inventory (SRI)

on all proposed clearcuts that are located on areas of high erosion hazard rating; field verify Order 3 SRI on other project areas. Restore or improve **20** acres of riparian habitat per year. Continue present Eagle Lake monitoring and cooperative snow survey programs.

Special Areas Continue evaluation of Green Island Lake, Indian Creek, Soda Ridge, Timbered Crater, Graham Pinery and Mayfield as candidate Research Natural Areas. Classify as Special Interest Areas. Black Rock (geologic), Crater Lake (geologic), Deep Hole (geologic), Homer/Deerheart Lakes (scenic), Montgomery Creek Grove (botanical), Murken (botanical), and Willow Lake Bog (botanical) areas.

Timber Adopt an average annual allowable sale quantity (scheduled harvest) of **96** MMBF obtained from **596,341** acres of suitable timberland. Give preference to regeneration harvests on sites capable of being planted to **200-250** trees per acre, while generally maintaining continuous forest cover on rocky lands. Utilize Group Selection on about 500 acres per year where appropriate. Place initial harvest emphasis on regeneration cutting of both poorly-stocked and well-stocked mature stands. Capture mortality by sanitation and salvage cutting where economically feasible. Reforest an average of **3,600** acres per year in decade 1 and an average of **3,400** acres per year in decades 2 through 5.

Visual Along Highways **89, 299, 32, 44** and **36**, meet visual quality objectives of Retention and Partial Retention in foreground and middle-ground distance zones. (See Appendix Q for descriptions of Visual Quality Objectives.) Along paved county roads and roads leading to important recreation areas, meet visual quality objectives along foreground and middle-ground distance zones. For other sensitivity level 1 roads and use areas, drop the inventoried visual quality objective level by one level. Along sensitivity level 2 roads and use areas, meet Modification, except meet Partial Retention on variety Class A and B foregrounds (see Chapter, 3 Visual Resources, for explanation of sensitivity levels and variety class). Meet Inventoried Visual Quality Objectives in the Lake Almanor Basin backdrop, Diamond Mountain, and Keddie Ridge backdrop, Stover Mountain backdrop, and Hat Creek watershed. Meet primarily Partial Retention in foreground along the Pacific Crest Trail. Meet

Retention in foreground along the Heart Lake and Spencer Meadows National Recreation Trails and Butte Creek Trail. Meet Retention in foreground along the Bizz Johnson Trail in the canyon areas and meet Partial Retention in foreground along flat areas. Meet Preservation in wilderness and recommended wilderness areas.

Wild and Scenic For Mill Creek, recommend study segments **1** and **2** as recreational, segments **3a** and **4** as scenic, and segments **3b** and **5** as wild. (See Appendix E for descriptions of study segments.) For Deer Creek, recommend segment **3** as recreational, segments **4** and **6** as scenic, segments **5** and **7** as wild. For Antelope Creek, recommend all study segments as wild.

Wilderness and Further Planning Areas Recommend the Heart Lake, and portions of Mill Creek, Trail Lake B, and Wild Cattle Mountain further planning areas for wilderness (**21,584** acres).

Wildlife, Early Successional Burn **1,300** acres of non-timber vegetation per year to improve deer habitat. Improve **50** acres of wetlands per year during decade 1. Complete **30** acres of other habitat improvement per year (riparian areas, meadows, and snags). About **3,600** acres of early seral habitat would be created annually through timber regeneration. This includes regeneration of 600 acres per year of commercial forest land using the Early Successional Prescription to enhance deer forage during the first three decades.

Wildlife, Late Successional Enhance and protect nesting habitat for **16** pairs of bald eagles and 3 pairs of peregrine falcons the first decade, and **19** pairs of bald eagles and **5** pairs of peregrine falcons in the second through fifth decades. Use state-of-the-art nest management techniques to enhance reproductive success and meet Forest recovery goals as provided for in recovery plans for these species. Provide **40** spotted owl territories and habitat for at least **113** pairs of goshawks. Maintain one Habitat Conservation Area for the northern spotted owl to support two pairs.

Retain at least five percent old growth in all timber types, and maintain a series of habitat areas that contribute to the viability of marten and fisher. Defer scheduled timber harvesting

mtm spotted owl, marten and fisher habitat management areas. Conduct limited timber management in old growth and goshawk areas where habitat suitability can be maintained.

c. Environment Projected to be Created

By the fifth decade, a projected **34** percent of the productive timber land will have been harvested, presenting a mosaic of stands varying in age from 0 to **50** years and in size from **5** to **40** acres. Approximately **243,000** acres of large sawtimber and old growth would remain, 29 percent of the forested land. Patches of old growth yellow pines would be visible along major highways and scattered through the Forest. Timber harvests would be more commonly seen from some secondary roads, unpaved county roads, local roads, and many trails. Areas burned by prescribed fire or wildfire would be slightly more evident.

At least nine percent of the Forest would remain in natural condition in wild and scenic rivers and wilderness areas. Unroaded areas and areas protected for their scenery would also contribute to a natural appearing landscape. Lakes and streams would remain clean, and air would remain generally clear except following fluctuations from prescribed burning or wildfires during summer and fall.

A diversity of forest and rangelands would support wildlife that favor early to mid-successional stages including deer, small rodents, waterfowl, and birds that prefer openings, brush, and young forests. Livestock use would be less evident in riparian zones.

The number of woodcutters and Forest recreationists would increase. Visitor increases would be most noticeable in campgrounds, picnic areas, and interpretive sites. Fishing would continue to increase. Hikers and backpackers would choose from five separate wildernesses and several unroaded areas.

Table 2-3
Average Annual Outputs by Decade for PRF Alternative

Output/Activity	Base Year 1982	1980 RFA Goals		Decade				
		1990	2030	1	2	3	4	5
ECONOMIC								
Total Budget (MM \$)	13.9	17.9	19.3	16.3	19.2	21.4	25.7	30.1
Total Cost (MM \$)	14.5			17.5	20.5	22.8	27.1	31.4
BIOMASS a/								
Biomass Available (M O.D. Tons)	148			165	165	165	179	187
FACILITIES								
Roads & Trails (miles)								
Trail Construction/ Reconstruction	0	3	3	3.5	3.5	3.5	3.5	3.5
Road Construction	15			16	7	6	5	4
Road Reconstruction	80			50	46	56	60	55
Road Maintenance b/	2,862			3,552	3,667	3,732	3,787	3,832
Dams & Reservoirs (number)								
Forest Service	8			10	11	11	16	16
Other Federal	0			0	0	0	0	0
Other State/Local	7			7	7	7	7	7
Private	2			2	2	2	2	2
Administrative Sites (number)								
Forest Service Owned	12			11	11	11	11	11
Leased	4			1	1	1	1	1
FIRE AND FUELS								
Fuel Treatment (total acres)	11,630			6,050	5,950	5,950	5,750	5,650
Fire-Related Treatment	1,000			1,150	1,150	1,150	1,150	1,150
Timber-Related Treatment	8,990			3,600	3,500	3,500	3,300	3,200
Range/Wildlife Fuel Treatment	1,640			1,300	1,300	1,300	1,300	1,300
Expected Acres Burned by Wildfire								
Intensity Class 1	328			380	410	436	450	439
Intensity Class 2	74			91	98	105	108	105
Intensity Class 3	6			8	8	9	9	9
Intensity Class 4	113			228	246	262	269	263
Intensity Class 5	6			8	8	9	9	9
Intensity Class 6	39			45	92	52	54	53
Total	566			760	862	873	899	878

Table 2-3 (continued)

Average Annual Outputs by Decade for PRF Alternative

Output/Activity	Base Year 1982	1980 RPA Goals		Decade				
		1990	2030	1	2	3	4	5
FIREWOOD								
Firewood (Thousand Cords)	70			69	69	70	79	83
FISH								
Resident Fish (M pounds)	48	53	57	51	52	54	54	54
Anadromous Fish-Commercial Harvest (M pounds)	100	100	103	100	100	101	101	101
Anadromous Fish-Sport (M pounds)	39	39	40	39	39	39	39	39
Total WFUD's	18,750			19,400	19,400	19,400	19,400	19,400
Direct Habitat Improvement (WFUD's)								
Resident Fish	300			2,000	3,700	4,000	4,000	4,000
Anadromous Fish-Sport	115			1,000	1,000	1,000	1,000	1,000
Direct Habitat Improvement (acres/structures)								
Resident fish	15/10			3/30	3/15	1/1	1/1	1/1
Anadromous Fish-Commercial & Sport	1/10			3/20	.5/1	.5/1	.5/1	.5/1
LANDS								
Land Acquisition (acres) c/	1,600	0	0	2,000	2,000	200	200	200
Minerals (plans & permits)	58	51	65					
Locatable Minerals	6			6	6	6	6	6
Mineral Materials	52			46	49	50	52	54
Leasable Minerals	0			2	4	6	8	10
RANGE								
Grazing (M AUM's)	49 7	50 5	53 2	48 5	48 5	48 5	48 5	48 5
RECREATION								
Developed Public (M RVD)	591	639	930	629	726	810	886	997
Developed Private (M RVD)	190	202	294	190	190	190	190	190
Dispersed (M RVD) (including wilderness use, excluding WFUD's)	312	336	448	402	451	493	533	589

Table 2-3 (continued)
Average Annual Outputs by Decade for PRF Alternative

Output/Activity	Base Year 1982	1980 RPA Goals		Decade				
		1990	2030	1	2	3	4	5
RECREATION (continued)								
Open Usable OHV Areas, Summer (M acres)	961			763	763	763	763	763
Open Usable OHV Areas, Winter (M acres)	961			763	763	763	763	763
Roads & Trails Open to OHV Use, Summer (mi)	2,240			2,301	2,422	2,542	2,662	2,782
Roads & Trails Open to OHV Use, Winter (mi)	3,070			3,132	3,252	3,372	3,492	3,612
SPECIAL AREAS (number of areas/M acres)								
Research Natural Areas	2/4 4			8/143	8/143	8/143	8/143	8/143
National Natural Landmarks	0			0/0	0/0	0/0	0/0	0/0
Special Interest Areas	0			7/2 3	7/2 3	7/2 3	7/2 3	7/2 3
TIMBER								
Allowable Sale Quantity								
MMCF	27	28	29	15	15	15	17	18
MMBF	171	176	187	96	96	96	108	113
Long Term Sustained Yield								
MMCF	30			22	22	22	22	22
MMBF	195			139	139	139	139	139
Reforestation (acres)	600	606	707	3,600	3,500	3,500	3,300	3,200
Timber Stand Improvement (acres)	2,200	2,586	2,637	4,700	4,700	4,700	5,700	7,000
VISUAL RESOURCE								
Visual Quality Index	57			56	56	55	55	54
WATER								
Quality (M acre-feet @ standards)	1,308	2,102	2,124	1,304	1,299	1,299	1,300	1,301
Quantity (M acre-feet) d/	1,308			1,304	1,299	1,299	1,300	1,301
Increased Quantity (M acre-feet)				-4	-9	-9	-8	-7
Watershed Improvement (acres)	15	170	200	75	75	5	5	5
Riparian Area Improvement (acres)	5			20	20	20	20	20

Table 2-3 (continued)
Average Annual Outputs by Decade for PRF Alternative

Output/Activity	Base Year 1982	1980 RPA Goals		Decade				
		1990	2030	1	2	3	4	5
WILD & SCENIC RIVERS	Miles Recommended							
Wild	0			485	485	485	485	485
Scenic	0			10.0	10.0	10.0	10.0	10.0
Recreational	0			175	175	175	175	175
WILDERNESS								
Wilderness Acres	78,060			99,644	99,644	99,644	99,644	99,644
Wilderness Units	3			7	7	7	7	7
Wilderness Use (MRVD) e/	20.4			37.4	41.1	45.3	49.8	54.8
WILDLIFE								
Threatened & Endangered Species								
Bald Eagle (pairs)	14			16	19	19	19	19
Northern Spotted Owl/HCA	Unmanaged			1	1	1	1	1
Peregrine Falcon (pairs)	1			3	5	5	5	5
Other Wildlife								
Deer (animals)	49,000	54,800	54,800	45,600	46,000	46,400	46,800	47,200
California Spotted Owl Habitat-Areas	Unmanaged			40	40	40	40	40
Goshawk Management Areas	Unmanaged			113	113	113	113	113
Total WFUD's	62,400			58,100	58,600	59,100	59,600	60,100
Direct Habitat Improvement (WFUD's)								
Deer	400			540	540	540	400	400
Small Game and Non-Game	800			800	800	700	600	600
Wildlife Habitat Improvement (acres)								
Deer	2,000			1,300	1,300	1,300	1,300	1,300
Small Game and Non-game	50			80	80	80	80	80

a/ Excludes material <4" diameter, precommercial thinning, firewood

b/ Mileages shown are mid-decade averages for new construction

c/ Five-year average

d/ Flow figures do not include runoff contributed from private lands, while the RPA figures were based on entire watershed areas

e/ 1982 base year includes RVD's for Caribou and Thousand Lakes Wilderness Areas

Note Decade 2-5 potential outputs are shown for purpose of long-range comparison of alternatives

2 CUR (CURRENT ALTERNATIVE)

a. Theme

This alternative continues current management policies and practices. Important elements are: (1) Maintaining expenditures at the current level; (2) Providing no increase in recreational facilities; and (3) Maintaining current management policies and commodity outputs (e.g. timber harvests, forage for livestock, etc.) for most resources while allowing reductions in visual quality and in semi-primitive recreation opportunities. Other resources will be managed to fit with

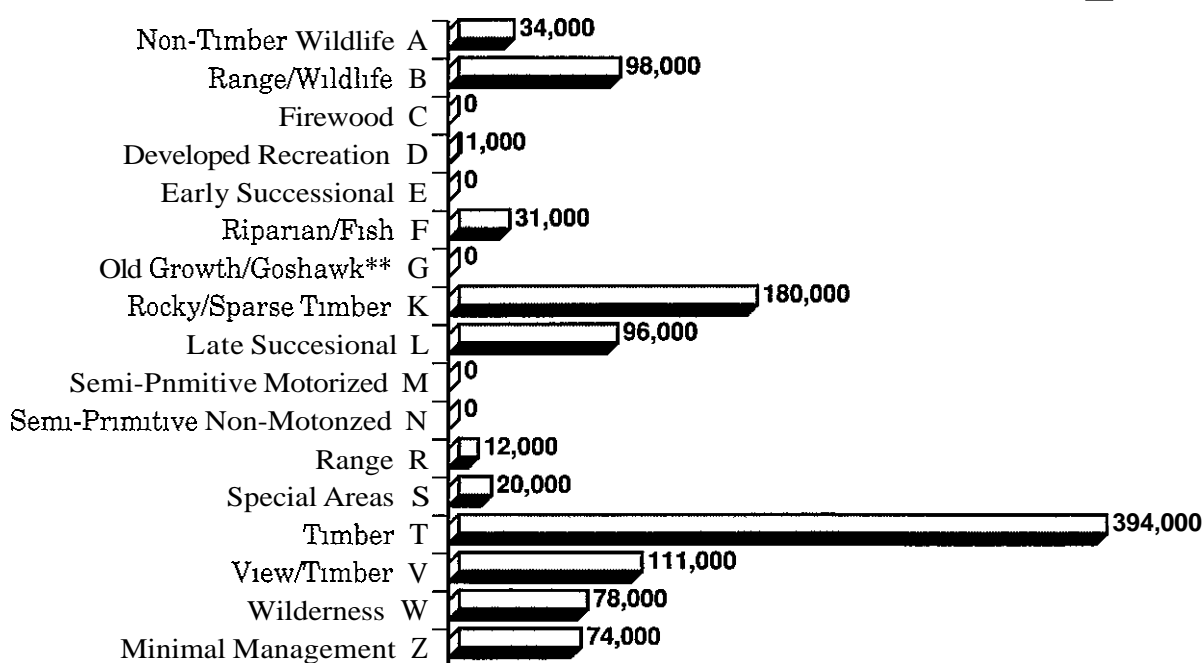
these emphases. Figure 2-3 shows acreage allocations (rounded) by prescription, Table 2-4 (page 46) indicates average annual outputs by decade.

b. Resource Program Direction

Cultural Resources Identify and evaluate the Forest's cultural resources. If determined eligible for inclusion on the National Register of Historic Places, recover or protect and preserve their values. Nominate eligible cultural resources to the National Register. Insure that Forest actions are not detrimental to Native American religious rights and practices.

Figure 2-3

Acreage Allocation by Prescription*



* Prescriptions represent general management intent. Final land allocations will be done at the project level, after a site-specific environmental analysis has been completed. Prescription maps do not generally display areas smaller than 200 acres. More than one prescription may apply to an area. See Prescription Application Priority in Plan Chapter 4, section F, for a listing of which prescriptions take precedence.

** G Prescription acres were modeled, but not field verified. They do not appear on present prescription maps. When mapped, the number of acres in this bar will change, representing acres not allocated to more restrictive prescriptions. Other prescription acreages may be reduced when G acreage is adjusted.

CUR

Facilities Maintain local roads not serving resource management activities at level **1**. Maintain all other roads at level 2 unless management activities require a higher level.

Fire and Fuels Use the current fire management program which emphasizes suppression. The budget, at the existing level, would be divided among the following programs: Prevention, 14 percent; Detection, 6 percent; Suppression, **68** percent; and Fuels, 12 percent. On a 10-year average, about 818 acres of forest will burn from wildfire each year. Approximately 1,760 acres of range and wildlife habitat improvement, 5,900 acres of timber site preparation, and 2,000 acres of fuels treatment will be accomplished with prescribed fire each year. Additionally, prescribed fire from unplanned ignition can be used on 78,060 acres of wilderness.

Firewood Provide firewood to meet personal use demand.

Fish, Resident Improve .75 acres of stream channel and install 8 habitat improvement structures per year through decade 1.

Fish, Anadromous Improve **1.5** acres of stream channel and install two habitat improvement structures per year through decade 1.

Forest Health The moderate levels of vegetative management and resource outputs provide both the opportunity and need for a moderate level of pest management.

Range Manage existing allotments to maintain the current level of livestock grazing by taking advantage of transitory range. Continue with a minimum range improvement program for resources protection.

Recreation, Developed Provide no increase in developed recreation capacity over 1982 levels, nor rehabilitation of sites. Maintain sites at the limited service levels unless serious violation of safety and sanitation standards requires closure. Make no special provisions for a Butt Mountain downhill ski development.

Recreation, Dispersed Assign no acres to the Semi-Primitive Non-Motorized or Semi-Primitive Motorized Prescriptions. Construct no new trails. Maintain the Pacific Crest Trail and

National Recreation Trails at the standard level, and other trails at less than standard maintenance. Maintain selected trails at higher levels through the Adopt-a-Trail program. Implement the Forest Off-Road Vehicle Plan, keeping the Forest open to summer off-highway vehicle use on 931,000 usable acres. (Refer to the CUR Alternative Map.) Reduce interpretive services to minimum level, maintaining only the most important facilities.

Soil, Water, and Riparian Areas Meet minimum requirements of NFMA and 36 CFR 219. Restore all known acres of deteriorated watershed in two decades (75 acres per year). Prepare erosion prevention and compaction prevention plans for most land-disturbing projects. Emphasize critical projects and high value streams. Field verify Order 3 soil resource inventories (SRI) on most project areas, especially in proposed clearcuts. Improve five acres of riparian habitat per year. Continue present Eagle Lake monitoring and cooperative snow survey programs.

Special Areas Recommend no additional Special Areas.

Timber Adopt an average annual allowable sale quantity of 171 MMBF; obtain from a portion of 745,000 acres of suitable timberland. Give preference to regeneration harvests on sites capable of being planted to 200-250 trees per acre, while generally maintaining continuous forest cover on rocky lands. Place initial harvest emphasis on regeneration cutting of mature stands. Capture mortality by sanitation and salvage cutting where economically feasible. Reforest an average of 5,900 acres per year in decade 1, and an average of approximately 6,400 acres per year during decades 2 through 5.

Visual Along Highways 89, 299, 32, and 44, meet Retention in the foreground and Partial Retention in the middleground. Along Highway **36** and paved county roads, meet Partial Retention in the foreground and Modification in the middleground. For other sensitivity level 1 roads, drop the inventory visual quality objective by one. On sensitivity level 2 roads, meet Modification except meet Partial Retention on vanity class A and **B** foregrounds. Meet Preservation in wilderness.

Wild and Scenic Rivers Recommend no Wild and Scenic Rivers.

Wilderness and Further Planning Areas Recommend no additional wilderness.

Wildlife, Early Successional Annually burn 1,760 acres of non-timber vegetation to improve deer habitat. Improve 50 other acres of habitat per year in wetlands and other areas. Also, 5,900 acres of early seral habitat would be created annually through timber regeneration

Wildlife, Late Successional Enhance and protect nesting habitat for 16 pairs of bald eagles and three pairs of peregrine falcons through the first decade, and 19 pairs of bald eagles and five pairs of peregrine falcons in decades two through five. Use state-of-the-art nest management techniques to enhance reproductive success and meet Forest recovery goals as specified in recovery plans for these species. Provide 39 spotted owl territories (the minimum network), and habitat for at least 113 pairs of goshawks.

Maintain one Habitat Conservation Area for the northern spotted owl. Retain at least five percent of all timber types in old growth, and maintain habitat that contributes to the viability of marten and fisher. Conduct limited timber management within spotted owl habitat (SOHA's), marten, fisher, goshawk and old growth areas where habitat sustainability can be maintained.

c. Projected Environment to be Created

By the fifth decade, a projected 53 percent of the productive timberland would be in an even-aged condition, presenting a mosaic of stands varying in age from 0 to 50 years and in size from 5 to 40 acres. Approximately 162,000 acres of large sawtimber and old-growth would remain. Old growth yellow pines would be visible along major highways and occasionally seen scattered through the Forest. Timber harvests would increasingly be seen from unpaved county roads, local roads, and many trails. Areas burned by prescribed fire would be visible in about the same amount as presently seen.

About seven percent of the Forest would remain in a natural condition in existing wilderness areas. Areas protected for their scenery would also contribute to a natural appearing landscape. The air would remain clear except following prescribed burns or wildfires during summer and fall.

A diversity of forest and rangelands would support wildlife that favors early to mid-successional stages including deer, small rodents, and birds that prefer openings, brush, and young forests.

The numbers of firewood cutters and Forest recreationists would increase. Use of developed campgrounds would stay about the same, motorized dispersed use would increase, and semi-primitive use would decline. Fishing would continue to increase. The number of wilderness users would remain unchanged. Deer hunting success could increase and attract additional hunters to the Forest.

Table 2-4
Average Annual Outputs by Decade for *CUR* Alternative

Output/Activity	Base Year 1982	1980 RPA Goals		Decade				
		1990	2030	1	2	3	4	5
ECONOMIC								
Total Budget (MM \$)	13.9	17.9	19.3	15.1	17.5	20.7	24.6	29.3
Total Cost (MM \$)	14.5			16.1	18.5	21.7	25.6	30.3
BIOMASS - a/								
Biomass Available (M O.D. Tons)	148			148	181	145	109	169
FACILITIES								
Roads & Trails (miles)								
Trail Construction/ Reconstruction	0	3	3	0	0	0	0	0
Road Construction/ Reconstruction	95			77	113	106	101	111
Road Maintenance b/	2,862			3,622	3,847	3,997	4,122	4,234
Dams & Reservoirs (number)								
Forest Service	8			10	11	11	11	11
Other Federal	0			0	0	0	0	0
Other State/Local	7			7	7	7	7	7
Private	2			2	2	2	2	2
Administrative Sites (number)								
Forest Service Owned	12			11	11	11	11	11
Leased	4			1	1	1	1	1
FIRE AND FUELS								
Fuel Treatment (total acres)	11,630			9,660	12,260	11,060	7,960	9,800
Fire-Related Treatment	1,000			2,000	2,000	2,000	2,000	2,000
Timber-Related Treatment	8,990			5,900	8,500	7,300	4,200	5,700
Range/Wildlife Fuel Treatment	1,640			1,760	1,760	1,760	1,760	2,100
Expected Acres Burned By Wildfire								
Intensity Class 1	328			475	498	532	550	570
Intensity Class 2	74			106	111	119	123	128
Intensity Class 3	6			8	8	9	9	10
Intensity Class 4	113			164	172	183	190	197
Intensity Class 5	6			8	8	9	9	10
Intensity Class 6	39			57	60	64	66	69
Total	566			818	857	916	947	984

Table 2-4 (continued)

Average Annual Outputs by Decade for CUR Alternative

Output/Activity	Base Year 1982	1980 RPA Goals		Decade				
		1990	2030	1	2	3	4	5
FIREWOOD								
Fuewood (Thousand Cords)	70			70	79	65	51	65
FISH								
Resident fish (M pounds)	48	53	57	48	48	47	47	47
Anadromous Fish-Commercial Harvest (M pounds)	100	100	103	100	98	96	94	92
Anadromous Fish-Sport (M pounds)	39	39	40	39	39	37	36	35
Total WFUD's	18,750			19,100	19,100	19,100	19,100	19,100
Direct Habitat Improvement (WFUD's)								
Resident Fish	300			800	1,200	1,700	2,000	2,400
Anadromous Fish-Sport	115			800	1,000	4,000	1,000	1,000
Direct Habitat Improvement (acres/structures)								
Resident Fish	1 5/10			75/8	.75/8	.75/8	.75/8	75/8
Anadromous Fish - Commercial & Sport	1/10			1.5/2	.5/1	.5/1	.5/1	.5/1
LANDS								
Land Acquisition (acres)	1,600	0	0	2,000	2,000	200	200	200
Mmerals (plans & permits)	58	51	65					
Locatable Minerals	6			6	6	6	6	6
Mineral Materials	52			52	54	56	58	60
Leasable Minerals	0			2	4	6	8	10
RANGE								
Grazing (M AUM's)	497	50.5	53.2	497	544	56.4	54.2	497
RECREATION								
Developed Public (M RVD)	591	639	930	629	726	810	865	865
Developed private (M RVD)	190	202	294	190	190	190	190	190
Dispersed (M RVD) (including wilderness use; excluding WFUD's)	312	336	448	402	451	493	533	589

Table 2-4 (continued)
Average Annual Outputs by Decade for CUR Alternative

Output/Activity	Base Year 1982	1980 RFA Goals		Decade				
		1990	2030	1	2	3	4	5
RECREATION (continued)								
Open Usable OHV Areas, Summer (M acres)	961			931	931	931	931	931
Open Usable OHV Areas, Winter (M acres)	961			939	939	939	939	939
Roads & Trails Open to OHV Use, Summer (mi)	2,240			2,298	2,348	2,398	2,438	2,468
Roads & Trails Open to OHV Use, Winter (mi)	3,070			3,128	3,178	3,228	3,268	3,298
SPECIAL AREAS (number of areas/M acres)								
Research Natural Areas	2/44			2/4.4	2/4.4	2/4.4	2/4.4	2/4.4
National Natural Landmarks	0			0/0	0/0	0/0	0/0	0/0
Special Interest Areas	0			0/0	0/0	0/0	0/0	0/0
TIMBER								
Allowable Sale Quantity								
MMCF	27	28	29	27	27	27	27	27
MMBF	171	176	187	171	171	171	171	171
Long Term Sustained Yield								
MMCF	30			34	34	34	34	34
MMBF	195			215	215	215	215	215
Reforestation (acres)	600	606	707	5,900	8,500	7,300	4,200	5,600
Timber Stand Improvement (acres)	2,200	2,586	2,637	3,000	3,000	3,100	5,100	5,100
VISUAL RESOURCE								
Visual Quality Index	57			55	54	52	51	51
WATER								
Quality (M acre-feet @ standard)	1,308	2,102	2,124	1,308	1,308	1,304	1,302	1,308
Quantity (M acre-feet) d/	1,308			1,308	1,308	1,304	1,302	1,308
Increased Quantity (M acre-feet)				0	0	4	6	0
Watershed Improvement (acres)	15	170	200	75	75	5	5	5
Riparian Area Improvement (acres)	5			5	5	5	5	5

Table 2-4 (continued)

Decade	1980 RPA Goals				WILD & SCENIC RIVERS			
	1980	1990	2000	2010	Wild	Scenic	Recreational	Miles Recommended
1980s	1	1	1	1	0	0	0	78,060
1990s	2	2	2	2	0	0	0	78,060
2000s	3	3	3	3	0	0	0	78,060
2010s	4	4	4	4	0	0	0	78,060
2020s	5	5	5	5	0	0	0	78,060
WILDERNESS								
Wilderness Units				3	Wilderness Across			
Wilderness Use (M RVD) e/				204	Wilderness Units			
WILDLIFE								
Threatened & Endangered Species				14	Bald Eagle (pairs)			
Northern Spotted Owl				Unmanaged	HCA			
Peregrine Falcon (pairs)				1	California Spotted Owl			
Other Wildlife				49,000	Unmanaged			
Deer (animals)				54,800	Habitat Areas			
California Spotted Owl				Unmanaged	Goshawk Management			
Areas				Unmanaged	Total WFD's			
62,400				63,800	64,200	66,000	66,000	67,000
Direct Habitat Improvement (WFD's)								
400				400	400	400	400	400
Small Game and Non-Game				800	Non-Game			
Wildlife Habitat Improvement (same)				2,000	Small Game and Non-Game			
Deer				1,760	Small Game and Non-Game			
1,760				1,760	1,760	1,760	1,760	1,760
50				50	50	50	50	50

a/ Excludes material <4" diameter, precommercial thinning, firewood
b/ Data for new construction for the CUR Alternative was not separate from miles of reconstruction Miles shown are estimates of the mid-decade average for new construction based on the previous 20 year average of 30 miles of new construction per year
c/ Five-year average
d/ Flow figures do not include runoff contributed from private lands, while the RPA figures were based on entire watershed areas
e/ 1982 base year includes RVD's for Caribou and Thousand Lakes Wilderness Areas

Note Decade 2-5 potential outputs are shown for purpose of long-range comparison of alternatives

3. EGP (ENVIRONMENTAL GROUP ALTERNATIVE)

This alternative was developed in consultation with representatives from environmentalist groups. Figure 2-4 shows acreage allocations (rounded) by prescription. Table 2-5 (page 53) summarizes annual outputs by decade.

a. Theme

This alternative emphasizes amenity outputs while maintaining commodity outputs on lands not needed for amenity values. Important elements are: (1) Producing timber, range, and other commodities efficiently while conforming to "very high" visual quality objectives along

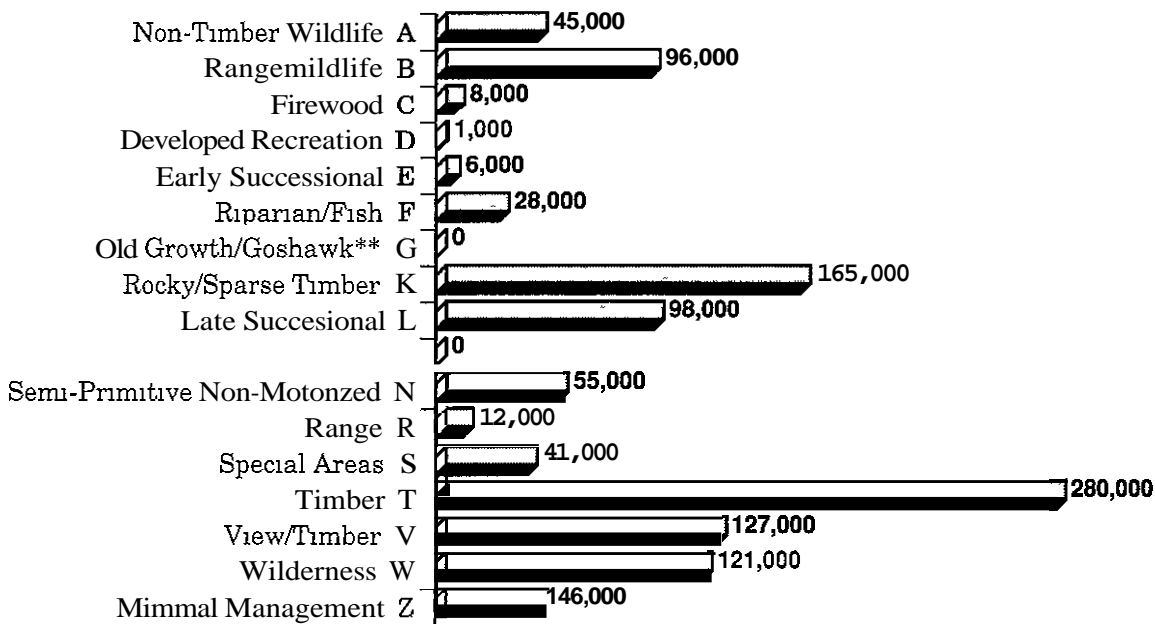
state highways; (2) Using the group selection method of uneven-aged management, (3) Recommending a high level of wilderness expansion; (4) Providing recreational facilities to partially meet the expected increase in demand for developed recreation, and allowing for very extensive semi-primitive recreation, and (5) Maintaining range utilization at the current level except in areas of wildlife conflicts or water quality degradation. Other resources will be managed to fit with these emphases.

b. Resource Program Direction

Cultural Resources Identify the Forest's cultural resources by the end of the first decade. By the end of the decade, determine the eligibility of

Figure 2-4

Acreage Allocation by Prescription*



* Prescriptions represent general management intent. Final land allocations will be done at the project level, after a site-specific environmental analysis has been completed. Prescription maps do not generally display areas smaller than 200 acres. More than one prescription may apply to an area. See Prescription Application Priority in Plan Chapter 4, section F, for a listing of which prescriptions take precedence.

** G Prescription acres were modeled, but not field verified. They do not appear on present prescription maps. When mapped, the number of acres in this bar will change, representing acres not allocated to more restrictive prescriptions. Other prescription acreages may be reduced when G acreage is adjusted.

20 percent of the cultural properties for inclusion on the National Register of Historic Places. If determined eligible, recover or protect and preserve their values. Nominate eligible cultural resources for inclusion on the National Register. Insure that Forest actions are not detrimental to Native American religious rights and practices. Provide information on the cultural heritage of the Forest for public education and enjoyment.

Facilities Close selected roads where economically feasible. Maintain all other roads at level 2 unless management activities require a higher level.

Fire and Fuels The fire management program emphasizes wildfire suppression. The budget, 20 percent higher than the 1991 level, will be divided among the following programs: Prevention, 14 percent; Detection, 6 percent; Suppression, 68 percent; and Fuels, 12 percent. On a 10-year average, about 757 acres of forest will burn from wildfire annually. Each year prescribed fire will be used on approximately 1,300 acres for range and wildlife habitat improvement and 3,600 acres for timber site preparation. Fuel treatment with prescribed fire would average 1,150 acres per year. Additionally, prescribed fire from unplanned ignition can be used on 121,146 acres of wilderness based on site specific fire management plans.

Firewood Provide firewood to meet personal use demand.

Fish, Resident Improve three acres of stream channel and install 30 habitat improvement structures per year through decade 1.

Fish, Anadromous Improve three acres of stream channel and install 20 habitat improvement structures per year through decade 1.

Forest Health The low levels of vegetative management and resource outputs provide both the opportunity and need for a low level of pest management.

Range Maintain or improve range condition, and reduce livestock grazing levels where appropriate to avoid conflicts with wildlife and other uses. Close allotments where resource conflicts are high and not manageable. Utilize transitory forage to offset allotment closures and to reduce livestock numbers in riparian areas.

Recreation, Developed Rehabilitate major campgrounds being used to capacity (at Almanor, Deer Creek, Hat Creek, and Eagle Lake) during decade 1, and manage these sites at the standard service level. Manage all other sites at the limited service level. Construct new campgrounds or expand existing facilities to meet 40 percent of the expected increase in demand by decade 4. Increase interpretive services, renovate existing Visitor Information Services (VIS) exhibits, and construct and operate a visitor contact station at Panther Springs. Do not provide for the future construction of Butt Mountain downhill ski area.

Recreation, Dispersed Assign 55,000 acres to the Semi-Primitive Non-Motorized Prescription, and no acres to the Semi-Primitive Motorized Prescription. Maintain trails at the standard level, and construct or reconstruct 2.5 miles of trail annually. Implement the Forest Off-Road Vehicle Plan, keeping the Forest open to summer off-highway vehicle use on 747,000 usable acres.

Soil, Water, and Riparian Areas Restore all known areas of deteriorated watershed in decade 1 (150 acres per year). Prepare soils plans for all land-disturbing projects. (Three plans are envisioned: erosion prevention, compaction prevention, and preservation of soil productivity in Forest activities.) Complete all inventory and survey work prior to preparation of project EA's. Analyze cumulative watershed impact of projects affecting Class I fisheries and their perennial tributaries. Accomplish a water resource inventory (WRI) to survey all Class I streams and their watersheds by the end of decade 1, beginning with streams supporting anadromous fisheries. Conduct an Order 1 soil resource inventory (SRI) for localized construction projects, an Order 2 SRI for proposed group selection areas on unstable soils, and field verify Order 3 SRI information for other projects. Inventory and monitor water quality to define baseline data and to identify maintenance or improvement needs for major streams. Restore or improve 20 acres of riparian habitat. Continue present Eagle Lake monitoring and cooperative snow survey programs. Protect stream corridors (including riparian and terrestrial zones) along all streams, including ephemerals.

Special Areas Continue evaluation of Green Island Lake, Indian Creek, Soda Ridge, Timbered Crater, Graham Pinery and Mayfield for Research Natural Areas. Recommend as a Deep

Hole as a National Natural Landmark Classify as Special Interest Areas Black Rock (geologic), Crater Lake (geologic), Deep Hole (geologic), Homer/Deerheart Lakes (scenic), Montgomery Creek Grove (botanical), Murken (botanical), and Willow Lake Bog (botanical) areas.

Timber Adopt an average annual allowable sale quantity of **94 MMBF** for five decades; obtain from a portion of **585,881** acres of suitable timberland. Utilize Group Selection and overstory removal on all sites capable of being planted while generally maintaining continuous forest cover on rocky lands Capture mortality by sanitation and salvage cutting where economically feasible Reforest an average of **3,600** acres per year in decade **1**, and approximately **3,800** acres per year in decades **2** through **5**.

Visual Meet Retention and Partial Retention along State Highways **32, 36, 44, 89, and 299**, and meet inventoried visual quality objectives in the Eagle Lake backdrop. Meet Retention in semi-primitive areas and meet Preservation and Retention in Special Areas and Wild and Scenic rivers. Meet Preservation in wilderness and recommended wilderness areas.

Wild and Scenic Rivers For Mill Creek, recommend study segments **1** and **2** as recreational, segments **3a** and **4** as scenic, and segments **3b** and **5** as wild. For Deer Creek, recommend study segment **3** as recreational, segments **4** and **6** as scenic, and segments **5** and **7** as wild. For Antelope Creek, recommend all segments as wild.

Wilderness and Further Planning Areas Recommend Heart Lake, Ishi B, Mill Creek, and Wild Cattle Mountain, and a portion of Trail Lake B further planning areas for wilderness (**43,086** acres).

Wildlife, Early Successional Burn an average of **1,300** acres for deer habitat improvement. An average of **3,600** additional acres of early seral habitat would be created annually by timber harvest. Improve **80** acres of habitat per year in wetlands and other areas.

Wildlife, Late Successional Use state-of-the-art techniques to manage nests and protect nesting habitat to enhance nesting success for **16** pairs of bald eagles and **3** pairs of peregrine falcons the first decade, and **19** pairs of bald eagles and **5** pairs of peregrine falcons in decades **2** through **5**. Manage and protect **40** spotted owl

and **200** goshawk territories. Maintain one Habitat Conservation Area for the northern spotted owl to support two pairs.

Retain five percent of lodgepole, red fir, and mixed conifer types in old growth, and maintain habitat areas that contribute to the viability of marten and fisher. Defer scheduled timber harvesting within spotted owl, fisher and marten habitat management areas. Conduct limited timber management in old growth and goshawk areas where habitat sustainability can be maintained.

c. *Projected Environment to be Created*

By the fifth decade, a projected **34** percent of the productive timberland will have been harvested, presenting a mosaic of stands varying in age from **0** to **50** years and in size from **0.5** to **2** acres. Approximately **236,000** acres of large sawtimber and old-growth would remain, **28** percent of the forested land. Old growth yellow pine would be visible along major highways, scenic areas, unroaded areas, and scattered throughout the forest. Timber harvesting activities would be less noticeable to visitors traveling along all roads and trails. Fewer burned acres would be observed due to wild or prescribed fire. At least **12** percent of the Forest would remain in a natural state in wilderness and Wild and Scenic Rivers. Areas managed for semi-primitive recreation or for scenic quality would also contribute to a natural appearing landscape. Water and air would appear clean with only an occasional fluctuation in air quality due to a fire or other vegetative management activities.

A diversity of forest and rangelands would support wildlife species representing each successional stage including spotted owls, bald eagles, deer, small rodents, and other birds. Livestock grazing in riparian zones would decline, and few conflicts between livestock and wildlife would occur.

The number of firewood cutters and Forest recreationists would increase steadily. Visitor increases would be most noticeable at campgrounds, picnic areas, and interpretive sites. Fishing would continue to increase. Hikers and backpackers would choose from six wildernesses, three Wild and Scenic Rivers, and a wide range of unroaded areas.

Table 2-5
Average Annual Outputs by Decade for EGP Alternative

Output/Activity	Base Year 1982	1980 RPA Goals		Decade				
		1990	2030	1	2	3	4	5
ECONOMIC								
Total Budget (MM \$)	13.9	17.9	19.3	17.0	21.8	22.2	23.7	26.9
Total Cost (MM \$)	14.5			18.3	23.2	23.5	24.8	28.0
BIOMASS a/								
Biomass Available (M.O.D. Tons)	148			165	165	165	165	176
FACILITIES								
Roads & Trails (miles)								
Trail Construction/ Reconstruction	0	3	3	2.5	2.5	2.5	2.5	2.5
Road Construction	15			16	10	6	3	3
Road Reconstruction	80			50	61	53	51	36
Road Maintenance b/	2,862			3,552	3,682	3,762	3,807	3,837
Dams & Reservoirs								
Forest Service	8			10	10	10	10	10
Other Federal	0			0	0	0	0	0
Other State/Local	7			7	7	7	7	7
Private	2			2	2	2	2	2
Administrative Sites (number)								
Forest Service Owned	12			11	11	11	11	11
Leased	4			1	1	1	1	1
FIRE AND FUELS								
Fuel Treatment (total acres)	11,630			6,050	7,150	6,550	5,750	5,550
Fire-Related Fuel Treatment	1,000			1,150	1,150	1,150	1,150	1,150
Timber-Related Fuel Treatment	8,990			3,600	4,700	4,100	3,300	3,100
Range/Wildlife Fuel Treatment	1,640			1,300	1,300	1,300	1,300	1,300
Expected Acres Burned by Wildfire								
Intensity Class 1	328			439	471	505	527	530
Intensity Class 2	74			98	106	113	118	119
Intensity Class 3	6			8	8	9	9	9
Intensity Class 4	113			151	162	174	182	182
Intensity Class 5	6			8	8	9	9	9
Intensity Class 6	39			53	52	61	64	64
Total	566			757	807	871	909	913

Table 2-5 (continued)

Average Annual Outputs by Decade for EGP Alternative

Output/Activity	Base Year 1982	1980 RPA Goals		Decade				
		1990	2030	1	2	3	4	5
FIREWOOD								
Firewood (Thousand Cords)	70			64	64	64	68	68
FISH								
Resident Fish (M pounds)	48	53	57	51	52	54	54	54
Anadromous Fish Commercial Harvest (M pounds)	100	100	103	100	100	101	101	101
Anadromous Fish Sport (M pounds)	39	39	40	39	39	39	39	39
Total WFUD's	18,750			19,400	19,400	19,400	19,400	19,400
Direct Habitat Improvement (WFUD's)								
Resident Fish	300			2,000	3,700	4,000	4,000	4,000
Anadromous Fish Sport	115			1,000	1,000	1,000	1,000	1,000
Direct Habitat Improvement (acres/structures)								
Resident Fish	1.5/10			3/30	3/15	1/1	1/1	1/1
Anadromous Fish Commercial & Sport	1/10			3/20	5/1	5/1	5/1	5/1
LANDS								
Land Acquisition (acres)/c/	1,600	0	0	2,000	2,000	200	200	200
Mmnerals (plans & permits)	58	51	65					
Locatable Minerals	6			6	6	6	6	6
Mineral Materials	52			36	38	39	41	42
Leasable Minerals	0			2	4	6	8	10
RANGE								
Grazing (M AUM's)	49.7	50.5	53.2	48.5	48.5	48.5	48.5	48.5
RECREATION								
Developed Public (M RVD)	591	639	930	629	726	810	886	997
Developed Private (M RVD)	190	202	294	190	190	190	190	190
Dispersed (M RVD) (including wilderness use; excluding WFUD's)	312	336	448	402	451	493	533	589

Table 2-5 (continued)
Average Annual Outputs by Decade for EGP Alternative

Output/Activity	BaseYear 1982	1980RPA Goals		Decade				
		1990	2030	1	2	3	4	5
RECREATION (continued)								
Open Usable OHV Areas, Summer (M acres)	961			147	747	741	747	747
Open Usable OHV Areas, Winter (M acres)	961			747	747	747	747	747
Roads & Trails Open to OHV Use, Summer (mi)	2,240			2,302	2,422	2,542	2,662	2,782
Roads & Trails Open to OHV Use, Winter (mi)	3,070			3,132	3,252	3,372	3,492	3,612
SPECIALAREAS (number of areas/M acres)								
Research Natural Areas	2/4.4			8/14.3	8/14.3	8/14.3	8/14.3	8/14.3
National Natural Landmarks	0			1/0.1	1/0.1	1/0.1	1/0.1	1/0.1
Special Interest Areas	0			7/2.3	7/2.3	7/2.3	7/2.3	7/2.3
TIMBER								
Allowable Sale Quantity								
MMCF	27	28	29	15	15	15	15	15
MMBF	171	176	187	94	94	94	94	94
Long Term Sustained Yield								
MMCF	30			15	15	15	15	15
MMBF	195			95	95	95	95	95
Reforestation (acres)	600	606	707	3,600	4,700	4,100	3,300	3,000
Timber Stand Improvement (acres)	2,200	2,586	2,637	4,700	4,700	4,700	4,100	4,100
VISUAL RESOURCE								
Visual Quality Index	57			57	57	56	56	56
WATER								
Quality (M acre-feet @ standard)	1,308	2,102	2,124	1,303	1,299	1,299	1,299	1,299
Quantity (M acre-feet) d/	1,308			1,303	1,299	1,299	1,299	1,299
Increased Quantity (M acre-feet)				-5	-9	-9	-9	-9
Watershed Improvement (acres)	15	170	200	150	5	5	5	5
Riparian Area Improvement (acres)	5			20	20	20	20	20

Table 2-5 (continued)
Average Annual Outputs by Decade for EGP Alternative

Output/Activity	1980 RPA Goals					Miles Recommended	WILD & SCENIC RIVERS	
	Base Year	1990	2030	1	2	3	4	5
Decade								
Wild	0	48.5	48.5	48.5	48.5	48.5	48.5	48.5
Scenic	0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Recreational	0	17.5	17.5	17.5	17.5	17.5	17.5	17.5
WILDERNESS								
Wilderness Acres	78,060	121,146	121,146	121,146	121,146	121,146	121,146	121,146
Wilderness Units	3	8	8	8	8	8	8	8
Wilderness Use (M RVD) e/	20.4	43.3	47.6	52.3	57.5	63.3		
WILDLIFE								
Threatened & Endangered Species								
Bald Eagle (pairs)	14	16	19	19	19	19	19	19
Northern Spotted Owl	Unmanaged	1	1	1	1	1	1	1
HCA								
Peregrine Falcon (pairs)	1	3	5	5	5	5	5	5
Other Wildlife								
Deer (animals)	49,000	54,800	54,800	43,600	45,100	46,500	48,000	49,400
California Spotted Owl	Unmanaged	40	40	40	40	40	40	40
Goshawk Management Areas	Unmanaged	200	200	200	200	200	200	200
Total WFD's	62,400	55,500	57,400	59,200	61,100	62,900		
Direct Habitat Improvement (WFD's)	400	370	370	370	370	370	370	370
Deer	800	1,040	1,040	1,040	1,040	1,040	1,040	1,040
Small Game and Non-Game								
Wildlife Habitat Improvement (saia)								
Deer	2,000	1,300	1,300	1,300	1,300	1,300	1,300	1,300
Small Game and Non-Game	50	80	80	80	80	80	80	80

a/ Excludes material <4" diameter, precommercial thinning, firewood

b/ Miles shown are mid-decade averages for new construction

c/ Five-year average

d/ Flow figures do not include runoff contributed from private lands, while the RPA figures were based on entire watershed areas

e/ 1982 base year includes RVD's for Carbon and Thousand Lakes Wilderness Areas

Note: Decade 2-5 potential outputs are shown for purpose of long-range comparison of alternatives

4. TGP (TIMBER INDUSTRY GROUP ALTERNATIVE)

This alternative was developed in consultation with representatives from the timber industry. Figure 2-5 shows the acreage allocations (rounded) by prescription. Table 2-6 (page 60) summarizes annual outputs for decades 1 and 5.

a. Theme

This alternative provides moderately high levels of commodity benefits while preserving amenity values at present levels. Important elements are: (1) Increasing timber outputs, recreational

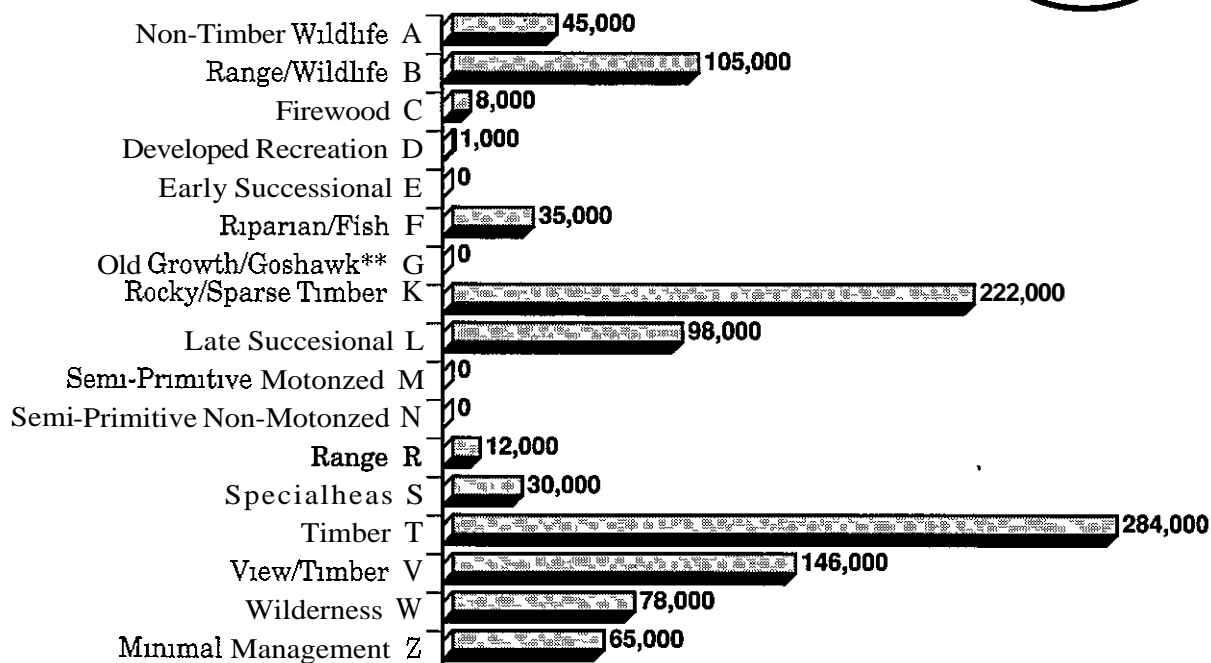
facilities, and other commodities to maximize economic efficiency; (2) Incorporate the group selection method of uneven-aged timber management into the even-aged methods to provide a balance between the two; (3) Managing other resources to conform to **minimum** acceptable levels of outputs; and (4) Providing for very little unroaded area recreation outside of existing wilderness. Other resources will be managed to fit these emphases.

b. Resource Program Direction

Cultural Resources Identify and evaluate the Forest's cultural resources. If determined to be

Figure 2-5

Acreage Allocation by Prescription*



* Prescriptions represent general management intent. Final land allocations will be done at the project level, after a site-specific environmental analysis has been completed. Prescription maps do not generally display areas smaller than 200 acres. More than one prescription may apply to an area. See Prescription Application Priority in Plan Chapter 4, section F, for a listing of which prescriptions take precedence.

** G Prescription acres were modeled, but not field verified. They do not appear on present prescription maps. When mapped, the number of acres in this bar will change, representing acres not allocated to more restrictive prescriptions. Other prescription acreages may be reduced when G acreage is adjusted.

gible for inclusion on the National Register of Historic Places, recover or protect and preserve their values. Nominate eligible cultural resources to the National Register. Insure that Forest actions are not detrimental to Native American religious rights and practices.

Facilities Keep all roads open and maintained at their objective maintenance level.

Fire and Fuels The fire management program emphasizes wildfire suppression. The budget, 20 percent higher than the 1991 level, will be divided among the following programs: Prevention, 14 percent; Detection, 6 percent; Suppression, 68 percent; and Fuels, 12 percent. On a 10-year average, about 761 acres of forest will burn from wildfire annually. Each year prescribed fire will be used on approximately 1,300 acres for range and wildlife habitat improvement and 5,000 acres for timber site preparation. Fuel treatment with prescribed fire would average 1,150 acres per year. Additionally, prescribed fire from unplanned ignition can be used on 78,060 acres of wilderness based on site specific fire management plans.

Firewood Provide firewood to meet personal use demand.

Fish, Resident Improve three acres of stream channel and install 30 habitat improvement structures per year through decade 1.

Fish, Anadromous Improve three acres of stream channel and install 20 habitat improvement structures per year through decade 1.

Forest Health The high levels of vegetative management and resource outputs provide both the opportunity and need for a high level of pest management.

Range Maintain the range program at current levels. Provide structural improvements for protection of water quality, wildlife, riparian zones, and to enhance forage availability.

Recreation, Developed Construct new campgrounds and other recreation facilities to meet estimated future demand. Demand is expected to exceed capacity in decades 4 and 5. Consider some new construction or expansion of existing sites during the first three decades only in areas of particularly high demand where use cannot be

transferred to other less-used sites. Rehabilitate all existing fee campgrounds during the planning period, and manage all sites at the standard service level. Increase interpretive services and construct Forest entrance stations and interpretive facilities.

Recreation, Dispersed Provide a low level of dispersed semi-primitive recreation opportunities. Maintain the Pacific Crest Trail and National Recreation Trails at the standard level, and all other trails at less than standard maintenance. Construct or reconstruct 10 miles of trail annually. Implement the Forest Off-Road Vehicle Plan, keeping the Forest open to summer off-highway vehicle use on 848,000 usable acres.

Soil, Water, and Riparian Areas Restore all known areas of deteriorated watershed in two decades (75 acres per year). Inventory and monitor water quality to establish baselines and to identify maintenance or improvement needs for major streams. Maintain a water use and needs inventory. Analyze cumulative watershed impacts of projects affecting Class I fisheries. Prepare soils plans for such land-disturbing activities as timber harvesting, road building, livestock grazing, recreation activities, or wildlife projects. (Three plans are envisioned: erosion prevention, compaction prevention, and preservation of soil productivity in Forest activities.) Conduct an Order 2 soil resource inventory (SRI) on all proposed clearcuts that are located on areas of high erosion hazard rating, field verify Order 3 SRI on other project areas. Restore or improve 10 acres of riparian habitat per year. Continue present Eagle Lake monitoring and cooperative snow survey programs.

Special Areas Continue evaluation of Green Island Lake, Indian Creek, Soda Ridge, Timbered Crater, Graham Pinery and Mayfield as candidate RNAs.

Timber Adopt an average annual allowable sale quantity of 118 MMBF from 633,796 acres of suitable timberland. Give preference to regeneration harvest on sites capable of being planted to 200-250 trees per acre and group selection where appropriate (mixed conifer), while generally maintaining continuous forest cover on rocky lands. Capture mortality by sanitation and salvage cutting where economically feasible. Reforest an average of 5,000 acres per year in decade 1.

Visual Manage for Inventoned Visual Quality Objectives in the Eagle Lake backdrop and along all State Highways Meet Preservation in wilderness.

Wild and Scenic Rivers For Mill Creek, recommend study segment 5 as wild For Deer Creek, recommend segment 7 as wild

Wilderness and Further Planning Areas Recommend no additional wilderness

Wildlife, **Early Successional** Annually burn about 1,300 acres of brush for improved deer forage About 5,000 acres per year of early seral habitat would be created by timber regeneration. Improve ten acres of habitat per year in wetlands and other areas.

Wildlife, Late Successional Provide 16 bald eagle and three peregrine falcon pairs Enhance reproduction to achieve recovery goals Provide networks for 40 spotted owl territories and for 113 goshawk pairs. Maintain one Habitat Conservation Area for the northern spotted owl

Retain at least five percent old growth in all timber types, and maintain habitat areas that contribute to the viability of marten and fisher. Defer scheduled timber harvesting within spotted owl, marten and fisher habitat management areas. Conduct limited timber management in old growth and goshawk areas where habitat suitability can be maintained.

c. Projected Environment to be Created

By the fifth decade, a projected 42 percent of the productive timberland will have been harvested,

presenting a mosaic of stands varying in age from 0 to 50 years and in size from 0.5 to 40 acres. Approximately 228,000 acres of large sawtimber and old-growth would remain, 28 percent of the forested acres. Old growth yellow pines would virtually disappear except in thin mixed-conifer spotted owl habitat and along highways. Timber harvests would be seen from paved highways, unpaved county roads, local roads, and many trails. Burned areas would be increasingly seen from all vantage points on the Forest.

About eight percent of the Forest would remain in a natural condition in existing wilderness and some Research Natural Areas. State highway corridors and a few unroaded areas would also contribute to a natural appearing landscape. Managed timber lands would appear to have smaller trees, with uniform age and density in numbers. Lakes and streams would continue to meet State water quality standards, although the increase in the acres receiving some form of vegetation manipulation could contribute to some seasonal fluctuation in siltation and clarity. Summer and fall months would bring occasional days of reduced visibility in the air due to wild fires and increased prescribed burning.

A diversity of forest and rangelands would support wildlife species that favor early to mid-successional stages including deer, small rodents, and birds that inhabit brushy areas.

The number of firewood cutters, Forest recreationists in developed recreation sites, and motorized use would increase, while visitors who seek semi-primitive or unroaded recreation opportunities would decrease. Fishing would continue to increase. The number of wildernesses and wilderness users would remain unchanged.

Table 2-6
Average Annual Outputs by Decade for TGP Alternative

Output/Activity	Base Year 1982	1980 RPA Goals		Decade				
		1990	2030	1	2	3	4	5
ECONOMIC								
Total Budget (MM \$)	13.9	17.9	19.3	185	23.0	25.9	29.8	33.6
Total Cost (MM \$)	14.5			200	246	274	31.1	348
BIOMASS a/								
Biomass Available (M.O.D. Tons)	148			187	187	208	218	222
FACILITIES								
Roads & Trals (miles)								
Tral Construction/ Reconstruction	0	3	3	10	10	10	10	10
Road Construction	15			21	11	7	4	4
Road Reconstruction	80			67	68	69	51	45
Road Maintenance b/	2,862			3,577	3,737	3,827	3,882	3,922
Dams & Reservoirs								
Forest Service	8			10	11	11	16	16
Other Federal	0			0	0	0	0	0
Other State/Local	7			7	7	7	7	7
Private	2			2	2	2	2	2
Adnnnistrative Sites (number)								
Forest Service Owned	12			11	11	11	11	11
Leased	4			1	1	1	1	1
FIRE AND FUELS								
Fuel Treatment (total acres)	11,630			7,450	7,450	6,650	6,250	5,850
Fire-Related Fuel Treatment	1,000			1,150	1,150	1,150	1,150	1,150
Timber-Related Fuel Treatment	8,990			5,000	5,000	4,200	3,800	3,400
Range/Wildlife Fuel Treatment	1,640			1,300	1,300	1,300	1,300	1,300
Expected Acres Burned by Wildfire								
Intensity Class 1	328			441	480	520	546	543
Intensity Class 2	74			99	108	117	123	122
Intensity Class 3	6			8	8	9	10	9
Intensity Class 4	113			152	166	179	189	188
Intensity Class 5	6			8	8	9	10	9
Intensity Class 6	39			53	58	63	66	66
Total	566			761	828	897	944	937

Table 2-6 (continued)
Average Annual Outputs by Decade for TGP Alternative

Output/Activity	Base Year 1982	1980 RPA Goals		Decade				
		1990	2030	1	2	3	4	5
FIREWOOD								
firewood (Thousand Cords)	70			85	91	92	92	92
FISH								
Resident Fish (M pounds)	48	53	57	48	48	50	50	50
Anadromous Fish Commercial Harvest (M pounds)	100	100	103	100	100	98	97	96
Anadromous Fish Sport (M pounds)	39	39	40	39	39	39	38	37
Total WFUD's	18,750			19,400	19,400	19,400	19,400	19,400
Direct Habitat Improvement (WFUD's)								
Resident Fish	300			2,000	3,700	4,000	4,000	4,000
Anadromous Fish Sport	115			1,000	1,000	1,000	1,000	1,000
Direct Habitat Improvement (acres/structures)								
Resident Fish	15/10			3/30	3/15	1/1	1/1	1/1
Anadromous Fish Commercial & Sport	1/10			3/20	.5/1	.5/1	.5/1	.5/1
LANDS								
Land Acquisition (acres) c/	1,600	0	0	2,000	2,000	200	200	200
Minerals (plans & permits)	58	51	65					
Locatable Minerals	6			6	6	6	6	6
Mineral Materials	52			56	57	59	61	63
Leasable Minerals	0			2	4	6	8	10
RANGE								
Grazing (M AUM's)	49.7	50.5	53.2	48.5	48.5	48.5	48.5	48.5
RECREATION								
Developed Public (M RVD)	591	639	930	629	726	810	886	997
Developed Private (M RVD)	190	202	294	190	190	190	190	190
Dispersed (M RVD) (including wilderness use, excluding WFUD's)	312	336	448	402	451	493	533	589

Table 2-6 (continued)
Average Annual Outputs by Decade for TGP Alternative

Output/Activity	Base Year 1982	1980 RPA Goals		Decade				
		1990	2030	1	2	3	4	5
RECREATION (continued)								
Open Usable OHV Areas, Summer (M acres)	961			848	848	848	848	848
Open Usable OHV Areas, Winter (M acres)	961			854	854	854	854	854
Roads & Trails Open to OHV Use, Summer (mi)	2,240			2,302	2,422	2,542	2,662	2,782
Roads & Trails Open to OHV Use, Winter (mi)	3,070			3,132	3,252	3,372	3,492	3,612
SPECIAL AREAS (number of areas/M acres)								
Research Natural Areas	2/4 4			8/14.3	8/14.3	8/14.3	8/14.3	8/14.3
National Natural Landmarks	0			0/0	0/0	0/0	0/0	0/0
Special Interest Areas	0			0/0	0/0	0/0	0/0	0/0
TIMBER								
Allowable Sale Quantity								
MMCF	27	28	29	18	20	20	20	20
MMBF	171	176	187	118	124	124	124	124
Long Term Sustained Yield								
MMCF	30			25	25	25	25	25
MMBF	195			157	157	157	157	157
Reforestation (acres)	600	606	707	5,000	5,000	4,200	3,800	3,400
Timber Stand Improvement (acres)	2,200	2,586	2,637	4,700	5,900	7,500	9,300	10,400
VISUAL RESOURCE								
Visual Quality Index	57			57	57	56	56	56
WATER								
Quality (M acre-feet @ standard)	1,308	2,102	2,124	1,305	1,302	1,302	1,302	1,302
Quantity (M acre-feet) d/	1,308			1,305	1,302	1,302	1,302	1,302
Increased Quantity (M acre-feet)				-3	-6	-6	-6	-6
Watershed Improvement (acres)	15	170	200	75	75	5	5	5
Riparian Area Improvement (acres)	5			10	10	10	10	10

Table 2-6 (continued)

Average Annual Outputs by Decade for TGP Alternative

Output/Activity	BaseYear 1982	1980 RPA Goals		Decade				
		1990	2030	1	2	3	4	5
Mdes Recommended								
WILD & SCENIC RIVERS								
Wild	0			160	16.0	16.0	160	160
Scenic	2			0	0	0	0	0
Recreational	0			0	0	0	0	0
WILDERNESS								
Wddemess Acres	78,060			78,060	78,060	78,060	78,060	78,060
Wilderness Units	3			3	3	3	3	3
Wilderness Use (M RVD) e/	20.4			30.7	33.7	37.1	40.8	44.9
WILDLIFE								
Threatened & Endangered Spenes								
Bald Eagle (pairs)	14			16	16	16	16	16
Northern Spotted Owl HCA	Unmanaged			1	1	1	1	1
Peregnne Falcon (pairs)	1			3	3	3	3	3
Other Wildlife								
Deer (animals)	49,000	54,800	54,800	44,500	45,600	46,700	47,900	49,000
California Spotted Owl Habitat Areas	Unmanaged			40	40	40	40	40
Goshawk Management Areas	Unmanaged			113	113	113	113	113
Total WFUD's	62,400			56,600	58,000	59,400	61,000	62,400
Direct Habitat Improvement (WFUD's)								
Deer	400			240	240	240	240	240
Small Game and Non-game	800			130	130	130	130	130
Wildlife Habitat Improvement (acres)								
Deer	2,000			1,300	1,300	1,300	1,300	1,300
Small Game and Non-Game	60			10	10	10	10	10

a/ Excludes material <4" diameter, precommercial thinning, firewood

b/ Mileages shown are mid-decade averages for new construction

c/ Five-year average

d/ Flow figures do not include runoff contributed from private lands, while the RPA figures were based on entire watershed areas

e/ 1982 base year includes RVD's far Canbou and Thousand Lakes Wilderness Areas

Note Decade 2-5 potential outputs are shown for purpose of long-range comparison of alternatives

5. Comparison of Alternatives

This section presents a quantitative and qualitative comparison of the alternatives considered in detail. It is organized as follows

All figures and tables for this section begin on page 71

- a) Narrative description (by resource element) of the major differences between alternatives.
- b) Comparison of planned average annual outputs by alternative for decade 1 and potential annual outputs for decade 5, for purposes of long-term comparisons (Table 2-7).
- c) Acreage allocation by management prescription and alternative (Table 2-8).
- d) Further planning area allocation by alternative (Table 2-9).
- e) Timber management comparisons:
 - Land classification for timber management by alternative (Table 2-10)
 - Harvesting methods by alternative (Figure 2-6 and Table 2-11)
 - Comparison of timber management practices by alternative (Figure 2-7 and Table 2-12).
- f) Key comparisons between alternatives for the first decade (Figure 2-8).
- g) Summary comparison of economic effects (Table 2-13)
- h) Comparison of PNV and associated trade-offs and opportunity costs by alternative (including narrative) (Tables 2-14, 2-15, 2-16, 2-17).
- i) Indicators of responsiveness to major issues and national concerns (Table 2-18)

- j) Comparison of the treatment of issues and concerns by alternative (Table 2-19).
- k) Narrative comparison of key environmental consequences by alternative (page 2-102).

a. Major Differences Between Alternatives

The following narrative highlights major differences by resource element between the alternatives considered in detail (Also see Table 2-7, Table 2-8, and Figure 2-8) For economic differences see Tables 2-13 through 18. For complete details on current conditions and effects of alternatives, refer to Chapter 3, Affected Environment, and Chapter 4, Environmental Consequences, respectively

(1) Cultural Resources

All alternatives provide for the identification, evaluation, protection and interpretation of cultural resources. However, the level of effort for managing them varies by alternative Under the CUR and TGP alternatives, the management of cultural resources would largely be restricted to legal requirements. Efforts to identify, evaluate and protect cultural properties would occur in association with Forest resource management projects, such as timber sales, that could affect them Little effort would be made to interpret cultural resources for the benefit of the public

The PRF and EGP alternatives provide for the identification of Forest cultural properties potentially eligible for inclusion on the National Register of the Historic Places. In addition, the eligibility of 20 percent of the properties would be determined by the end of the decade Efforts to protect and interpret cultural resources would also significantly increase They would be managed to provide for public education and enjoyment Those cultural properties subject to deterioration, through looting, vandalism, erosion, and decay, would be protected.

(2) Fire and Fuels Management

Fire management differs among alternatives by the funding level and emphasis of the fire management program, and by the number of acres burned by wildfire and prescribed fire All alternatives except CUR initially have a funding

level 20 percent higher than 1991. The CUR Alternative is funded at the current level in all decades

The fire management program emphasis in the PRF, EGP, TGP, and CUR Alternatives is the traditional ground attack that has been in use for several years. Area burned by wildfire varies little among the alternatives. In decade 1, the least acres (757) would burn in the EGP Alternative. There is much more variation in the acres burned by prescribed fire. The CUR Alternative would burn the most (9,660 acres), and the PRF and EGP Alternatives would burn the least (6,050 acres)

(3) Fish

Alternatives vary to a moderate extent in their effects on fisheries. The PRF Alternative provides for a moderate level of habitat enhancement for resident fish and a moderate program for anadromous fish. Under these programs, identified enhancement opportunities would be completed for resident fish by the end of decade 2. Anadromous fisheries enhancements would be accomplished by decade 1. Maintenance and accomplishment of new opportunities would continue in this and other alternatives.

The CUR Alternative gives low program emphasis to both resident and anadromous fish. EGP gives moderate emphasis to resident fish, and moderate emphasis to anadromous fish. EGP also provides high levels of watershed protection due to an emphasis on uneven-aged timber management. TGP gives moderate emphasis to resident fish, and moderate emphasis to habitat improvement for anadromous fish.

(4) Range

In comparison to the base year level (49,700 AUM's), livestock grazing in decade 1 would decrease by two percent in PRF, EGP, and TGP. Grazing in CUR would remain the same. AUM's between alternatives would vary because of transitory range and the degree of timber management.

Increases in livestock grazing would require intensifying livestock management, increasing forage through improvements, and expanding utilization of transitory range. Public comments indicate no demand for increased AUM's on the Lassen National Forest.

(5) Recreation, Developed

In the CUR Alternative, developed recreation facilities would not be increased in capacity to meet increasing demand. Sites would not be rehabilitated, but would be maintained at a low service level or closed if sanitation and safety standards could not be met. In decade 4, the EGP Alternative increases recreation sites to meet some of the additional expected demand. All sites would be maintained at the standard service level and rehabilitated in decade 1. By decade 5, the PRF and TGP Alternatives increase sites in capacity to meet expected demand. All sites would be maintained at the standard service level and rehabilitated in decade 1. Both the PRF and TGP Alternatives respond to high recreation demand in specific areas by considering construction or expansion of sites in the first three decades.

(6) Recreation, Dispersed and Unroaded Areas

Dispersed recreation receives low emphasis in the CUR and TGP Alternatives. CUR and TGP provide no semi-primitive motorized or non-motorized areas or new wilderness. Trails are maintained at a low level and no trails or trailheads are constructed to disperse use. The PRF and EGP Alternatives emphasize a broad range of dispersed recreation opportunities and supporting facilities. Many semi-primitive non-motorized and semi-primitive motorized areas are provided. These alternatives have a high level of trail and trailhead construction.

Off-highway vehicle use in general forest roaded areas is highest in the CUR Alternative, and moderately high in TGP. The other alternatives provide for approximately 20 percent less area.

Unroaded areas (listed in Appendix M) can be retained as unroaded areas with the Semi-Primitive Motorized and Semi-Primitive Non-Motorized Prescriptions, or made available for other uses that would eventually make them roaded. The alternatives vary from 0 to 65,000 acres receiving a semi-primitive prescription. The CUR and TGP Alternatives retain no unroaded acres with semi-primitive prescriptions. PRF retains 65,000 acres, and EGP retains 55,000 acres. Mayfield, Lava, and Timbered Crater are unroaded areas that are not retained as semi-primitive because they lack dispersed recreation values. Lava and Mayfield receive a minimum level prescription in all alternatives, and Tim-

bered Crater receives several prescriptions in the various alternatives.

(7) Soils

Current levels of soil erosion and productivity impacts would continue under the CUR Alternative, since fewer projects would be done to rehabilitate deteriorated watersheds. The EGP and PRF Alternatives would also result in few changes to the soil resource. These alternatives would cause some soil-disturbing activity, but projects would be implemented to improve deteriorated watersheds. The CUR and TGP Alternatives would result in the greatest impact to the soil resource.

(8) Timber

Timber outputs under all alternatives do not meet the 1980 RPA goal. All alternatives fall short of the 2030 RPA goal. Acres available for timber production range from 586,000 acres under the EGP Alternative to 745,000 acres under CUR. Selection of the suitable timber base depends upon management objectives reflecting the theme of each alternative, economic efficiency, and constraints limiting or precluding timber production. The main differences between alternatives are: (1) the acreages in the Late Seral Prescription, (2) the acres in wilderness and semi-primitive recreation with no timber production, (3) the acres with visual requirements that reduce timber production; and (4) the acres primarily managed for other resource objectives such as riparian areas, old growth areas, and goshawk territories that limit timber management. The PRF and TGP Alternatives provide both even and uneven-aged timber management while EGP relies heavily on uneven-aged management. All alternatives require maintenance of a continuous forest cover on presently forested rocky land and on the poorly-stocked eastside pine land. Uneven as well as even-aged timber management is planned for other land, with total decade 1 regeneration ranging from 40,000 acres in the PRF Alternative to over 79,000 acres in the CUR Alternative. Clearcutting and shelterwood harvests are a significant portion of the total reforestation acreage in all alternatives, except EGP.

(9) Visual Resource

The existing (1982) Inventoried Visual Quality Objectives can be used as a standard for comparison. It emphasizes retaining scenic values in areas of high scenic quality while allowing for

visual changes in the landscape where scenic priorities are lower. The EGP Alternative provides even higher emphasis on retaining scenic values, and also recommends substantial areas for wilderness and semi-primitive designations that protect the landscape.

The TGP Alternative has the highest number of acres with a Retention or Partial Retention Visual Quality Objective (VQO) as less acres fall within a Preservation VQO. The PRF Alternative falls between the EGP and the CUR Alternatives in acres of Retention and Partial Retention Visual Quality Objectives (VQO's). It provides for retaining scenic values viewed from major highways, paved county roads, and other roads, trails, and use areas while allowing for visual changes to the landscape in the general forest areas. In terms of the Visual Quality Index, a measure of the entire Forest's visual quality, the PRF Alternative ranks midway as there are two alternatives ranking higher and one alternative ranking lower.

The CUR Alternative de-emphasizes visual management and allows more landscape changes. The TGP Alternative provides moderate emphasis on visual management and allows extensive changes to the natural landscape except for views along Highways 32, 36, 44, 89, 299, and at Eagle Lake. This is mitigated by the use of group selection timber harvesting.

(10) Water and Riparian Areas

PRF, EGP and TGP would create the least riparian corridor disturbance (at about the same level), since they assign all stream corridor riparian and terrestrial areas to the Regulation Class III (limited) harvesting schedule, treating only 2.5 percent of the inventory per decade. The PRF and EGP Alternatives would restore or improve 20 acres of riparian area per year, CUR would improve five acres while TGP would improve 10 acres per year. In addition, EGP would improve 1,500 acres of watershed by decade 1. The other alternatives would improve 750 watershed acres per decade, to complete the restoration backlog in two decades.

(11) Wilderness

Additional wilderness varies by alternative from five further planning areas proposed for wilderness or semi-primitive recreation to no new proposed wilderness. In the PRF Alternative, the Heart Lake further planning area and portions

of three others (Mill Creek, Trail Lake **B**, and Wild Cattle Mountain) are proposed for wilderness for a total of **21,584** acres. In the EGP Alternative, four further planning areas and a portion of one other (Heart Lake, Mill Creek, Wild Cattle Mountain, Ishi **B**, and part of Trail Lake **B**) are proposed for wilderness for a total of **43,086** acres. (See Table 2-9.)

(12) Wildlife

Alternatives vary considerably, both in the degree they emphasize wildlife resources and in the species groups emphasized. The PRF Alternative provides a relatively high emphasis for the Forest's variety of wildlife. It provides moderate amounts of habitat for late seral species and early seral species such as deer. Much of the late seral habitat is provided by designating spotted owl management areas, old growth retention areas, marten and fisher habitat, semi-primitive areas, and stream corridors. Younger successional habitat is provided by standard timber management, allocation of the Early Successional Prescription, and prescribed burning of brush for deer habitat improvement.

The CUR Alternative emphasizes a mix of wildlife resources, but at a lower level than in the PRF Alternative for late successional species, and a much higher level for early successional species. TGP and EGP would provide moderate to high emphasis for late seral and minimal emphasis for early seral wildlife species.

b. Economics and Trade-Off Analysis

The following tables and narratives compare economic values and the major trade-offs between the alternatives. These comparisons are based on:

- Economic effects (Table 2-13),
- Marginal cost of constraints (Table 2-14),
- PNV comparison of alternative constraints (Table 2-15),
- Cash flows and non-cash benefits (Table 2-16),
- Tradeoffs between PNV and non-priced benefits (Table 2-17),
- Responsiveness to major issues and national concerns (Table 2-18)

Comparison of Economic Effects

Table 2-13 summarizes the various economic effects of each alternative. Included is a breakout of the total costs, cash and non-cash benefits, capital investment costs, operation and maintenance costs, and national, regional, and local benefits and costs. Decade 1 effects are planned, while decades 2 through 5 are projected effects shown and discussed for purposes of comparison of alternatives.

Total benefits increase over the first five decades primarily because of the projected real price increase for timber. Total benefits, and the increase in those benefits, are highest for those alternatives with the highest timber output. Non-cash benefits comprise 68 to 74 percent of total benefits in decade 1. Even though non-cash benefits increase over the first five decades, the cash benefits increase even faster, primarily as a result of the real price increases for timber. Because of this, non-cash benefits range from 50 to 57 percent of total benefits in decade 5.

Capital investments range from 30 to 53 percent of total costs in decade 1. Most capital costs are for reforestation and silvicultural investments. In general, the differences in capital investments between alternatives can be explained by the acres of regeneration harvest in each alternative.

Income and employment opportunities are primarily linked to timber output. Recreation and wildlife outputs affect income and employment, as does the Forest budget. Range forage outputs have a much smaller impact. The various alternatives would cause changes in local employment opportunities ranging from a reduction of 0 to 30 percent.

Present Net Value Comparison of Marginal Cost of Constraints

Table 2-14 presents the economic costs of the MMR, and CEF constraints (see Appendix B, Section 2 A, for an explanation of these constraints). The MMR base run contains objectives relating to spotted owls (VPD constraint), dispersion constraint, as well as protective measures for Threatened and Endangered species and riparian zones. Of these, the spotted owl objective has the highest cost, a \$140 million reduction in PNV. This objective also reduces

timber harvest between 19 MMBF and 42 MMBF per year during the first five decades. The soil and water protection objective results in a \$40 million dollar reduction in PNV. The cost of both these objectives is a result of the restrictions on timber harvest that are needed to meet the objectives. The other objectives, and any overlap between objectives, cost another \$9 million and bring the total cost of the MMR objectives to \$189 million.

In terms of both dollars and timber (or other outputs), the cost of the spotted owl constraint (or other constraints) applies to the benchmarks, but not necessarily to a well-balanced multiple-use alternative. In a multiple-use alternative, the above costs would be split among many benefiting resources such as visual quality, watershed, recreation, wilderness, etc

The CEE base run differs from the MMR base run in that Minimum Implementation Requirements (MIR's) have been added to the CEE run. The MIR's address objectives of maintaining visual quality along designated scenic highways (Highways 89 and 299), protecting 750 acres of Sensitive plants, and the operational capability of the Forest to do slash disposal, site preparation, and tree planting within limited seasonal time periods, or "windows".

The cost of the MIR's is measured by a change in PNV. The PNV between the MMR and CEE runs is unchanged, indicating that the MIR's have no significant cost. They do cause a slight drop in benefits, but this is offset by an equal drop in costs.

The CEF run is the same as the CEE run except that one Forest objective common to all alternatives is added: to maintain the visual quality of the Eagle Lake scenic backdrop (1,400 acres). The PNV and outputs of the CEF run are virtually identical to those of the CEE run, indicating that this objective can be met at no cost.

Present Net Value Comparison of Alternatives

Table 2-15 presents the total PNV and the costs and benefits of the major contributing resources for each alternative. The timber resource accounts for most of the benefits (62 to 74 percent)

as well as most of the costs (65 to 72 percent) in every alternative. While all recreation (RVD's and WFUD's) makes a significant contribution to PNV, the ranking by PNV is essentially determined by the timber resource. All recreation also has less influence on the PNV ranking because the costs and benefits vary less than those of timber. The ranking of alternatives by timber benefits is the same as the ranking by decade 1 timber volume. Volume also has a significant influence on timber costs, however, other factors such as timber management practices and harvest methods also influence costs.

Average Annual Cash Flows and Non-Cash Benefits

Table 2-16 presents the total costs, benefits, and net cash flows by alternative for decade 1 and potential for decade 5.

In every alternative returns to the treasury exceed costs and timber generates at least 95 percent of the returns. The remaining returns are generated by recreation and special use permit fees and a small amount (less than one percent) from grazing fees.

In decade 1, every alternative would provide higher gross returns to the treasury than the base year level of \$12.4 million. (This is due, in large part, to the reduced harvest in 1982 resulting from market conditions.) By decade 5, returns are projected to be significantly higher than in decade 1, primarily due to the projected real price increases for timber.

Net cash flow is generally correlated with returns to the Treasury. The EGP, TGP, and PRF Alternatives have relatively high costs, due in part to more expensive silvicultural systems.

Tradeoffs Between Present Net Value and Major Non-Priced Benefits

Table 2-17 displays the PNV, change in PNV, and major non-priced benefits of the alternatives considered in detail. In general, as PNV declines the amount of non-priced amenities increases. Appendix D contains a discussion of the relationship between economic values and net public benefits.

Indicators of Responsiveness to Major Issues and National Concerns

Table 2-18 displays the relationship among the key economic values, local economic impacts, and the responses to selected issues. PNV is an indicator of efficiency in government and the economic value of Forest management. Net cash flow is important as an indicator of the Forest's ability to contribute to the reduction of the Federal deficit. Both of these are of national concern. County receipts, jobs, and local income are all very important indicators of the Forest's contribution to the local economy. Timber harvest level is significant in that timber is the single most valuable commodity produced by the Forest. The remaining six categories are all important indicators of responsiveness to issues related to production of the various amenity outputs that are important to a wide variety of Forest users.

Summary of Reasons for Changes in PNV

The following summary discusses the changes in PNV when compared to the Constrained Economically Efficient Alternative with Forest Constraints (CEF) which has a PNV of \$1,397 million ^d

CEF Alternative

PNV ^{a/} = \$1,425 million

CUR Alternative

PNV = \$1,315 million

Change in PNV = -\$82 million

Reasons for Change in PNV: CUR has the highest PNV of the alternatives considered in detail. The primary reason for the drop in PNV is the constrained budget. As a result, developed recreation is limited to existing facilities. The higher decade 1 timber harvest contributes to a lower PNV for reasons discussed earlier in this chapter and in Appendix P. Because a high proportion of the forest is comprised of poles and

young sawtimber, the best economic solution would be to defer timber harvest in those stands to later decades, when the trees are larger and much more valuable. However, the Forest Service operates under the concept of sustained yield to avoid large fluctuations in timber supplies, the related employment levels, and community stability. To maintain sustained yield, younger and less valuable trees would be harvested in decade 1, resulting in a lower PNV.

An additional 89,000 acres above CEF of limited and modified timber management (instead of full timber management) for visual quality purposes also reduces PNV. Visual quality is a non-priced benefit, so its value is excluded from the PNV calculations.

Although developed recreation demand is met in the first three decades, recreation users incur some loss because needed campground rehabilitation cannot be accomplished. After that, there would be additional loss as demand for developed recreation would exceed capacity. Local publics who view the Forest as a source of employment and income would find that, compared to CEF, CUR would provide slightly more opportunities for employment and income in decade 1. This would be accompanied by a small structural shift away from the service sector and less recreational activity in CUR.

TGP Alternative

PNV = \$1,060 million

Change in PNV = -\$337 million

Reasons for Change in PNV: Timber management costs are significantly higher, largely due to the extensive use of clearcutting and group selection harvests. Economic benefits are foregone to provide a sustained yield timber harvest in decade 1, discussed above and in Appendix P.

Many Forest users would benefit under TGP when compared to EGP and PRF. Specifically, in decade 1, timber industry workers and to a lesser extent government workers and urban emigrants would benefit from higher income and employment opportunities. To some extent, all social

^{a/} Alternatives are in order of decreasing PNV. Minimum level (i.e., naturally occurring) benefits and fixed costs have been subtracted from PNV in each of the alternatives in order to highlight the effect of management on PNV.

groups would benefit from the increased government services made possible by higher returns to the local counties. At the same time, members of those groups who prefer more amenity values would incur some loss as a result of the higher timber harvest.

PRF Alternative

PNV = \$946 million

Change in PNV = -\$451 million

Reasons for Change in PNV. The major reductions in PNV are caused by management that favors protection of old growth dependent wildlife habitat, visual quality, riparian protection, and semi-primitive recreation and wilderness. Over 30,000 timbered acres are assigned to semi-primitive recreation. About 22,000 acres are recommended for wilderness, and 76 miles of river are recommended for Wild and Scenic Rivers. Over 342,000 acres of timber would have limited or modified timber management, rather than full timber management, in order to protect visual quality. Many of these benefits are non-priced, so their value is not reflected in PNV.

Maintaining high yields in decade 1 is another reason for lower PNV. Because a high proportion of the forest is comprised of poles and young sawtimber, the best economic solution would be to defer timber harvest in those stands to later decades, when the trees are larger and much more valuable. To maintain a higher yield, younger and less valuable trees would be harvested in decade 1, resulting in a lower PNV.

In the first decade, many Forest users would benefit by this alternative as compared to CEF. Recreation opportunities would be only slightly higher, but the quality of recreation experience would be improved. This would benefit recreational users of the Forest as well as the service sector of the local economy. Timber industry workers would find less opportunities for employment and income, but opportunities would gradually increase over time as harvest levels rise.

EGP Alternative

PNV = \$874 million

Change in PNV = -\$523 million

Reasons for Change in PNV: The main factors responsible for the reduced PNV are lower timber harvest levels due to increased emphasis on additional wilderness recommendations, high costs, and increased acres of old growth wildlife habitat. Many of the limitations on the timber program arise from objectives related to providing amenity outputs. Many of these benefits are non-priced, so their value is not reflected in PNV.

The heavy emphasis on group selection timber harvest methods tends to reduce timber volume and increase timber management costs. Maintaining a timber harvest level in decade 1 that is above the efficient level tends to lower PNV, but provides stable income and employment opportunities for timber industry workers.

Table 2-7

Average Annual Outputs by Alternative for Decades 1 and 5

Output/Activity	Base Year 1982	Decade	1980 RPA Goals	PRF	Alternative		
					CUR	EGP	TGP
ECONOMIC							
Total Budget (MM \$)	13.9	1	17.9	16.3	15.1	17.0	18.5
		5	19.3	30.1	29.3	26.9	33.6
Total Cost (MM \$)	14.5	1		17.5	16.1	18.3	20.0
		5		31.4	30.3	28.0	34.8
BIOMASS a/							
Biomass Available	148	1		165	148	165	187
(Thousand Oven Dry Tons)		5		187	169	176	222
FACILITIES							
Roads & Trails (miles)							
Trail Construction/ Reconstruction		1 5	3.0 3.0	3.5 3.5	0 0	2.5 2.5	1.0 1.0
Road Construction/ Reconstruction	95	1 5		66 59	77 111	66 39	88 49
Road Maintenance	2,862	1 5	-	3,552 3,832	3,622 4,234	3,552 3,837	3,577 3,922
Dams & Reservoirs (number)							
Forest Service	8	1 5		10 16	10 11	10 10	10 16
Other Federal	0	1 5		0 0	0 0	0 0	0 0
Other State/Local	7	1 5		7 7	7 7	7 7	7 7
Private	2	1 5		2 2	2 2	2 2	2 2
Administrative Sites (numbers)							
Forest Service Owned	12	1 5		11 11	11 11	11 11	11 11
Leased	4	1 5		1 1	1 1	1 1	1 1
FIRE AND FUEL							
Fuel Treatment (total acres)	11,630	1 5		6,050 5,650	9,660 9,800	6,050 5,550	7,450 5,850
Fire-Related Fuel Treatment	1,000	1 5		1,150 1,150	2,000 2,000	1,150 1,150	1,150 1,150
Timber-Related Fuel Treatment	8,990	1 5		3,600 3,200	5,900 5,700	3,600 3,100	5,000 3,400
Range/Wildlife Fuel Treatment	1,640	1 5		1,300 1,300	1,760 2,100	1,300 1,300	1,300 1,300

Table 2-7 (continued)

Average Annual Outputs by Alternative for Decades 1 and 5

Output/Activity	Base Year 1982	Decade	1980 RPA Goals	PRF	Alternative		
					CUR	EGP	TGP
Expected Acres Burned by Wildfire							
Intensity Class 1	328	1		380	475	439	441
		5		439	570	530	543
Intensity Class 2	74	1		91	106	98	99
		5		105	128	119	122
Intensity Class 3	6	1		8	8	8	8
		5		9	10	9	9
Intensity Class 4	113	1		228	164	151	152
		5		263	197	182	188
Intensity Class 5	6	1		8	8	8	8
		5		9	10	9	9
Intensity Class 6	39	1		45	57	53	53
		5		53	69	64	66
Total	566	1		760	818	757	761
		5		878	984	913	937
FIREWOOD							
Firewood (thousand cords)	70	1		69	70	64	86
		5		83	65	68	92
FISH							
Resident Fish (M pounds)	48	1	53	51	48	51	48
		5	57	54	47	54	50
Anadromous Fish Commercial Harvest (M pounds)	100	1	100	100	100	100	100
		5	103	101	92	101	96
Anadromous Fish Sport (M pounds)	39	1	39	39	39	39	39
		5	40	39	35	39	37
TOTAL WFUD's	18,750	1		19,400	19,100	19,400	19,400
		5		19,400	19,100	19,400	19,400
Direct Habitat Improvement (WFUD's)							
Resident Fish	300	1		2,000	800	2,000	2,000
		5		4,000	2,400	4,000	4,000
Anadromous Fish - Sport	115	1		1,000	800	1,000	1,000
		5		1,000	1,000	1,000	1,000
Direct Habitat Improvement (acres/structures)							
Resident Fish	1.5/10	1		3/30	75/8	3/30	3/30
		5		1/1	75/8	1/1	1/1
Anadromous Fish - Commercial & Sport	1/10	1		3/20	1.5/2	3/20	3/20
		5		.5/1	5/1	5/1	.5/1

Table 2-7 (continued)

Average Annual Outputs by Alternative for Decades 1 and 5

Output/Activity	Base Year 1982	Decade	1980 RPA Goals	Alternative			TGP
				PRF	CUR	EGP	
LANDS							
Land Acquisition (acres) b/	1,600	1		2,000	2,000	2,000	2,000
		5		200	200	200	200
Acres Withdrawn from Locatable Mineral Entry	83,106	1		158,778	82,503	166,050	89,298
		5		158,778	82,503	166,050	89,298
Acres Withdrawn from Mineral Leasing	78,663	1		145,579	78,060	158,991	78,060
		5		145,579	78,060	158,991	78,060
Minerals (plans and permits)	58	1	51	54	60	44	63
		5	65	70	76	58	79
Locatable Minerals	6	1		6	6	6	6
		5		6	6	6	6
Mineral Materials	52	1		46	52	36	55
		5		54	60	42	63
Leasable Minerals	0	1		2	2	2	2
		5		10	10	10	10
RANGE							
Crazing (M AUM's)	49.7	1	50.5	48.5	49.7	48.5	48.5
		5	53.2	48.5	49.7	48.5	48.5
RECREATION							
Developed Public (M RVD)	591	1	639	629	629	629	629
		5	930	997	865	997	997
Developed Private (M RVD)	190	1	202	190	190	190	190
		5	294	190	190	190	190
Dispersed (M RVD) (including wilderness use; excluding WFUD's)	312	1	336	402	402	402	402
		5	448	589	589	589	589
Open Usable OHV, Summer (M acres)	961	1		763	931	747	848
		5		763	931	747	848
Open Usable OHV, Winter (M acres)	961	1		763	939	747	854
		5		763	939	747	854
Road & Trails Open to OHV Use, Summer (mi)	2,240	1		2,301	2,298	2,302	2,302
		5		2,782	2,468	2,782	2,782
Roads & Trails Open to OHV Use, Winter (mi)	3,070	1		3,132	3,128	3,132	3,132
		5		3,612	3,298	3,612	3,612

Table 2-7 (continued)
Average Annual Outputs by Alternative for Decades 1 and 5

Output/Activity	Base Year 1982	Decade	1980 RPA Goals	PRF	Alternative		
					CUR	EGP	TGP
RECREATION (continued)							
Roads & Trails Closed to OHV Use, Summer(mi)	1,340	1		1,371	1,355	1,371	1,363
		5		1,393	1,400	1,593	1,568
Road & Trails Closed to OHV Use, Winter (mi)		1		549	536	549	541
		5		685	557	685	660
ROS Class (M acres)							
Primitive	3.4	1		3.4	3.4	3.4	3.4
(Wilderness)		5		3.4	3.4	3.4	3.4
Semi-Primitive	33.6	1		96.2	74.7	117.7	74.7
Non-Motorized		5		96.2	74.7	117.7	74.7
(Wilderness)							
Semi-Primitive	109.4	1		48.0	0	55.0	0
Non-Motorized		5		48.0	0	55.0	0
Semi-Primitive	59.3	1		17.0	0	0	0
Motorized		5		17.0	0	0	0
Roaded Natural	919.2	1		955.3	1,041.8	946.8	1,041.8
		5		955.3	1,041.8	946.8	1,041.8
Rural	9.7	1		9.7	9.7	9.7	9.7
		5		9.7	9.7	9.7	9.7
SPECIAL AREAS (numbers of areas/M acres)							
Research Natural Areas	2/4.4	1		8/14.3	4/4	8/14.3	8/14.3
		5		8/14.3	4/4	8/14.3	8/14.3
National Natural	0	1		0/0	0/0	1/0.1	0/0
Landmarks		5		0/0	0/0	1/0.1	0/0
Special Interest Areas	0	1		7/2.3	0/0	7/2.3	0/0
		5		7/2.3	0/0	7/2.3	0/0
TIMBER							
Allowable Sale Quantity							
MMCF	27	1	28	15	27	15	18
		5	29	18	27	15	20
MMBF	171	1	176	96	171	94	118
		5	187	113	171	94	124
Long Term Sustained Yield							
MMCF	30			22	34	15	25
MMBF	195			139	215	95	157
Reforestation (acres)	600	1	606	3,600	5,900	3,600	5,000
		5	707	3,200	5,600	3,000	3,400
Timber Stand	2,200	1	2,586	4,700	3,000	4,700	4,700
Improvement (acres)		5	2,637	7,000	5,100	4,100	10,400

Table 2-7 (continued)

Average Annual Outputs by Alternative for Decades 1 and 5

Output/Activity	Base Year 1982	Decade	1980 RPA Goals	PRF	Alternative		
					CUR	EGP	TGP
VISUAL RESOURCE							
Visual Quality Objectives (M/acres)							
Preservation	99.2	1		111.2	81.5	134.4	87.3
		5		111.2	81.5	134.4	87.3
Retention	166.2	1		254.3	201.5	258.2	238.6
		5		254.3	201.5	258.2	238.6
Partial Retention	440.8	1		454.2	318.0	457.0	479.7
		5		454.2	318.0	457.0	479.7
Modification	305.5	1		254.1	394.3	280.0	284.0
		5		254.1	394.3	280.0	284.0
Maximum Modification	117.9	1		55.8	134.3	0	40.0
		5		55.8	134.3	0	40.0
Visual Quality Index	57	1		56	55	57	57
		5		54	51	56	56
WATER							
Quality (M acre-feet meeting standards)	1,308	1	2,102	1,304	1,308	1,303	1,305
		5	2,124	1,301	1,308	1,299	1,302
Quantity (Yield, M acre-feet) c/	1,308	1		1,304	1,308	1,303	1,305
		5		1,301	1,308	1,299	1,302
Increased Quantity		1		-4	0	-5	-3
		5		-7	0	-9	-6
Watershed Improvement (acres)	15	1	170	75	75	150	75
		5	200	5	5	5	5
Riparian Area Improvement (acres)	5	1		20	5	20	10
		5		20	5	20	10
WILD AND SCENIC RIVERS							
Recommended Wild (miles)	0	1		48.5	0	48.5	16.0
		5		48.5	0	48.5	16.0
Recommended Scenic (miles)	0	1		10.0	0	10.0	0
		5		10.0	0	10.0	0
Recommended Recreational (miles)	0	1		17.5	0	17.5	0
		5		17.5	0	17.5	0
WILDERNESS							
Wilderness Acres	78,060	1		99,644	78,060	121,146	78,060
Wilderness Units	3	1		7	3	8	3
Wilderness Use (M RVD) d/	20.4	1		37.4	30.7	43.3	30.7
		5		54.8	44.9	63.3	44.9

Table 2-7 (continued)

Average Annual Outputs by Alternative for Decades 1 and 5

Output/Activity	Base Year 1982	Decade	1980 RPA Goals	PRF	Alternative		
					CUR	EGP	TGP
WILDLIFE							
Threatened & Endangered Species							
Bald Eagle (pairs)		14	1	16	16	16	16
			5	19	19	19	16
Northern Spotted Owl	Unmanaged		1	1	1	1	1
HCA			5	1	1	1	1
Peregrine Falcon (pairs)		1	1	3	3	3	3
			5	5	5	5	3
Other Than Threatened & Endangered Species							
Deer	49,000	1	54,800	45,600	49,700	43,600	44,500
		5	54,800	47,200	52,600	49,400	49,000
California Spotted Owl	Unmanaged	1		40	39	40	40
Habitat Areas		5		40	39	40	40
Goshawk Management	Unmanaged	1		113	113	200	113
Areas		5		113	113	200	113
Total WFUD's	62,400	1		58,100	63,300	55,500	56,600
		5		60,100	67,000	62,900	62,400
Direct Habitat Improvement (WFUD's)							
Deer	400	1		540	400	370	240
		5		400	400	370	240
Small Game & Non-game	800	1		800	800	1,040	130
		5		600	800	1,040	130
Wildlife Habitat Improvement (acres)							
Deer	2,000	1		1,300	1,760	1,300	1,300
		5		1,300	1,760	1,300	1,300
Small Game & Non-game	50	1		80	50	80	10
		5		80	50	80	10

a/ Excluding material <4" diameter, precommercial thinning, firewood

b/ Five-year average

c/ Flow figures do not include runoff contributed from private lands, while the RPA figures were based on entire watershed areas

d/ 1982 base year includes RVD's for Canbou and Thousand Lakes Wilderness Areas

NOTE Decade 5 outputs are shown for purpose of long-range comparison of alternatives

Table 2-8**Acreage Allocation by Prescription and Alternative**

<u>Prescription 1/</u>	<u>Acres by Alternative</u>			
	<u>PRF</u>	<u>CUR</u>	<u>EGP</u>	<u>TGP</u>
A Non-Timber Wildlife	43,000	34,000	45,000	45,000
B Rangemildlife	96,000	98,000	96,000	105,000
C Firewood	8,000	0	8,000	8,000
D. Developed Recreation	1,000	1,000	1,000	1,000
E Early Successional	6,000	0	6,000	0
F. Riparian/Fish 2/	28,000	31,000	28,000	35,000
K Rocky/Sparse Timber	158,000	180,000	165,000	222,000
L Late Successional	98,000	96,000	98,000	98,000
M. Semi-primitive Motonzed	17,000	0	0	0
N. Semi-Pnmitive Non-Motonzed	48,000	0	55,000	0
R. Range	12,000	12,000	12,000	12,000
S Specialheas	43,000	20,000	41,000	30,000
T. Timber	254,000	394,000	280,000	284,000
V View/Timber	168,000	111,000	127,000	146,000
W Wilderness	100,000	78,000	121,000	78,000
Z Minimum Level	49,000	74,000	46,000	65,000

1/ Prescnptions represent general management intent. Final land allocations will be done at the project level after a site-specific environmental analysis has been completed. Prescription maps do not generally display areas less than 200 acres. There may be more than one prescription applied to any area. See the Prescription Application Priority in the Plan, Chapter 4, section F, for a listing of which prescnptions take precedence.

2/ Less acres are displayed in the F Prescnption for PRF and EGP because of the application of more restnctive prescriptions in some riparian areas such as the S or W Prescriptions.

Table 2-9

<u>Further Planning</u>	<u>PRF Alternative</u>				<u>EGP Alternative</u>	
	<u>W</u>	<u>M</u>	<u>N</u>	<u>OP</u>	<u>W</u>	<u>N</u>
Butt Mountam				8,300		8,300
Heart Lake	9,289				9,289	
Ish1 B		8,220	3,937	7,870	20,027	
Mill Creek	7,580			410	7,990	
Trail Lake B	815	300			815	300
Wild Cattle Mountain	3,900			1,065	4,965	
<u>Totals</u>						
W- Wilderness	21,584				43,086	
M - Semi-Primitive Motorized		8,520				
N - Semi-Primitive Non-Motorized			3,937			8,600
OP - Other Presenptions				17,645		

CUR and TGP Alternatives are not shown in this table because they assign no further planning area acres to W, N, or M.

Table 2-10

Land Classification for Timber Management

Classification	Alternatives			
	<u>PRF</u>	<u>CUR</u>	<u>EGP</u>	<u>TGP</u>
1 Non-Forested Land (incl. water)	304,450	304,450	304,450	304,450
2 Forested Land	825,135	825,135	825,135	825,135
3 Forest Land Currently Withdrawn from Timber Production ^{1/}	55,025	55,025	55,025	55,025
4. Forested Land Not Capable of Producing Industrial Wood	0	0	0	0
5 Forested Land Physically Unsited				
a Irreversible damage to soils, watersheds, or productivity likely to occur	0	0	0	0
b. Unregenerable within 5 years of final harvest	0	0	0	0
6. Inadequate Information to Project Responses ^{2/}	0	0	0	0
7 Tentatively Suitable Timber Base (item 2 minus 3, 4, 5 & 6)	770,110	770,110	770,110	770,110
8. Not Suitable for Timber Under the Alternative ^{3/}	178,769	26,533	184,229	136,314
9. Total Unsuitable Acres (sum of items 3, 4, 5, 6, & 8)	228,794	80,558	239,254	191,339
10. Total Suitable Acres (item 2 minus item 9)	596,341	744,577	585,881	633,796
11 Total National Forest (sum of items 1 and 2)	1,129,585	1,129,585	1,129,585	1,129,585

^{1/} Areas withdrawn by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service

^{2/} Lands for which current information is inadequate to project responses to timber management Usually applies to low site lands

^{3/} Lands identified as not appropriate for timber production due to (a) assignment to other resource uses to meet objectives, (b) management requirements, or (c) not being cost efficient in meeting Forest Plan objectives over the planning horizon Examples areas recommended for mldemess, areas where timber production activities are not cost efficient, the 1984 designation of the Ishi Wilderness, spotted owl, marten and fisher habitat management areas

Figure 2-6
Harvest Methods by Alternative

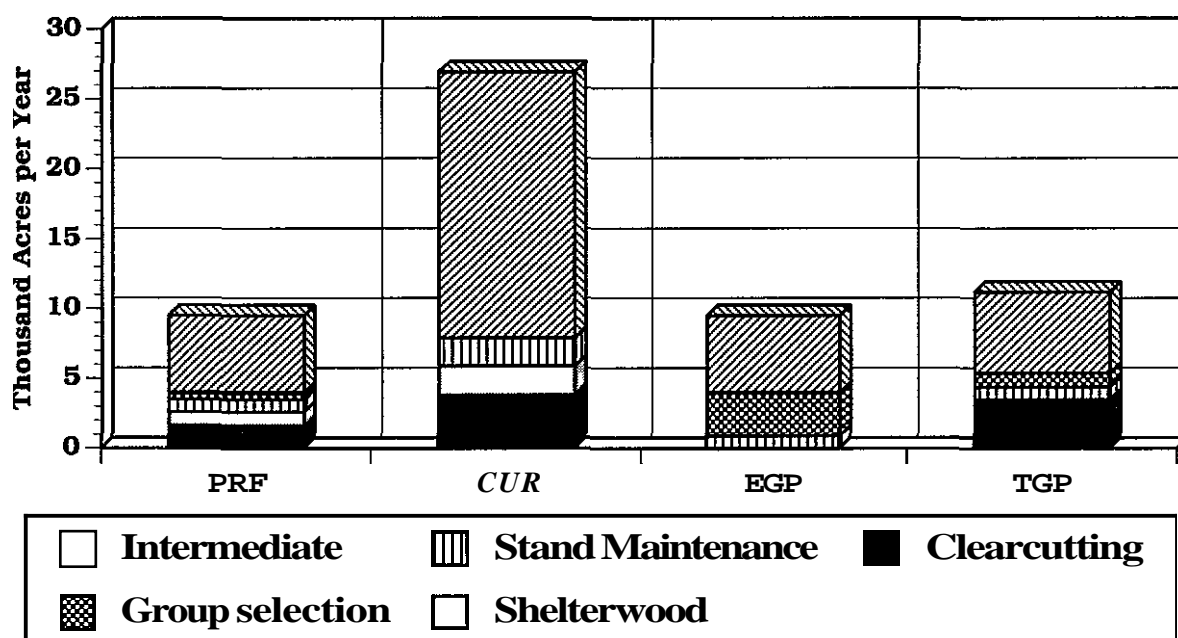


Table 2-11

Harvest Methods by Alternative

<u>Harvest Method</u> <u>(M Acres/ Year)</u>	<u>Decade</u>	<u>Alternatives</u>			
		PRF	CUR	EGP	TGP
Regeneration					
Clearcutting	1	1.6	3.8	0.0	3.3
Shelterwood 1/	1	1.0	2.1	0.0	0.2
Overstory Removal/Stand Maintenance	1	.9	2.0	0.9	0.9
Group Selection	1	5	0.0	3.1	1.0
Intermediate	1	5.5	19.0	5.5	5.5

1/ Shelterwood harvest includes all stages - preparatory step, seed step, and overwood step
Intermediate harvest includes commercial thinning, sanitation, and salvage harvest.

Figure 2-7
Comparison of Timber Management Practices

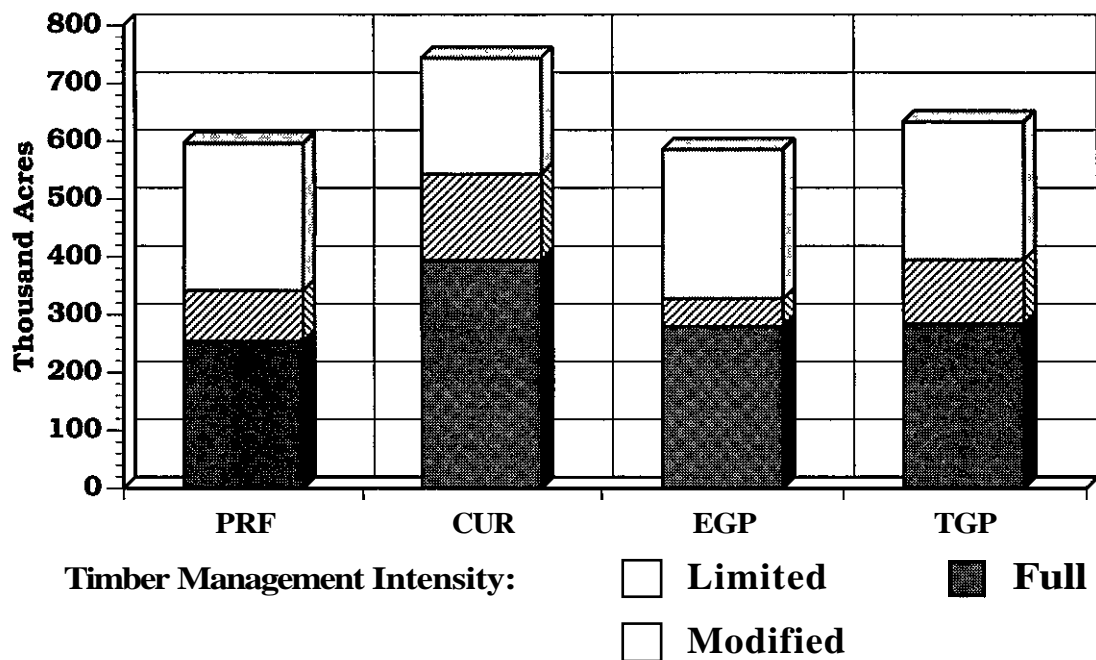


Table 2-12
Comparison of Timber Management Practices

Management Practices	Alternatives			
	PRF	CUR	EGP	TGP
Full	254,082	394,418	280,083	283,977
Modified	87,958	148,792	47,552	111,232
Limited	254,301	201,367	258,246	238,587
Total	596,341	744,577	585,881	633,796

Notes

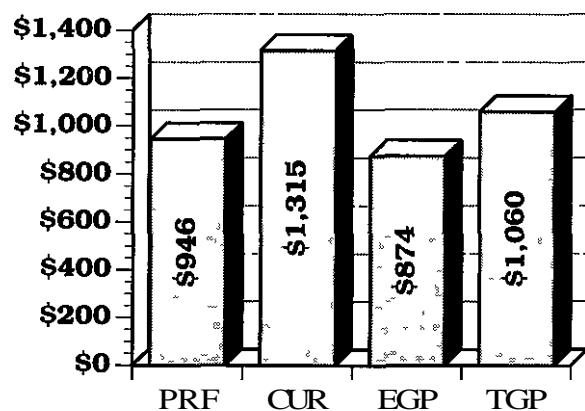
Full timber management practice includes the full range of silvicultural practices and a high level of timber production with minimum length rotations

Modified timber management practice includes the full range of silvicultural practices, but uses longer rotations and longer time intervals between harvests in an area to meet other resource objectives.

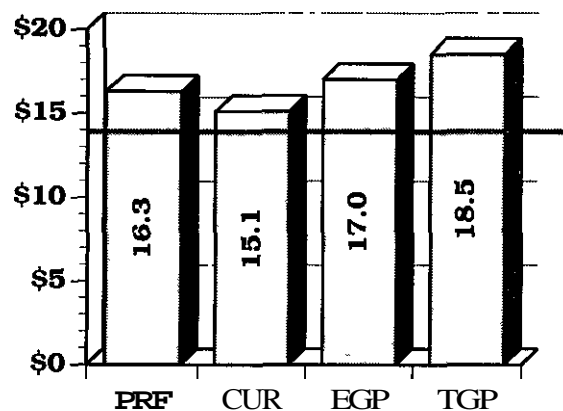
Limited timber management practice involves individual tree and group selection harvest. This is used on rocky forest land, eastside pine with naturally sparse to poor stocking, and in other areas where the management intensity is restricted to protect other resources.

Figure 2-8
Key Comparisons Between Alternatives (First Decade)

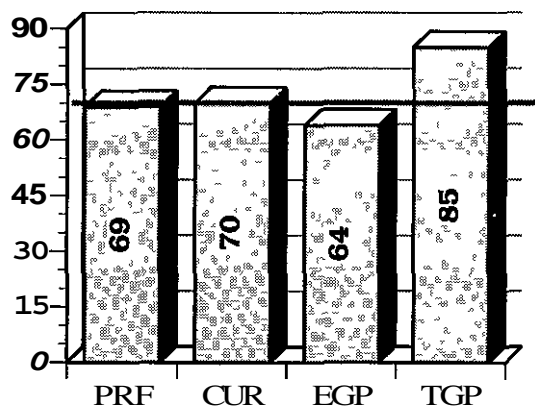
PNV [Million \$ per Year)



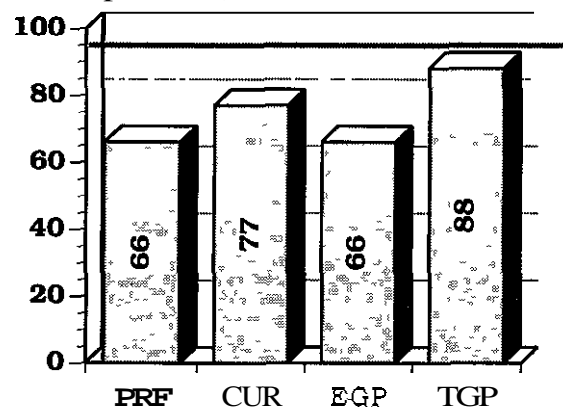
Total Budget (Million \$ per Year)



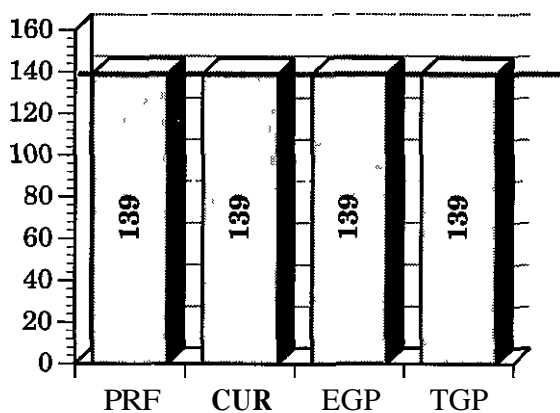
Firewood (Thousand Cords per Year)



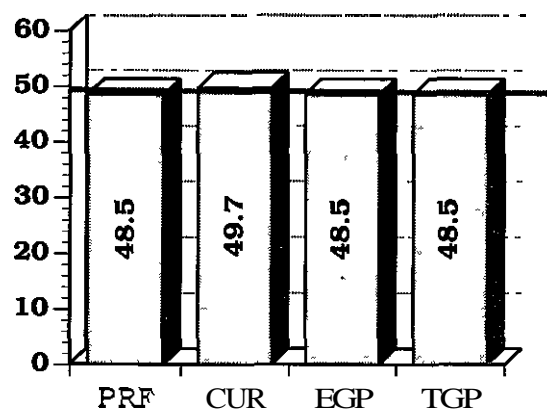
Road Construction + Reconstruction
[Miles per Year)



Anadromous Fish
(Thousand Pounds per Year)



Grazing (Thousand AUM's per Year)



— = 1982 Base Level

Figure 2-8 (continued)
Key Comparisons Between Alternatives (First Decade)

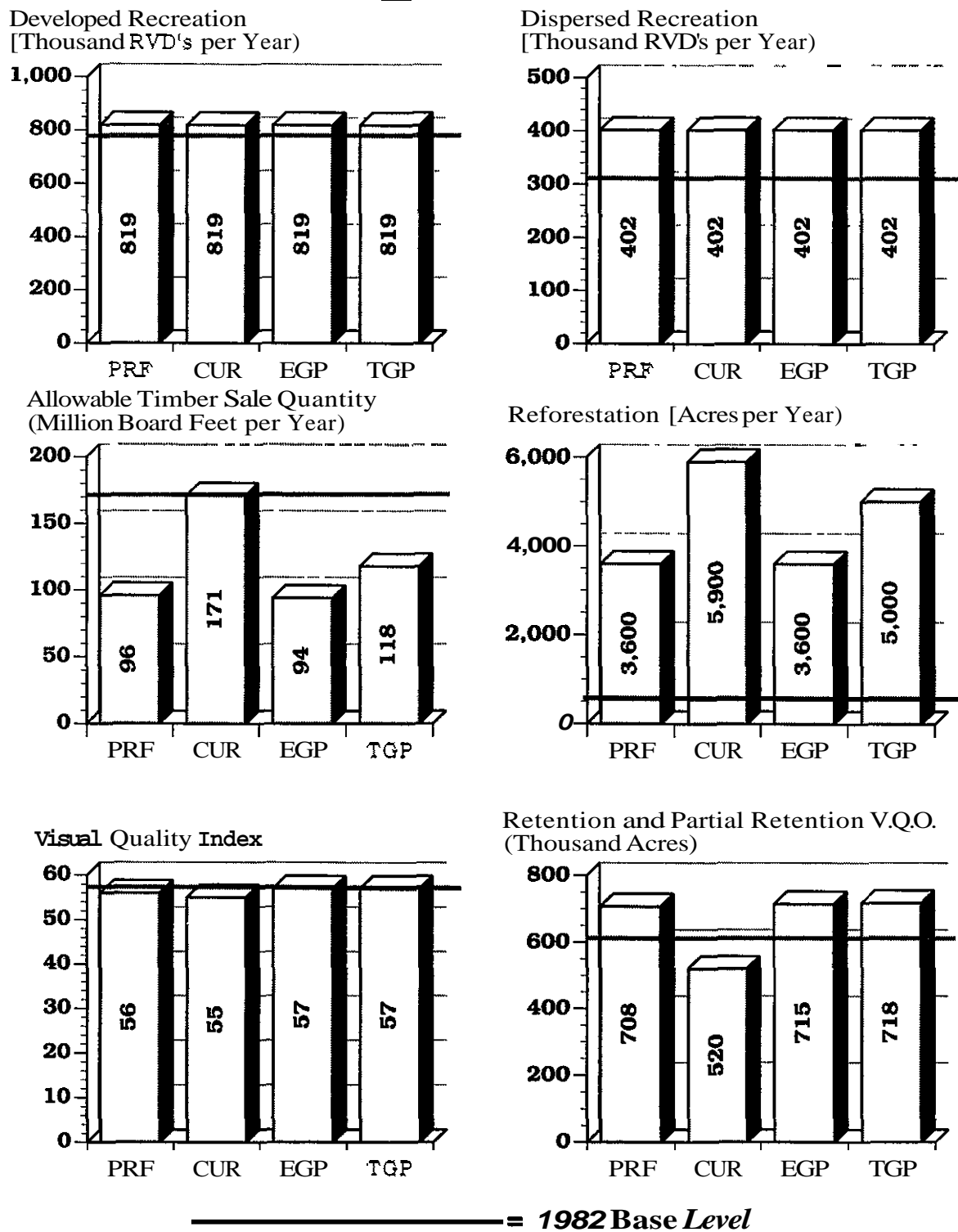


Figure 2-8 (continued)
Key Comparisons Between Alternatives (First Decade)

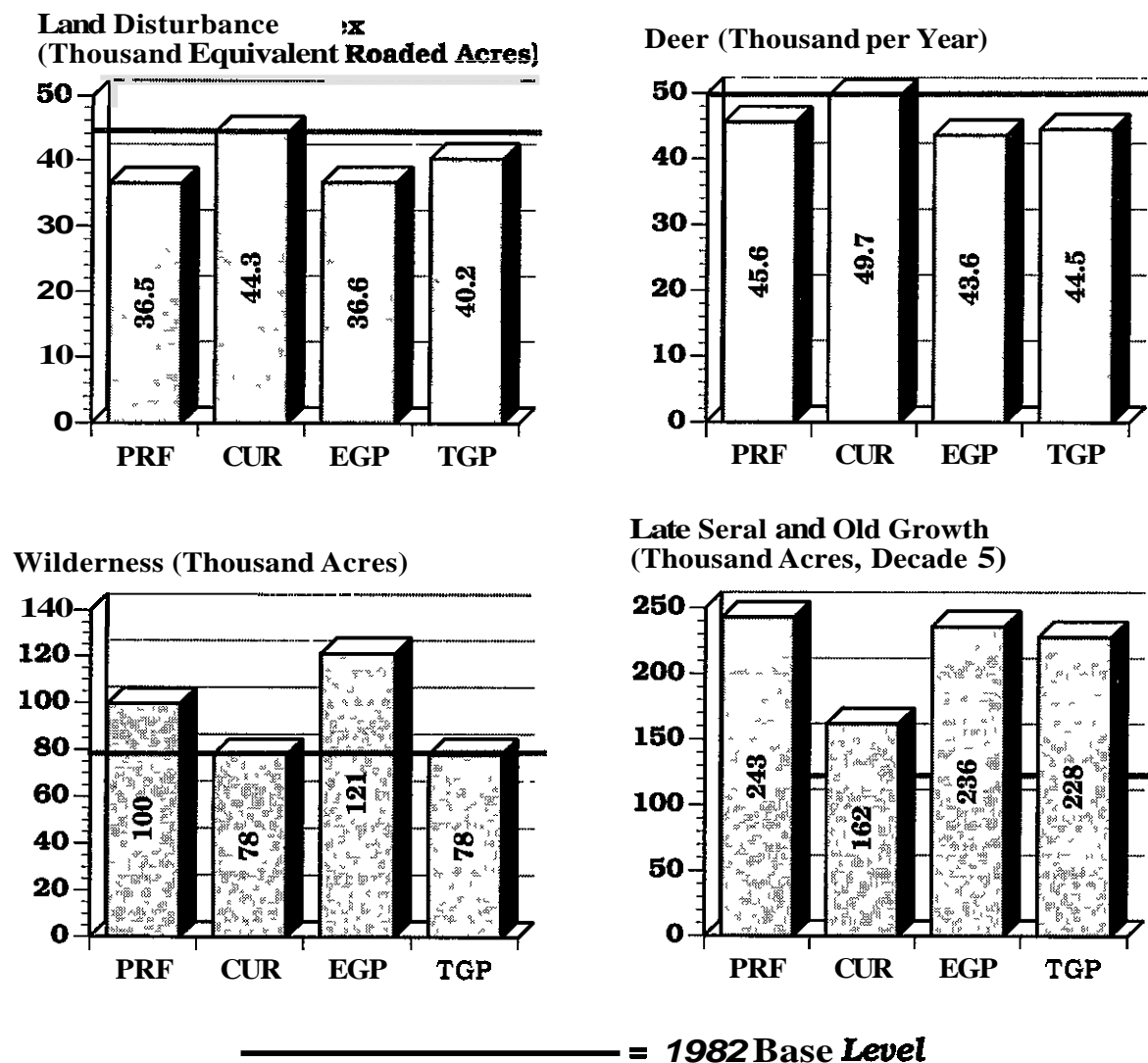


Table 2-13**Summary Comparison of Economic Effects - Part A**

Economic Effect	1982 Decade Base Year	Alternative				
		PRF	CUR	EGP	TGP	
-Millions of 1982 Dollars per Year-						
1. Total Benefits	79.0	1	84.1	98.0	84.6	90.0
		2	94.3	123.6	95.6	104.8
		3	103.8	131.2	104.3	114.7
		4	120.8	134.6	113.8	125.7
		5	134.5	138.0	122.9	136.7
2. Returns to the U.S. Treasury	12.4	1	22.1	31.4	23.7	27.3
		2	30.0	53.4	31.8	39.6
		3	37.3	60.1	38.6	47.3
		4	52.4	63.8	45.8	56.8
		5	64.0	68.4	52.4	66.0
3. Non-Cash Benefits (Item 1-Item 2)	66.6	1	62.0	66.6	60.9	62.7
		2	64.3	70.2	63.8	65.2
		3	66.5	71.1	65.7	67.4
		4	68.4	70.8	68.0	68.9
		5	70.5	69.6	70.5	70.7
4. Federal Costs (Item 6 - Item 5)	14.3	1	17.1	15.7	17.9	19.6
		2	20.1	18.1	22.8	24.2
		3	22.4	21.3	23.1	27.0
		4	26.7	25.2	24.4	30.7
		5	31.0	29.9	27.6	34.4
5. Non-Federal Cost	0.2	1	0.4	0.4	0.4	0.4
		2	0.4	0.4	0.4	0.4
		3	0.4	0.4	0.4	0.4
		4	0.4	0.4	0.4	0.4
		5	0.4	0.4	0.4	0.4

1. Total benefits include both cash returns to the U.S. Treasury and non-cash benefits. Total benefits are the estimated total amount that consumers would be willing to pay for Forest outputs, whether or not this amount is actually collected by the U.S. Government
2. Returns to the U.S. Treasury are the estimated payments by consumers of Forest outputs collected by the Federal Government, before subtracting funds set aside from receipts (such as KV or payments in lieu of cash like purchaser road credits)
3. Non-cash 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. Federal costs are all costs born by the Federal 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 costs equal total costs less non-Federal cooperator costs
5. Non-Federal costs include all costs needed to produce forest outputs. (Examples include the cost of State coop fire protection and State funded wildlife projects)

Summary Comparison of Economic Effects - Part B

Economic Effect	1982 Decade	Base Year	-Millions of 1982 Dollars per Year-				
	PRF	CUR	EGP	TGP			
6 Total Costs (Item 4 + Item 5)	1	17.5	16.1	18.3	19.6	24.2	27.0
	2	20.5	18.5	23.2	30.7	34.4	40.0
	3	22.8	21.7	23.5	30.7	34.4	40.0
	4	27.1	25.6	24.8	30.7	34.4	40.0
	5	31.4	30.3	28.0	30.7	34.4	40.0
7 Total Budget	1	16.3	15.1	17.0	20.0	24.6	27.0
	2	19.2	17.5	21.8	24.6	29.2	32.6
	3	21.4	20.7	22.2	27.4	31.1	34.8
	4	25.7	24.6	23.7	31.1	34.8	40.0
	5	30.1	29.3	26.9	34.8	38.3	44.0
8 Operation Maintenance Cost (Item 6 - Item 9)	1	12.2	7.5	12.6	13.2	15.2	16.7
	2	13.5	9.9	14.1	15.2	16.7	18.3
	3	14.8	10.4	15.4	16.7	18.3	20.1
	4	17.2	11.4	16.7	18.3	20.1	21.9
	5	19.3	13.1	18.2	20.1	21.9	23.7
9 Total Capital Investment (Item 10 + Item 11 + Item 12)	1	5.3	8.6	5.7	6.8	8.1	9.4
	2	7.0	8.6	9.1	10.7	12.8	14.0
	3	8.0	11.3	8.1	10.7	12.8	14.0
	4	9.9	14.2	8.1	12.8	14.0	15.6
	5	12.1	17.2	9.8	14.0	15.6	17.2
10 Purchaser Road Credit	1	1.1	2.1	1.1	1.5	1.5	1.5
	2	0.8	1.2	1.1	1.2	1.2	1.2
	3	1.0	1.6	0.9	1.2	1.2	1.2
	4	1.0	1.9	0.7	0.9	0.9	0.9
	5	0.9	2.4	0.6	0.8	0.8	0.8
11 Reforestation and	1	3.3	4.8	3.7	4.4	4.4	4.4
	2	3.3	6.7	7.1	7.3	7.3	7.3
	3	6.1	9.3	6.3	8.6	8.6	8.6
	4	8.0	11.9	6.5	11.0	11.0	11.0
	5	10.7	14.7	8.2	12.9	12.9	12.9

-Millions of 1982 Dollars per Year-

- | | |
|----|---|
| 6 | Total costs include Federal and non-Federal costs needed to produce forest outputs |
| 7 | Total budget is equal to Federal cost less the cost of fighting forest fires (FFI) |
| 8 | Operation and maintenance costs include the cost of administration, management, and protection of existing resources w/d capital assets |
| 9 | Capital investment costs w/d the costs of creating or enhancing capital assets |
| 10 | 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 paid in a capital investment cost |
| 11 | Purchaser load credit is the cost of roads built by timber purchasers. These roads are accepted as in kind payments in lieu of cash from timber purchasers |
| 12 | Reforestation and silvicultural costs include expenditures for site preparation, timber stand improvements, w/d other silvicultural treatments |

Table 2-13

Summary Comparison of Economic Effects - Part C

Economic Effect	1982 Base Year	Decade	Alternative			
			PRF	CUR	EGP	TGP
-Millions of 1982 Dollars per Year-						
12 Appropriated Road and Other Capital Investment	1.0	1	09	17	0.9	0.9
		2	0.9	07	0.9	0.9
		3	0.9	04	0.9	0.9
		4	0.9	0.4	0.9	0.9
		5	1.0	0.1	1.0	1.0
13 25% Receipt Shares (Item 2x.25)	3.1	1	5.5	7.8	5.9	6.8
		2	7.5	13.4	8.0	9.9
		3	9.3	15.0	9.6	11.8
		4	13.1	16.0	11.4	14.2
		5	16.0	17.1	13.1	16.5
14 County Yield Tax revenue (Item 2x.029)	0.4	1	0.6	0.9	0.7	0.8
		2	0.9	1.5	0.9	1.1
		3	1.1	1.7	1.1	1.4
		4	1.5	1.8	1.3	1.6
		5	1.9	2.0	1.5	1.9
15. Income	40.8	1	48.7	68.8	48.5	55.8
16. Employment (number of jobs)	2,296	1	1,624	2,296	1,618	1,860
17. Discounted Benefits			1,418	1,824	1,370	1,613
18. Discounted Costs			472	509	-496	553
19. Present Net Value (Item 17-Item 18)			946	1,315	874	1,060
20. Benefit/Cost Ratio (Item 17/Item 18)			3.00	3.58	2.76	2.92

12 "Appropriated roads" is the cost of roads built by the Forest rather than by timber purchasers. Other capital investment is all investment cost other than purchaser road credits and appropriated roads.

13 Twenty-five percent of returns to the U.S. Treasury are distributed back to the counties in proportion to the Lassen National Forest's acreage in each county. Proportionate county shares are: Butte, 47%; Lassen, 39.9%; Plumas, 14.2%; Shasta, 23.5%; Tehama, 17.8% (does not equal 100% due to rounding).

14 Under California law, a yield tax currently equal to approximately three percent of approximate 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 input-output model used to make estimates.

16 Employment generated by the Forest in the zone of influence was estimated with an input-output model. See Appendix B.

17 Discounted benefits over the planning horizon.

18 Discounted costs over the planning horizon.

19 Discounted benefits less total discounted costs.

20. Discounted benefits divided by total discounted costs.

Table 2-14
Present Net Value Comparison of Marginal Cost of Constraints (Millions of 1982 Dollars)

A

Base Run ▼							Discounted Benefits by Resource ^B				Discounted Costs by Resource ^B			
	PNV	Change in PNV ^C	Discounted Costs	Change in Discounted Costs	Discounted Benefits	Change in Discounted Benefits	Timber	All Rec ^D	Firewood	Other ^E	Timber	All Rec ^C	Roads	Other ^F
FLW	1,614		581		2,195		1,641	498	55	1	423	59	55	44
VPD Constraint		-140		+47		-165								
DSP Constraint		-40		0		-27								
Other Constraints & Overlap		-9		0		-6								
MMR	1,425	-189	534	-47	1,959	-236	1,411	498	49	1	383	59	47	45
CEE	1,397	-28	531	-3	1,928	-31	1,381	497	49	1	380	59	47	45
CEF	1,397	0	531	0	1,928	0	1,381	497	49	1	380	59	47	45
MLV ^G Minimum Level	1,252		48		1,300		0	83	0	1,217	0	2	0	46

A Totals may vary slightly due to independent rounding.

B Direct comparison between individual benefit and cost categories may be misleading because many outputs have common costs of production that cannot be reliably separated and attributed to individual resources

C All changes are measured incrementally, starting from the PNV of the FLW base run, which does not include the MMR's

D "All Rec" includes Wildlife and Fish User Days as well as other recreation.

E Other discounted benefits include range and water benefits minus non-timber resource damage from wildfire

F Other discounted costs include range costs, fire suppression costs, and some variable project management costs

G The Minimum Level Benchmark (MLV) shows naturally occurring background benefits and fixed costs associated with maintaining the Forest in Federal ownership. In order to display incremental tradeoffs, the background benefits and fixed costs have been subtracted from the other alternatives

KEY

PNV = Present Net Value

VPD Constraint = Maintenance of viable wildlife populations and vegetative diversity

DSP Constraint = Dispersion of timber harvest openings

MMR Constraints (Minimum Management Requirements) are included in MMR, CEE, and CEF runs but not in FLW or MLV

Table 2-15
Present Net Value Comparison of Alternative Constraints (Millions of 1982 Dollars)

Base Run ▼							Discounted Benefits by Resource ^C				Discounted Costs by Resource			
	PNVA	Change in PNV ^B	Discounted Costs	Change in Discounted Costs	Discounted Benefits	Change in Discounted Benefits	Timber	All Rec ^D	Firewood	Other ^E	Timber	All Rec	Roads	Other ^F
CEF (CEE with Forest Constraints)	1,397	N/A	531	NA	1,928	N/A	1,381	497	49	1	380	59	47	45
CUR (Current)	1,315	-82	509	-22	1,824	-104	1,348	422	31	23	364	54	46	45
TGP (Timber Group)	1,060	-337	553	+22	1,613	-315	1,069	494	31	19	393	61	50	49
PRF (Preferred)	946	-451	472	-59	1,418	-510	892	474	31	21	312	60	50	50
EGP (Environmental Group)	874	-523	496	-35	1,370	-558	845	474	31	20	323	60	63	50
MLV Minimum Level ^G	1,252		48		1,300		0	83	0	1,217	0	2	0	46

A Alternatives are listed in order of decreasing PNV

B All changes are measured from **CEF** (the constrained, economically efficient alternative with Forest constraints common to all alternatives)

C Direct comparison between individual cost and benefit categories may be misleading because many outputs have common costs of production that cannot be reliably separated and attributed to individual resources

D "All Rec" includes Wildlife and Fish User Days as well as other recreation.

E Other discounted benefits include range and water benefits minus non-timber resource damage from wildfire

F Other discounted costs include range costs, fire suppression costs, and some variable project management costs.

G 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, minimum level costs and benefits have been subtracted from the other alternatives

Table 2-16
Average Annual Cash Flows and Non-cash Benefits by Alternative

Alternative A ▼	Decade 1				Decade 5 (Potential)			
	Net Cash Flow	Total Federal Cost	Returns Treasury	cash B Non-cash B Benefits	Net Cast Flow	Total Federal cost	Returns to Treasury	Non-cash Benefits
CUR Current	157	157	314			299	684	696
CEF Constrained Economic Efficiency	111	162	271	666 666	385 526	360	886	743
TGP Timber Group	77	196	273	627	316	344	660	707
EGP Environmental Group	58	179	237	609	248	276	524	705
PRF Preferred	50	171	221	620	330	310	640	705

A Alternatives are listed in order of decreasing net cash *flow*

B See Appendix B, Section 1 D 5 d and Table B-7 for a detailed listing of cash and non-cash benefits

Alternative A ▼	Present Net Value B (\$ Million)	Change in Present Net Value C (\$ Million)	VQO Retention (Acres)	VQO Partial Retention (Acres)	New Wilderness (Acres)	Semi-Primitive Area (Acres)	SOHA's	Mature Timber D (Acres—Decade 5)
CEF Constrained Economic Efficiency	1,397	NA			0	0		
CUR current	1,315	-82	201,500	318,000	0	0	39	162,000
TGP Timber Group	1,060	-337	238,600	479,700	0	0	40	228,000
PRF Preferred	946	-451	254,300	454,200	22,000	65,000	40	243,000
EGP Environmental Group	874	-523	258,200	457,000	43,000	55,000	40	236,000

A Alternatives are listed in order of decreasing PNV

B Minimum level costs and benefits have been deducted from PNV for all alternatives

C Change in PNV is measured from the PNV of the CEF Alternative

D Mature timber consists of stands having predominant crown sizes over 25 feet in diameter, including old growth

Table 2-18
Indicators of Responsiveness to Major Issues and National Concerns

Alternative ▼	Economic Effects			Community Effects, Decade 1			Timber Issue	Wilderness Issue	Recreation Issue	Wild & Scenic River Issue
	PNV ^A million dollars	Net Cash Flow (\$ million/yr), Decade 1	Net Cash Flow (\$ million/yr), Decade 5	Receipts to Counties (\$million/yr)	Jobs Available	Local Income 15 million/yr)	Timber Harvest, Decade 1 (MMBF/yr)	Existing and Recommended Wilderness (M acres)	Primitive and Semi-Primitive Recreation ^B (ROS Class, M Acres)	Recommended Wild and Scenic River (miles)
CEF Constrained Economic Efficiency	1,397	10.9	52.6	6.8	2,059					
CUR Current	1,315	15.7	38.5	7.8	2,296	68.8	171	78.1	0	0.0
TGP Timber Group Theme	1,060	7.7	31.6	6.8	1,860	55.8	118	78.1	0	16.0
PRF Preferred Theme	946	5.0	33.0	5.5	1,624	48.7	96	999	650	760
EGP Environmental Group Theme	874	5.8	24.8	5.9	1,618	48.5	94	121.1	550	760

A Alternatives are listed in order of decreasing PNV.

B Excludes existing and proposed wilderness acres.

Table 2-19

Summary Treatment of Issues and Concerns

Issue	Output, Activity, or Policy	Alternative.			
		PRF	CUR	EGP	TGP
1. AIR QUALITY -How should air quality be protected in various areas from activities on the Forest?	Meeting air quality standards.	In all alternatives, Forest Standards and Guidelines require that air quality be maintained to meet or exceed legal requirements of all levels of government. Standards and Guidelines in the Wilderness Prescription require that air quality related values be developed in decade 1. Air quality will be maintained by using prescriptions in prescribed burn plans that are designed to meet or exceed air quality standards in conjunction with other resource objectives. All Prevention of Significant Deterioration (P.S.D.) permits submitted to the State of California for fixed sources that could affect air quality in Class I wilderness areas will be reviewed			
2. BIOMASS - What kinds of biomass can be utilized for energy while meeting ecological needs?	Logging residue available.	In all alternatives, use of biomass is encouraged if it is surplus to silvicultural, personal-use firewood and ecological needs. This includes logging residue larger than four inches in diameter. Smaller material will be left for ground cover, nutrient renewal, wildlife, etc			
	Oven dry tons per year, decade 1	165,000	148,000	165,000	187,000
3. CULTURAL RESOURCES - How should the Forest effectively provide for protection and interpretation of prehistoric and historical resources while managing its land for other uses?	Cultural resources protection and management	All significant properties inventoried by end of decade; establish interpretive programs.	Protect cultural resources to minimum legal standards.	All significant properties inventoried by end of decade; establish interpretive programs.	All significant properties inventoried by end of decade; establish interpretive programs.
4 ENERGY - How should the Forest be managed and operated to best support local and regional energy needs?	Energy Conservation.	Energy efficiency is stressed in all alternatives for facility construction and reconstruction and for fleet operation.			

Table 2-19 (continued)

Summary Treatment of Issues and Concerns

Issue	Output, Activity, or Policy	Alternative.			
		PRF	CUR	EGP	TGP
5. FACILITIES - What transportation systems and other facilities should be established and maintained on the Forest to provide for management needs?	Transportation system	Forest Standards and Guidelines call for construction, reconstruction, maintenance, and obliteration, if necessary to meet traffic demands and other management direction			
	Road construction and reconstruction (miles/year, decade 1)	66	77	66	88
6. FIRE & FUELS - What fire management and fuel treatment programs will best protect life, property, and environmental quality while assisting in resource management?	Fire management budget (Millions of dollars)	2 1	1.6	2 1	2 1
	Expected burned acres (decade 1, yearly average)	760	818	157	761
7 FIREWOOD - How can a sustained supply of firewood be provided, and what should be the priorities in its allocation?	Firewood priorities	Forest Standards and Guidelines give personal use priority over industrial uses of firewood.			
	Firewood available (cords/year, decade 1)	69,000	70,000	64,000	85,000

Table 2-19 (continued)

Summary Treatment of Issues and Concerns

Issue	Output, Activity, or Policy	Alternative.			
		PRF	CUR	EGP	TGP
8. FISH - How should the productivity, quality, and diversity of fish habitat be provided or protected?	Fishenes protection and improvement.	Varying levels of habitat improvement and habitat disturbance occur under all alternatives. Productivity for all alternatives was determined from habitat quality ratings for resident and anadromous fish. Forest Standards and Guidelines specify the protection of riparian zones.			
	Anadromous habitat improvement program.	Moderate	Low	Moderate	Moderate
	Resident habitat improvement program.	Moderate	Low	Moderate	Moderate
	Riparian area improvement (Acres/year, decade 1).	20	5	20	10
9. FOREST HEALTH - What biological pests affect timber and other resources on the Forest and what pest management methods should be used?	Pest management approach.	Forest pests are identified in Chapter 3, Affected Environment. In all alternatives, Forest Standards and Guidelines call for application of integrated pest management to reduce unacceptable pest impacts. A full range of pest management techniques will be evaluated on a site-specific, project-level basis.			
10. GEOLOGY - What significant geological features are there on the Forest and how should they be developed, protected, or interpreted?	Geological hazards.	In all alternatives, geologic hazards will be evaluated prior to any capital investments.			
	Number of geological Special Interest Areas.	3	0	3	0

Table 2-19 (continued)

Summary Treatment of Issues and Concerns

Issue	output, Activity, or Policy	Alternative.			
		PRF	CUR	EGP	TGP
11 LANDS - How should the Forest coordinate land use practices with adjoining public and private landowners, and to what extent should it reduce possible conflicts with intermingled lands by implementing land ownership adjustments?	Landowner coordination, land adjustments.	In all alternatives, coordination activities would occur with adjacent landowners and concerned agencies. Land exchanges would occur on an opportunity basis, with the theme of each alternative guiding the emphasis on lands to be acquired			
12. LAW ENFORCEMENT - What priorities and strategies should be followed in the enforcement of laws on the Forest?	Law enforcement policy.	All alternatives involve protection of Forest resources to ensure public safety and maintain resource values, and all give priority to situations that threaten personal injury.			
13. MINERALS - How should mineral development be provided for while protecting surface resources?	Mineral development.	Mineral development is governed by existing laws and regulations, and plans of operation which specify particular necessary mitigation measures			
	Acres open to locatable and leasable mineral development.	Loc 970,807 Lea 984,006	1,047,082 1,051,525	963,535 970,594	1,040,287 1,051,525

Table 2-19 (continued)

Summary Treatment of Issues and Concerns

Issue	Output, Activity, or Policy	Alternative			
		PRF	CUR	EGP	TGP
14. RANGE - Where, how, and with what range improvements should livestock grazing occur on the Forest?	Livestock grazing				
	(AUM's/yr dec 1)	48,500	49,700	48,500	48,500
	(AUM's/yr dec 5)	48,500	49,700	48,500	48,500
	Transitory Range Grazing	Use of transitory range is increased	Use of transitory range is increased	Use of transitory range is increased	Use of transitory range is increased
15 RECREATION - What types of recreation facilities and opportunities should be provided on the Forest, and in what amounts, proportions, and locations?	Developed recreation	Rehabilitate existing campgrounds and construct new ones to meet expected demand increase.	Continue to meet existing use levels with no new construction or rehabilitation	Rehabilitate existing campgrounds and construct new ones to meet 40% of expected demand increase.	Rehabilitate existing campgrounds and construct new ones to meet expected demand increase.
	Dispersed recreation				
	SPM acres	17,000	0	0	0
	SPNM acres	48,000	0	55,000	0
16 SENSITIVE PLANTS - What Sensitive plants grow on the Forest and how should they be preserved?	Sensitive plant protection	In all alternatives, Sensitive plant habitat is protected by Forest Standards and Guidelines. The PRF Alternative directs that specific Sensitive plant species be inventoried for and protected in identified Management Areas.			

Table 2-19 (continued)

Summary Treatment of Issues and Concerns

Issue	Output, Activity, or Policy	Alternative.			
		PRF	CUR	EGP	TGP
17. SOILS - How should the Forest soil resource be protected and where should it be enhanced?	Soil productivity protection	In all alternatives, Forest Standards and Guidelines require the protection of soil productivity.			
	Soil Resource Inventories (SRI's)	Perform Order 2 SRI on lands with unstable soils before timber sales or other intensive land uses. Field verify Order 3 SRI on other project areas	Minimum verification on Order 3 SRI on regeneration units.	Perform Order 2 SRI on lands with unstable soils before timber sales or other intensive land uses. Field verify Order 3 SRI on other project areas.	Perform Order 2 SRI on lands with unstable soils before timber sales or other intensive land uses. Field verify Order 3 SRI on other project areas.
18 SPECIAL AREAS - Should management of existing special areas on the Forest be changed? Should additional special areas be established for unique resources and, if so, where should they be located and how should they be managed?	Special area management. Recommended Research Natural Areas, Special Interest Areas, National Natural Landmarks.	Research Natural Area, National Natural Landmark, and Special Interest Area management is guided by existing National, Regional, and Forest policy and would not vary by alternative			
		RNAs: 8	2	8	8
		SLA's: 7	0	7	0
		NNL's: 0	0	1	0

Table 2-19 continued)

Summary Treatment of Issues and Concerns

Issue	Output, Activity, or Policy	Alternative.			
		PRF	CUR	EGP	TGP
19 TIMBER- Where and how will the Forest manage its timber and other vegetative resources, while providing for other resource values such as diversity and recreation?	Silvicultural system	The PRF, CUR, and TGP Alternatives apply even-aged management where it is the optimum silvicultural system on areas suitable for full and modified timber management. Limited timber management applies to rocky areas and areas needing special management to protect other resource values			
		Uneven-aged management will be applied on three selected management areas.	Emphasizes even-aged management	Relies on uneven-aged management.	Relies on a mix of even-aged and uneven-aged management.
	Annual average allowable sale quantity (MMBF/year).	96	171	94	118
	Suitable acres.	596,341	744,577	585,881	633,796
20. VEGETATION & DIVERSITY - Where and how should the Forest manage its vegetative resources over time to maintain diversity while providing other resource outputs?	Regenerated acres, decade 1	40,000	79,000	40,000	54,000
		In all alternatives, Forest Standards and Guidelines require a minimum of five percent of each naturally occurring vegetation type within each seral stage.			
	Large sawtimber and old growth acres, decade 5	243,000	162,000	236,000	228,000
	Diversity index, forested vegetation, decade 5.	83	.85	82	.86

Table 2-19 (continued)

Summary Treatment of Issues and Concerns

Issue	output, Activity, or Policy	Alternative.											
		PRF			CUR			EGP			TGP		
21 VISUAL QUALITY - What visual quality objectives should be maintained on trails, state highways, county and Forest roads?	Visual Quality protection	Major highways, select county roads, the Pacific Crest Trail foreground and lakeshores are protected			Major highways protected - no county roads, only PCT foreground protected.			All major highways and county roads protected. Substantial scenic area protection The general forest area would appear mostly natural or partly modified.			Meet inventoried VQO's which protect most major highways and county roads, including 32, 36, 44, 89 and 299.		
22 WATER - How should watersheds on the Forest be managed to protect and enhanced water quality and quantity?	Water quality protection	Forest Standards and Guidelines require compliance with Federal and State Water Quality Standards and require use of Best Management Practices for water quality protection.											
	Riparian protection.	In all alternatives, perennial streams and lakeshores have at least a 100-foot streamside management zone (SMZ) for water quality protection. For specific stream guidelines, refer to Appendix R of the Lassen Forest Plan.											
	Watershed restoration	75 acres watershed restoration per year in decades 1 and 2, and five acres per year thereafter			75 acres watershed restoration per year in decades 1 and 2, and five acres per year thereafter			150 acres watershed improvement per year, decade 1 Five acres per year thereafter			75 acres watershed restoration per year in decades 1 and 2, and five acres per year thereafter.		
23 WILD & SCENIC RIVERS - What river segments should be recommended for inclusion in the Federal Wild and Scenic River System?	Recommended segments (miles)	Mill Deer Antelope			Mill Deer Antelope			Mill Deer Antelope			Mill Deer Antelope		
	Wild	16.5	18.0	14.0	0	0	0	16.5	18.0	14.0	8.0	8.0	0
	Scenic	6.0	4.0	0	0	0	0	6.0	4.0	0	0	0	0
	Recreational	9.5	8.0	0	0	0	0	9.5	8.0	0	0	0	0

Table 2-19 (continued)

Summary Treatment of Issues and Concerns

Issue	Output, Activity, or Policy	Alternative.			
		PRF	CUR	EGP	TGP
24. WILDERNESS & FURTHER PLANNING AREAS - How should the Forest's three existing wilderness areas be managed to maintain their wilderness character; and how should the Forest's six further planning areas be allocated and managed?	Further planning areas recommended for wilderness. Areas Acres	 4 21,584	 0 0	 5 43,086	 0 0
25. WILDLIFE - What type, amount, and diversity of wildlife habitats should be provided through time on the Forest?	Viable populations and diversity Deer numbers (decade 1) California spotted owl pairs (decade 1)	 45,600 40	 49,700 39	 43,600 40	 44,500 40

There are presently **78,060** acres of Wilderness on the Forest. Proposed additions are:

In all alternatives, Forest Standards and Guidelines provide for the continued survival of all vertebrate species by requiring viable population levels and minimum levels of vegetative diversity. All alternatives provide a high level of habitat capability for early seral dependent species. Deer numbers are shown as an indicator of early seral dependent species. Number of managed pairs for avian species are shown below for each alternative. Cavity dependent species have minimum snag requirements in the Forest Standards and Guidelines to ensure their survival in all alternatives. Acres of forested land not managed for full timber management will have more than minimum snag requirements and are a relative measure of the habitat quality for cavity dependent species. Threatened and Endangered species population levels are also shown for each alternative; habitat for the Endangered Shasta crayfish will be protected under each alternative.

Table 2-19 (continued)

Summary Treatment of Issues and Concerns

Issue	Output, Activity, or Policy	Alternative			
		PRF	CUR	EGP	TGP
25 WILDLIFE (continued)	Goshawk management areas (decade 1)	113	113	200	113
	Bald eagle pairs (decade 5)	19	19	19	16
	Northern spotted owl pairs (decade 1)	2	2	2	2
	Peregrine falcon pairs (decade 5)	5	5	5	3
26. SOCIO-ECONOMIC- What are the costs, benefits and socio-economic effects of management of the Forest?	Jobs (decade 1)	1,624	2,296	1,618	1,860
	County 25% receipt shares (million of dollars, decade 1)	5.5	7.8	5.9	6.8

c. *Summary Comparison of Key Environmental Consequences*

Following is a summary of the key environmental consequences that would be expected from implementation of each of the four alternatives considered in detail Chapter 4, Environmental Consequences, is the basis for this summary

(1) **Adverse Environmental Effects That Cannot Be Avoided**

Short-term reductions in air quality would occur due to prescribed burning. Increased public access and clearcutting could result in disturbance and damage to cultural resources. Short-term increases in erosion and sediment yield would occur due to vegetative management activities, including prescribed burning, timber harvesting, road construction, and off-highway vehicle use. There would be a decline in the numbers of late seral dependent wildlife. Vegetative management would also cause a short-term reduction in visual quality.

(2) **Cultural Resources**

Cultural resources would continue to be affected by managing for other resources, and by recreational activities, looting, vandalism, and natural deterioration. Management of cultural resources would provide for the interpretation of their values. Effects to cultural resources and the acquisition of cultural information would vary by alternative. They would be subject to greater risk under those alternatives that provide for improved access and more development of other resources. Alternatives emphasizing the acquisition and interpretation of information on cultural resources would mitigate the effects on them. Adverse effects would be greatest under the CUR and TGP Alternatives. The PRF and EGP Alternatives would best provide for maintenance of cultural resource values.

(3) **Fish**

Resident Fish Resident fishenes would vary to a moderate extent between alternatives. Fishenes production reflects the amount of active habitat improvement accomplished and extent of watershed disturbance. All alternatives except CUR

would provide levels of fisheries production above the 1982 base. Under CUR, fisheries would decline slightly. See Table 2-20.

Anadromous Fish Anadromous fishenes are analyzed in terms of the potential of the habitat to produce fish. Currently, production is considerably below potential due to factors occurring off the Forest, but efforts to enhance the population are underway. Production of anadromous fish is based on the amount of active habitat improvement and the degree of watershed disturbance. The PRF and EGP Alternatives would maintain high levels of fish production over the long term. Initial levels in the CUR and TGP Alternatives would drop off by the fifth decade due to watershed disturbance from management activities. Fishery production potential under CUR and TGP would decline slightly below the 1982 levels.

Table 2-20

Fish Outputs

Thousand Pounds/Year (Decade 5 Potential)	Alternative				
	Base Year 1982	PRF	CUR	EGP	TGP
Resident Fish	48	54	47	54	50
Anadromous Fish (Commercial & Sport)	139	140	127	140	133

(4) **Range**

The 49,700 AUM level would be maintained in the CUR Alternative. The PRF, EGP, and TGP Alternatives all have a slight drop from the 1982 base year, but would meet current demand for rangeland. All alternatives would maintain and/or enhance satisfactory range condition. See Table 2-21.

Table 2-21
Range Outputs

	Base Year 1982	Decade	Alternative			
			PRF	CUR	EGP	TGP
Range (M AUM's/ year)	49 7	1	485	497	485	485
		5	485	497	485	485
Percent of 1982 base		1	98	100	98	98
		5	98	100	98	98

(5) Soils

Changes in soil productivity are generally a result of the changes in acreage in a disturbed condition—with resultant compaction, erosion and loss of nutrients—and the extent of watershed restoration at any given time. Thus, alternatives involving the least disturbance and having the highest restoration program would improve soil productivity the most. The TGP and CUR Alternatives would result in the greatest deterioration in soil productivity. EGP and PRF would have less impact. While some of these alternatives would disturb more soil, they also include mitigation measures such as watershed restoration to counteract the disturbance.

(6) Timber

PRF Alternative The allowable sale quantity of **96** million board feet would be **2** percent higher than EGP and **19** percent lower than TGP. The acres regenerated in decade 1 would be lower than CUR and TGP.

CUR Alternative The allowable sale quantity and the acreage regenerated in decade 1 would be highest among all the alternatives.

TGP Alternative This alternative would have the second highest allowable sale quantity and regeneration acres among all the alternatives.

EGP Alternative The allowable sale quantity of **94** million board feet is slightly below the PRF Alternative. The acres regenerated are the same as PRF in decade 1.

Average annual acres regenerated and allowable sale quantity for decade 1 are shown in Table 2-22 for each of the alternatives.

Table 2-22
Timber Outputs

	Base Year 1982	Alternative			
		PRF	CUR	EGP	TGP
Acres Regenerated 1/	600	4,000	7,900	4,000	5,400
ASQ (MMBF)		96	171	94	118

1/ Includes both artificial and natural regeneration

(7) Visual Resources

The improvement, maintenance, and/or reduction of visual quality as a consequence of management activities all vary by alternative. The CUR Alternative would reduce visual quality the most as only the foreground and middleground views of Highways **32, 36, 44, 89, 299**, and the Eagle Lake backdrop would be maintained. All other areas, except wilderness, would have changes in their visual quality over time.

The TGP Alternative would greatly affect visual resources as visual quality would be retained only in the foreground and middleground views from major highways, paved county roads, and the Eagle Lake backdrop. In most other areas, the natural appealing landscape could be substantially modified. The CUR and TGP Alternatives would have no additional acres protected by semi-primitive prescriptions or by wilderness designation.

Impacts from the PRF Alternative would fall between TGP and EGP. In addition to major highways and paved county roads, other roads, trails, and use areas with high recreation value would have scenic quality maintained in the foreground and middleground. Several areas would be further protected with Special Areas, semi-primitive or wilderness prescriptions. The visual quality in the remaining areas would change.

The EGP Alternative would provide even higher protection and fewer impacts on the visual resource. All areas would meet at least inventory VQO's, and several roads and trails would be upgraded by one visual quality objective. Additional acres would be protected by Special Areas, semi-permitive and wilderness prescriptions. See Table 2-23.

Table 2-23

Visual Quality Objectives (M acres)

	Alternative			
	PRF	CUR	EGP	TGP
Modification	254	394	280	284
Maximum Modification	56	134	0	40
Total	310	528	280	324

(8) Water and Riparian Areas

Water Yield Alternatives have no major differences in their water yields. Both the total amount of water produced, and the amount of water that would be usable for irrigation, would vary by less than one percent among alternatives.

Water Quality The amount of water yield that meets Federal and State standards is the measure of the effects of alternatives on water quality. All alternatives would meet water quality standards.

Land Disturbance The land disturbance index (LDI) as shown in Table 2-24 is the key factor considered in estimating potential water quality effects. Land disturbance levels of alternatives may be compared to the present level, under the assumption that the amount of land disturbance in decade 1 of the CUR Alternative is similar to that which occurred in the 1982 base year. (No disturbance index is available for 1982.) The PRF, EGP and TGP Alternatives show a steady decrease in the LDI.

Riparian and Terrestrial Area Impacts Because of their proximity to streams and lakes, disturbance of riparian and terrestrial areas is a key factor in estimating land disturbance and there-

fore water quality. The effects of each alternative on stream corridors are measured by considering the percent of riparian and terrestrial areas that are affected by timber harvesting and livestock grazing. Alternatives PRF, EGP, and TGP reduce timber harvesting in these areas to minimal levels, equivalent to widely-dispersed individual tree selection cutting. Some more intensive treatments could occur, but only when they are proposed to benefit riparian-dependent resources. The CUR Alternative allows twice the level of harvesting within riparian areas than the other alternatives. All alternatives would cause some soil, water, or vegetation impacts to areas within stream corridors. However, much of the effect would be of relatively low intensity and involve regulated use of the areas by livestock. Acres allocated to the Riparian/Fish Prescription vary between alternatives, because some are protected by the more restrictive Wilderness and Special Areas Prescriptions.

Table 2-24

Land Disturbance Index

Base Year 1982- 44.3 (est.)	Alternative			
	PRF	CUR	EGP	TGP
Decade 1	36.5	44.3	36.6	40.2
Decade 5	34.1	42.1	32.2	37.1
5 Decade Average	35.0	44.4	35.3	39.8

(9) Wilderness And Further Planning Areas

The EGP Alternative would provide 43,086 acres of new wilderness, while PRF would provide 21,584 acres. No changes would occur in the existing wildernesses, with the exception of adding the Trail Lake B further planning area to the Caribou Wilderness in the PRF and EGP Alternatives, and adding the Ishi B further planning area to the Ishi Wilderness in EGP. CUR and TGP do not recommend any new wilderness. A potential loss of wilderness values in the six further planning areas could occur through timber harvests (5.6 MMBF annually), increased access, and energy, recreation, wildlife, and range developments.

(10) Wildlife

Bald Eagle Occupied and potential habitat for bald eagles will be protected in all alternatives to achieve the recovery population of at least 16 pairs. Only minor differences exist between alternatives. The PRF, CUR and EGP Alternatives provide and protect habitat for 19 territories by decade 5. This would increase the probability of population recovery. The TGP Alternative would provide and protect habitat for 16 territories. Although CUR provides 19 territories by decade 5, this alternative has a slightly greater potential for eagle disturbance due to higher timber harvest activity. See Table 2-25.

Peregrine Falcon Occupied and potential habitat will be protected in all alternatives. Presently a considerable amount of high quality habitat is unoccupied because the falcon population has been drastically reduced by the historical use of DDT on non-Forest lands. Efforts to increase populations will occur under all alternatives. Achievement of recovery population levels depends largely on reduction of environmental contaminants throughout the range of the peregrines.

Shasta Crayfish Occupied and potential habitat will be protected in all alternatives. The species only occurs in the Hat Creek and Pit River drainages. Efforts to increase populations or enhance habitat will occur in all alternatives.

Spotted Owl All alternatives will eventually meet network requirements for population viability for the California spotted owl. However, the amount of suitable base habitat in many of the designated 40 Spotted Owl Habitat Areas (SOHA's) is currently below the 1,000 acres per SOHA required by regional direction. Minimum acreages of mature forest habitat is predicted by decade 5 in all alternatives. Alternatives that would manage for more than the basic network are PRF, EGP and TGP.

Timber harvesting is permitted in the SOHA network under CUR. Salvage logging and thinning are permitted under PRF, EGP and TGP when habitat suitability can be maintained.

All alternatives would provide one Habitat Conservation Area (HCA) for the northern spotted owl. Pending additional direction, timber management activities in the HCA will be conducted in a manner not inconsistent with the Interagency Scientific Committee recommendations.

The viability of the spotted owl and other old growth dependent species is of particular concern. Studies and inventories are being conducted to determine existing population levels and habitat needs. As new information becomes available, the current SOHA management strategy for the California spotted owl may change.

Marten and Fisher All alternatives would provide Habitat Management Areas (HMA's) for marten and fisher at the moderate habitat capability level. HMAs for fisher comprise 9,800 acres, marten HMA's are 2,100 acres in size. All alternatives provide 600 foot wide connecting corridors that link larger blocks of habitat together. Only the CUR Alternative schedules timber management activities in HMAs where they fall within the suitable landbase. Studies and inventories on both of these species will be conducted to determine existing population levels and preferred habitat conditions.

Goshawk All alternatives will provide a network of 113 territories throughout the Forest to meet management requirements for population viability. The EGP Alternative would provide habitat for about 200 pairs. Goshawks would occur in higher than minimum management population densities in wilderness and semi-primitive non-motorized areas.

Deer All alternatives will provide habitat for a substantial number of deer. The California Department of Fish and Game (CDFG) goal for deer numbers, based on Deer Herd Plans for herds occurring on the Forest, calls for an 11 percent increase in deer numbers from the 1982 base year population of 49,000 to 54,800. Habitat capability in the summer range on Forest lands will vary, according to the deer capability model, from 47,200 in the PRF Alternative to 52,600 deer in the CUR Alternative by decade 5. None of the alternatives were able to equal the CDFG goal of 54,800 deer when the deer habitat capability model was used.

**Table 2-25
Wildlife Populations**

	<u>Base Year</u> <u>1982</u>	<u>Decade</u>	Alternatives			
			<u>PRF</u>	<u>CUR</u>	<u>EGP</u>	<u>TGP</u>
Bald Eagle (pairs)	14	1	16	16	16	16
		5	19	19	19	16
Northern Spotted Owl HCA	Unmanaged	1	1	1	1	1
		5	1	1	1	1
Peregrinne Falcon (pairs)	1	1	3	3	3	3
		5	5	5	5	3
Spotted Owl Habitat Areas	Unmanaged	1	40	39	40	40
		5	40	39	40	40
Goshawk Management Areas	Unmanaged	1	113	113	200	113
		5	113	113	200	113
Deer (thousand)	49 0	1	456	497	436	445
		5	472	526	494	490
NOTE Decade 5 outputs are projected outputs shown to disclose long-term effects of the alternatives						

Affected Environment

3



View of Pine Valley

CHAPTER 3 -AFFECTED ENVIRONMENT

A. INTRODUCTION

This chapter describes the environment that would be modified by the Preferred alternative or the other alternatives. The chapter is divided into four sections: Description of the Forest, Economic Environment, Social Environment, and the Resource Environment. The Resource Environment describes the supply and demand, the management, and the management opportunities, of each resource. The resources appear in alphabetical order here and in Chapter 4.

The Affected Environment gives the background for understanding the Forest's development of the alternatives (Chapter 2) and for the assessment of environmental consequences (Chapter 4). Unless otherwise noted, the descriptions below refer to the geographical area of the Lassen National Forest itself, not the region or State.

B. DESCRIPTION OF THE FOREST

The Lassen National Forest consists of approximately 1.1 million acres of forest and range lands in northeastern California (see Figure 3-1). Three different geomorphic provinces meet within the Forest and contribute to its great diversity—the Sierra Nevada Mountains, the Southern Cascade Mountains, and the Modoc Plateau. Elevations range from 900 feet to 8,677 feet. Topography varies from deep river canyons to vast sagebrush flats and to sharp rocky peaks. Annual precipitation ranges from 16 inches to 90 inches. Summers are hot and dry, while winters are cool and wet with rain in the foothills and snow at the higher elevations.

The Forest completely surrounds Lassen Volcanic National Park, where the 10,457-foot Lassen Peak last erupted in 1914-1921. Like the National Park, most of the land of the National Forest was formed by volcanic activity. The center and western portions of the Forest are in the Southern Cascade Mountain province and

show the full spectrum of volcanic features—volcanoes, cinder cones, craters, ash and mud-flow layers, and recent lava flows of basalt and andesite. The northeastern edge of the Forest is in the Modoc Plateau province, a flat to undulating highland capped by recent lava flows and shield volcanoes. The southern edge of the Forest lies in the Sierra Nevada province. In contrast to the volcanic provinces, the Sierra Nevada is primarily composed of granitic and metamorphic rock and has much steeper terrain.

Lakes and streams on the Forest are equally diverse. Eagle Lake, the second largest natural lake entirely within California, is a closed basin that lies at the junction of the three provinces. Lake Almanor is a large reservoir in the well-watered Feather River watershed. Lands east of the Cascade summit are relatively dry and drain eastward through two main streams, Pine Creek (to Eagle Lake) and the Susan River (to Honey Lake). Neither lake has an outlet. The dry lands of the Modoc Plateau to the north drain westward through the Pit River, a tributary of the Sacramento River. The west side of the Forest is much wetter and has many streams which flow to the Sacramento River. These include Battle Creek, Antelope Creek, Mill Creek, Deer Creek, Bailey Creek, Digger Creek, and the North Fork of the Feather River.

The vegetation of the Forest is determined by geology, soils, elevation, climate, slope, aspect, and fire occurrence. The six major categories of vegetation are conifer forest, hardwood forest, chaparral, sagebrush shrub, herbaceous (annual grassland), and riparian. Each is described later in this chapter under the Vegetation and Diversity section. A cross section sketch of Forest vegetation types is shown in Figure 3-2.

Administratively, the Forest is divided into three Ranger Districts: Almanor, Eagle Lake, and Hat Creek, with offices in Chester, Susanville, and Fall River Mills, respectively. The District Rangers report to the Forest Supervisor in Susanville, who is responsible for activities on the entire Forest.

Figure 3-1
Lassen National Forest

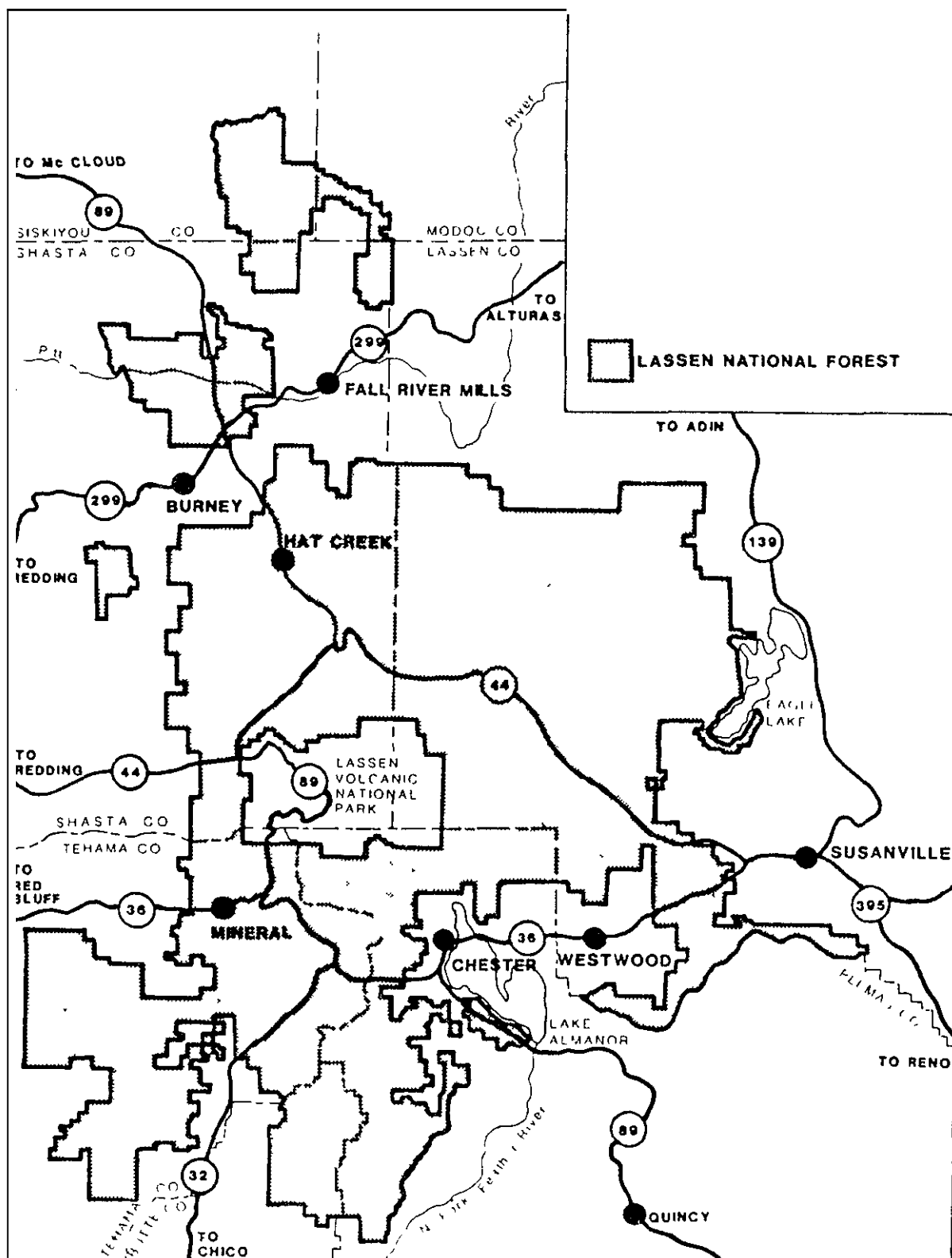
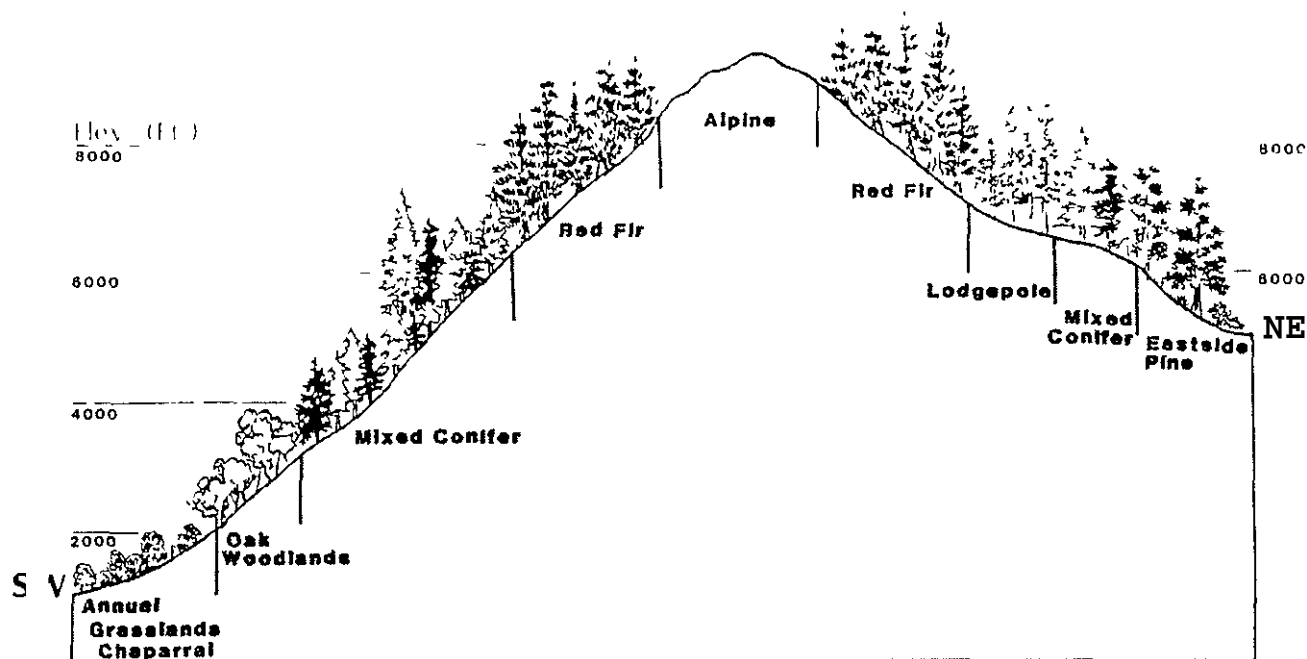


Figure 3-2

Cross-section of the Forest Showing Elevation and Vegetative Types



The Forest also includes the Blacks Mountain and Swain Mountain Experimental Forests. These are administered by the Director of the Pacific Southwest Range and Forest Experiment Station in Berkeley, California.

C. ECONOMIC ENVIRONMENT

1. Introduction

The Forest's primary zone of influence extends to five northeastern California counties: Butte, Lassen, Plumas, Shasta, and Tehama. These counties comprise the economic impact area for the Forest, see Figure 3-3. Small portions of the Forest are also within Modoc and Siskiyou Counties, but the Forest's economic effects on them are slight. The Forest's extended zone of influence includes the San Francisco, Sacramento,

and Vallejo/Napa areas of California, and the Reno/Sparks area of Nevada. The five impact counties are significantly affected by Forest Service employment and timber, range, wildlife, and recreation activities. The extended zone of influence is most affected by the demand for goods and services connected with recreation activities.

2. Population

The current population of the impact area is approximately 428,200. It has grown substantially in the past two decades (see Figure 3-4.) The 1989 population increased 75 percent over the 1970 population. The annual growth rate from 1970 to 1989 was 3.7 percent. The major source of this growth was immigration.

Butte County accounted for 43 percent of the area's population in 1982. Shasta County has

been the fastest growing county, between 1970 and 1989 it grew by 84.3 percent, at an average annual growth rate of 4.2 percent.

Plumas County, the least populated county, accounted for five percent of the impact area's population in 1982. Between 1970 and 1989 it grew by 71.3 percent, at an average annual growth rate of 3.6 percent.

The population of the impact area is expected to continue to grow at a greater rate than that of the State. Between 1990 and 2000, the area's population is projected to increase by 20.1 percent, at an average annual growth rate of 2 percent. Three-quarters of this growth is expected to be from in-migration. During the same period the State's population is projected to increase by 14.2 percent, at an average annual growth rate of 1.4 percent.

3. Employment

In 1982, employment in the impact area was dominated by the following sectors of the economy: government (26 percent of the workforce), services (20 percent), retail trade (20 percent), and manufacturing (11 percent). These account for 77 percent of total employment. The relative importance of different sectors has changed between 1975 and 1989. Those sectors showing a relative increase in importance include retail trade; finance, insurance, and real estate, services; and construction and mining. Those sectors showing a decrease in relative importance include agriculture, forestry, and fisheries; manufacturing, transportation, communication, and public utilities, and government. These trends reflect the impact area's lessening dependence on Forest-related industries for employment.

Figure 3-3
Impact Counties

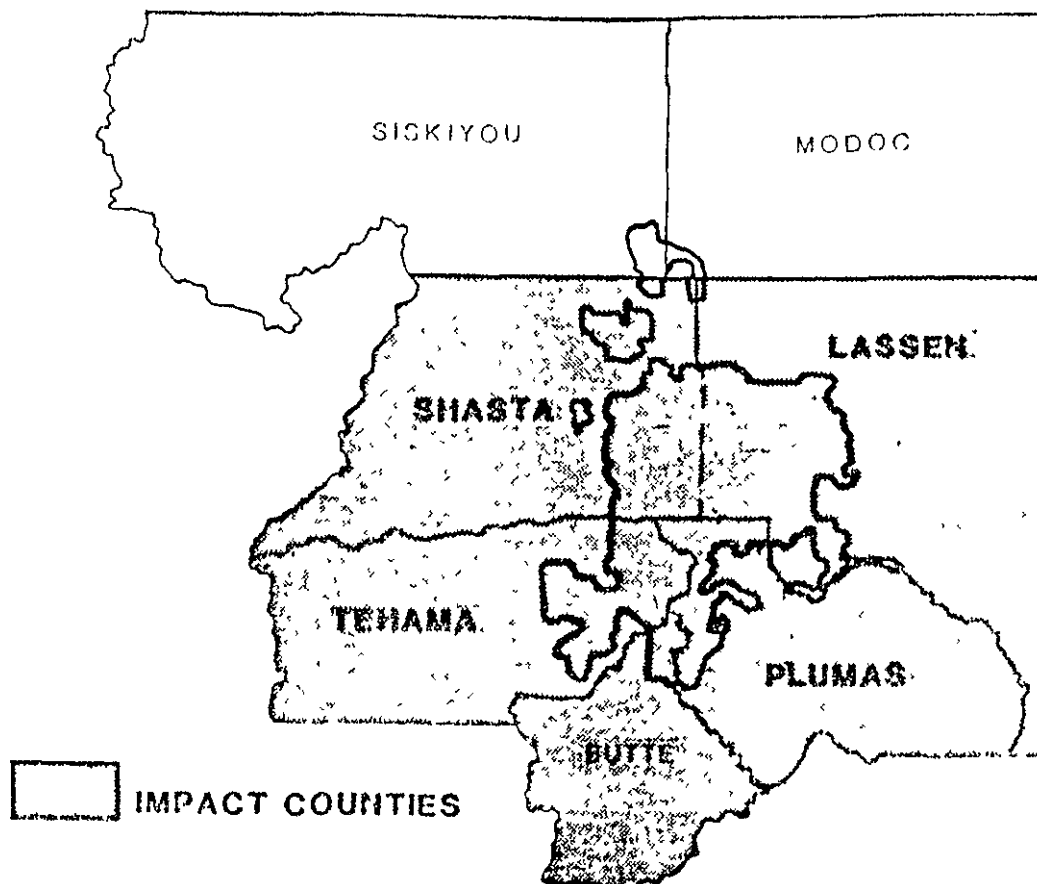
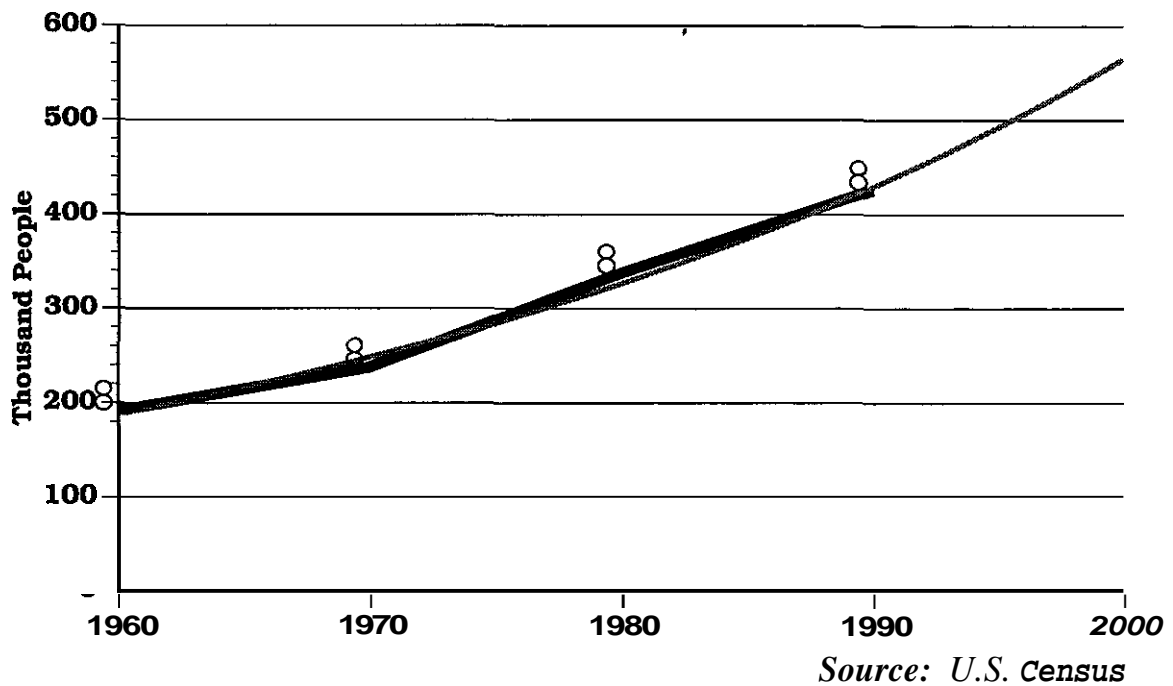


Figure 3-4

**Impact Counties' Population, 1960-1990
(Exponential Projection to 2000)**



4. Unemployment

As shown in Figure 3-5, unemployment relative to State and national averages has been high in the impact counties. Despite a 32 percent increase in job opportunities between 1975 and 1982, so many new residents have been moving into the area that the local economies have been unable to absorb all of the new job seekers. The more chronic source of high unemployment has been the impact counties' reliance on resource based industries. Timber harvesting, timber processing, and recreation/tourism are subject to seasonal fluctuations in employment, driving up the overall unemployment rate.

5. Income

Reduced employment has resulted in reduced income within each sector as well as overall. In 1982, per capita income, a measure of the purchasing power of the average resident, was only \$9,800 in the impact area, about 25 percent

below the State average. This was due in part to the seasonal nature of much of the employment.

6. Local Economic Impacts

The Forest contributes to the local economy in a number of ways: by providing water for recreation, agriculture, and hydroelectric production; by growing timber for lumber and other wood products, by furnishing range for livestock production; by providing recreation opportunities, and through the influx of the annual operating budget. In 1982, the Forest had approximately 350 full time equivalent jobs and employed about 300 permanent employees. The difference between the number of full time equivalent jobs and the number of people employed is due to the large number of seasonal jobs. In 1990, the Forest employed 234 permanent employees and 193 seasonals for a total of 427 people. The Forest's annual budget in 1982 was \$12.3 million. Except for inflationary adjustments, this budget level was relatively constant during the

years prior to 1982. About 45 percent of the budget represented disposable income (income **left** after taxes, insurance, and other deductions) from employee salaries

Present net value (PNV) *is* the sum of discounted benefits less discounted costs. The largest contributor to the Forest's PNV is water, which accounts for 50 percent. The next largest contributor is timber, which accounts for 25 percent of the PNV. Recreation and wildlife account for about 20 percent of the PNV, **with** the remainder coming from firewood, domestic livestock grazing, and special uses such as utility corridors and radio sites. During much of the last decade, the values of hydroelectric energy and agricultural products, from which water derives much of its value, have increased. The value of timber increased dramatically in the late seventies, then dropped in the early eighties. It increased again, **but** during the latter part of the eighties, the value leveled off and later declined.

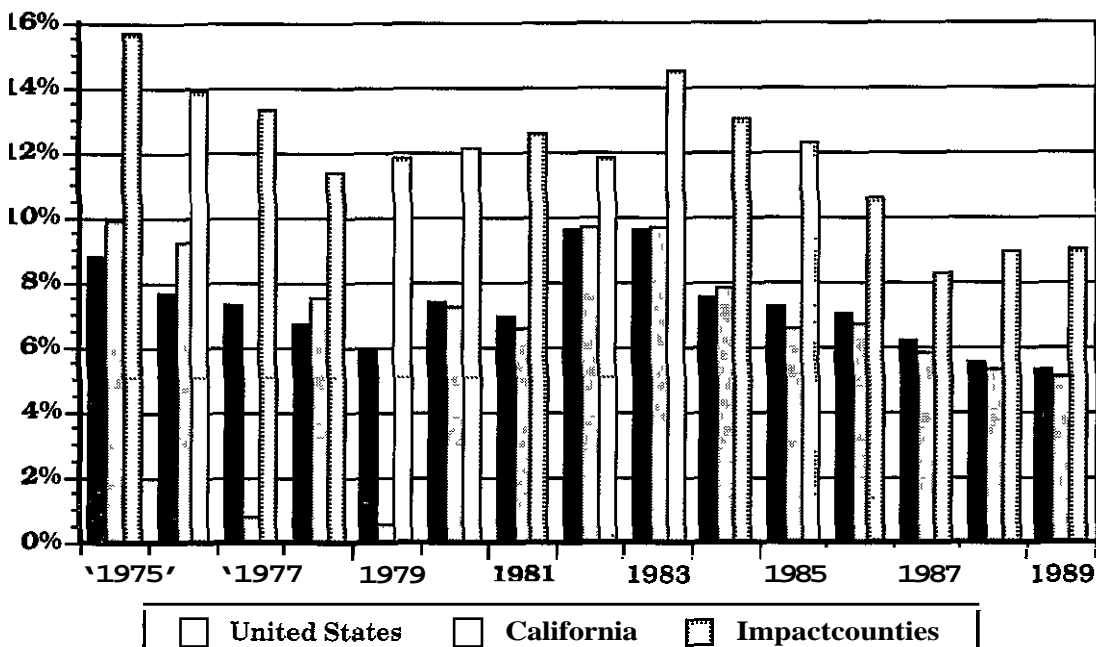
7. Impact County Finances

The Forest contributes to the impact counties' finances primarily through the Forest Reserve Fund (FRF) payments. The Forest generates revenue from the sale of timber, lease of range-land for livestock, use of developed campgrounds, sale and leasing of minerals, and levy of miscellaneous special use permit fees. Nearly all the Forest's gross receipts come from selling timber (98 percent in 1990). The next highest source of revenue *is* recreation fees (one percent in 1990).

By law, 25 percent of each National Forest's gross receipts, including the value of roads built by timber purchasers, is returned each year to the counties in which the National Forest lies. The funds are divided among the counties in proportion to the acres of National Forest within each county. Federal law requires that the monies be used for county schools and roads. California law requires that 50 percent go to

Figure 3-5

Unemployment Rates: U.S., California, Impact Counties



Source: U.S. Census

each. Because the payments are made when the timber is harvested and not when it is sold, Forest Reserve Fund payments tend to fluctuate with the level of timber harvest activity. In recent years total payments from the Forest to the impact counties have ranged from \$3 million to over \$9 million (see Figure 3-6). Forest Reserve Fund payments from the Lassen are usually higher than those payments from any other National Forest in California.

D. SOCIAL ENVIRONMENT

1. Community Organization and Lifestyle

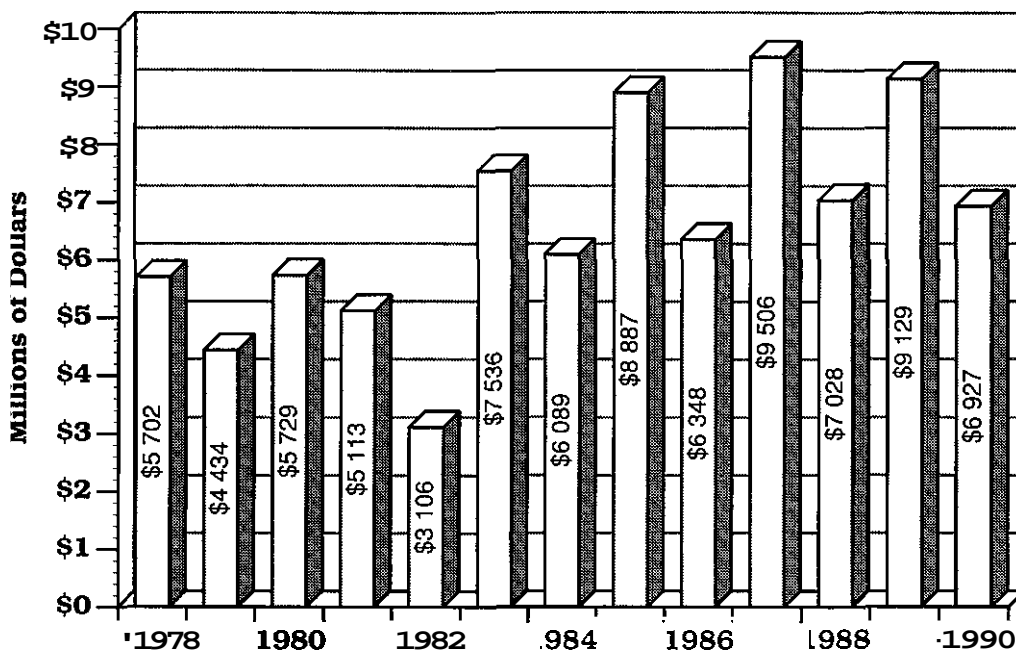
Forest management most directly affects people living in the vicinity of the Forest. All communities in the area are dispersed populations serviced by small towns. These communities (and towns) include Hat Creek (Burney), Honey Lake Valley (Susanville), Lake Almanor (Chester, Westwood), Indian Valley (Greenville), Crescent

Mills on the western slopes (Mineral, Shingletown, Manton), Big Valley (Bieber, Nubieber), and Fall River Valley (McArthur, Fall River Mills).

The major economic activity in the area is mill timber production and service to it. Many people have experienced a "boom-and-bust" because of the boom and bust in the timber industry. The development of hydroelectric power in the area, the development of Lake Britton and Lake Almanor, the development of the Western Pacific Railroad and gold mining in the area, and the logging and milling by the Red River, and other lumber companies. These communities have had to deal with the seasonal influx of a transient, unskilled labor force. The expansion of county, State, and Federal governments in the last 50 years has been a stabilizing force in these communities.

Most social groups in the area prefer similar to the traditional rural living, low population densities, small cohesive communities, personalized interactions, low crime rates, and the healthful, natural environment.

Figure 3-6
Forest Reserve Fund Payments to Impact Counties



Source: Forest Record and Receipts

groups also share concern for economic problems—low per capita income, increased population growth, and high unemployment. All groups utilize the Forest for firewood and recreation, and desire that such uses continue unhindered. However, differences exist among the groups within these rural communities in the form of diverse values, beliefs, and attitudes. These differences are often expressed over issues of public land management.

2. Social Groups

Several social groups can be distinguished: ranchers, timber industry workers, government workers and urban emigrants. These are not mutually-exclusive groups, but are characterizations of broad social patterns. Members of each group tend to share common values, beliefs, and attitudes. The groups were identified based on a social-economic overview of the Forest, and current public uses and concerns.

Ranchers

Most ranchers are descendants of the earliest emigrant homesteaders and are very proud of their pioneer ancestry. Initial settlement of the area was tied to agriculture, especially dairy, beef, and sheep ranching. Consequently, ranchers dominated all aspects of the local economy and social organization.

Ranchers' social values derive from traditional agricultural orientation to the land and include individualism, hard work, strong sense of family, neighborliness, social familiarity, and a preference for dispersed population, open spaces, clean air and water, freedom of movement, and unlimited natural resources.

Many ranchers perceive the Forest as a natural extension of the ranch, historically relying on it for essential resources: summer pasture lands, wood products for ranch construction and local energy needs, water for irrigation and power, and wildlife and fisheries for food. Technological developments have greatly reduced ranchers' dependence on the Forest for energy, pasture, and wood products. Nonetheless, ties to Forest lands are still strong.

Ranchers form the political and social center of many of the local communities, as in the Fall

River Valley. But in other areas, such as the Honey Lake Valley or the Lake Almanor Basin, the local communities have been substantially changed by the influx of urban migrants, sale of agricultural lands, and residential, commercial, and recreational land developments. The rancher leadership structure has been replaced by a network of contending special interest groups: land developers, environmentalists, loggers, recreationists, economic expansionists, and "slow-growthers." Traditional ranchers, resenting many of these changes, wish to preserve their rural lifestyle and retain local control over public land management and the supply of both commodity and amenity resources.

Timber Industry Workers

Although the initial settlement of the area was based on agriculture, the lumber industry rapidly came to dominate the local economy after 1900. Prior to this time, terrain constraints and haul costs to distant markets restricted the use of timber resources on the Forest. But after the turn of the century, steam-powered donkeys, tractors, mill saws, and railroad logging techniques ended the earlier dependence on manual labor and horse and oxen power. Mill towns (Westwood, Shingletown, Susanville, and Burney) developed along the major transportation routes throughout the Forest. The lumber industry grew and dominated the local economies throughout the first half of the twentieth century. Although the industry's local economic significance is much reduced today, fluctuations in the national lumber market still have significant effect on local employment and personal income.

Timber industry workers are a traditional social group with various constituents, including loggers, mill workers, managers, and small business operators. They are allied in a common concern for the economic values of Forest timber resources. Lumber market depression, mill-closure area proposals, and other timberland withdrawals are perceived as threats. When the market slackens, unskilled workers are often unable to find employment in the other sectors, the influx of urban emigrants has also increased competition for employment in this industry. Recently, the increased competition in a declining lumber market has threatened the survival of the small logging operators.

Timber industry workers perceive Forest land management as strongly affecting their economic well-being and lifestyle. They therefore favor high timber harvests and developments that enhance the commodity values of Forest resources. Secondly, they value local recreational opportunities, especially hunting and fishing.

Government Workers

Although formerly a traditional social group, government workers are today a group with rather fluid membership. In the early 1900's, local, State, and Federal agencies had small, dispersed administrative centers. Government workers were few; they regularly interacted with other members of the local community, and relations were very personalized. However, by 1990 the government sector had become the second largest employer in the area, accounting for 18 percent (Shasta) to 49 percent (Lassen) of the total employment. As government agencies expanded in size and complexity, formalized procedures largely replaced personalized interactions. At the same time, government workers were drawn from increasingly varied backgrounds. Today they come from all sectors of the local communities, including traditional long-term residents as well as people from urban areas.

In general, government workers have a common interest in public policy, place a high value on the amenity resources of the Forest, but also tend to favor economic development. Often politically and socially active in the community, they are concerned with diversification of the local economies, expansion of the services and trade sectors, and protection of the natural environment. Most do not perceive orderly economic development as a threat to the rural lifestyle.

Urban Emigrants

The traditional social structure of the local communities has been greatly modified by the influx of urban emigrants within the last 20 years. Urban migrants are a diverse group. They include retirees, second-home owners, professionals, small businessmen, and craftsmen who moved to the area to escape the stress, congestion, smog, and crime of the densely-populated urban areas. All are drawn to the rural area because of the relaxed lifestyle, healthful envi-

ronment, recreational opportunities, and lower costs of living.

Retirees and second-home owners do not depend on local employment and tend to favor protection of the amenity resources of the Forest. Most are concerned with limiting further population growth and maintaining the rural environment. Recreational expansion is a primary desire of this group, both to increase opportunity and to stimulate the tourist industry.

Although most urban emigrants are generally indifferent to the commodity aspects of Forest land management, (except when threats to the essential quality of the rural environment are perceived, such as herbicide use), a few bring with them strong concerns for preservation of the local environment. They are politically active within the local communities and some maintain links with urban-based conservation organizations. They are often quite vocal in environmental issues. As a group, they can be expected to demand more participation in Forest management policy decisions.

3. Minorities / Ethnic Groups

The population of the impact counties is predominantly white, see Table 3-1. The 1990 minority population ranged from 8.8 percent (Plumas County) to 20.6 percent (Lassen County). The Black population is about 1.3 percent in the five impact counties. Persons of Hispanic origin are the largest ethnic minority, ranging from 3.8 percent in Shasta County to 10.4 percent in Lassen County. Native Americans constitute the largest racial minority.

Most minority employment is in the resource industries. Minorities are most often employed, outside of government, as loggers, lumber mill workers, fire fighters, or farm and ranch laborers. Jobs are seasonal and sensitive to economic fluctuation in the resource industries.

All minorities use the Forest for recreation, especially hunting and fishing, but these activities are especially important to Native Americans. All ethnic and racial groups depend on the Forest for firewood. Many households use wood as their sole source for winter home heating.

Table 3-1**Racial and Ethnic Minority Population, 1990 Census**

County	Population	Race					Ethnic
		White	Black	Am Indian Eskimo Aleut	Asian & Pacific Islander	Other	Hispanic
Butte	182,120	158,242	2,238	2,946	4,961	127	13,606
Lassen	27,598	21,920	1,699	790	293	13	2,883
Plumas	19,739	17,996	151	561	112	12	907
Shasta	147,036	134,001	1,045	3,646	2,610	82	5,652
Tehama	49,625	43,049	246	849	325	32	5,124
Impact Area	426,118	375,208 88 1%	5,379 1.3%	8,792 2 1%	8,301 19%	266 0%	28,172 6 6%

Source California State Census Data Center 1991

Native Americans

Local Native Americans are descendants of several indigenous hunting and gathering groups: Paiute, Maidu, Achumawi, Atsugewi, and Yana Indians. Although Native Americans have lived in the local communities and towns since early historic times, they have retained a distinct set of attitudes and values derived from their unique cultural heritage. Traditionally they have depended upon the lumber and agricultural industries for seasonal employment.

Some Native Americans have strong ties to Forest lands and express concerns about land management policies. A few Native Americans gather traditional food plants, medicinal plants, ceremonial materials, and basketry materials from the Forest. Certain localities on the Forest are used for the practice of Native American religion. Native Americans increasingly press for the preservation of their cultural heritage and the protection of traditional religious sites. In 1976, Federal and State responsibilities for the preservation of Native American religious culture were formalized by enactment of the American Indian Religious Freedom Act (PL 95-341) and establishment of the Native American Heritage Commission in California. However, threats to preserving their cultural heritage from land distur-

bances, such as timber harvesting and energy development, continue to be public issues in land management decisions. Regular interaction exists between Native Americans and Forest administrators about land management decisions.

E. RESOURCE ENVIRONMENT

1. AIR QUALITY

a. Introduction

Clean air is a resource that many people associate with National Forests. While air quality on the Forest is normally high throughout the year, some activities can reduce it temporarily on a localized basis. Smoke, dust, engine emissions, and other materials can all affect the quality of the air, visibility, scenic quality, and human health.

b. Sources

Wildfires and forest activities such as prescribed fire and timber harvesting release pollutants

into the air. To a lesser and more localized extent, mining, motorized recreation, and Forest administration traffic also generate air pollutants. Prescribed fires aimed at improving wildlife habitat or reducing fuels generate large amounts of smoke, and wildfires generate even more. Timber management results in dust and smoke from road building, maintenance, log skidding and hauling, and slash burning. Mining, such as the removal of diatomaceous earth, can create open pits and clouds of fine dust. Cattle movements can create clouds of dust, as can motorized recreation and general Forest administration.

Activities outside the Forest also generate air pollution that may affect Forest management. Firewood burning is the main source outside the Forest that affects air quality. Lumber mills, agricultural burning and automobiles occasionally affect air quality also. If the combined pollution from these and Forest management activities threatens to exceed air quality standards, Forest activities might have to be limited or postponed.

c. Direction

Air quality in the Forest must comply with the Clean Air Act of 1963, as amended in 1970, 1977, and 1990. The 1970 amendment established National Ambient Air Quality Standards (NAAQS). The Forest meets and exceeds them and so is considered an "attainment" area, meaning the area has attained the standards set for it. The 1977 amendment established allowable degradation increments to prevent significant deterioration of air quality in attainment areas. Under this program, Caribou Wilderness, Thousand Lakes Wilderness, and Lassen Volcanic National Park are designated as Class I areas, allowing very little degradation, while Ishi Wilderness and the rest of the Forest are considered Class II areas, allowing some reduction in air quality. The 1990 amendment established that any new areas added to existing Class I wilderness would also be managed as Class I air sheds.

The Clean Air Act is administered through the State Air Resources Control Board under a State Implementation Plan (SIP). The State in turn has delegated implementation and monitoring to the counties. The Forest must comply with the SIP and with the regulations of the air quality

management districts (AQMD) in Butte, Lassen, Modoc, Plumas, Shasta, Tehama, and Siskiyou Counties.

d. Forest Compliance

To comply with the NAAQS, the Forest adopts mitigations for projects that create particulate matter. For a prescribed fire, the Forest prepares a prescribed burn plan that considers smoke-sensitive areas, atmospheric conditions, and best available technology and complies with State and county AQMD guidelines. Prescribed burning is timed so that the smoke and pollution from other sources do not cause air quality standards to be exceeded. The Forest then monitors pollutant concentrations for compliance.

If a natural fire starts within a Class I (Wilderness) area having an approved fire management plan, and atmospheric conditions meet the Plan's requirements, it is usually allowed to burn under surveillance. However, the Forest will suppress a naturally-caused fire if atmospheric conditions are unfavorable.

e. Trends

Prescribed burning is expected to increase slightly in the future, with an accompanying increase in smoke emissions. The Forest will time emissions to limit air quality degradation. The continued use of prescribed burning will reduce the threat of massive smoke pollution from wildfires.

For a variety of reasons, new sources of air pollution are expected to develop in the planning period. More use of wood stoves and fireplaces is increasing smoke levels in communities adjacent to the Forest. Wood stoves are the primary source of pollution in the area. More vehicles would increase carbon monoxide levels and particulates. New smoke pollutants would result from wood-fired power plants such as those in Burney and Westwood. New truck traffic carrying biomass would increase dust levels along roads. Added diatomite dust would result from expanded diatomaceous earth mining around Lake Butte. Noxious gases, including sulphur dioxide, would be released during geothermal energy production.

When the State or a county receives an application for these or other major fixed-source, air-

polluting projects that may affect a Class I area (i.e., Caribou or Thousand Lakes Wildernesses), the State seeks input from the Forest. The Forest will evaluate whether the expected pollutants would exceed the level of acceptable change in the Air Quality Related Values in the affected area, and send its evaluation to the State.

An Air Quality Related Value (AQRV) is a resource or feature that is dependent on air quality and that is determined to be of inherent significance to the Class I or Class II area. Examples are an endangered species in a wilderness, a long scenic vista; water quality in a backcountry recreation area, or a sensitive vegetation type in a natural area. Contingent on adequate funding, the Forest will establish Air Quality Related Values (AQRV's) for Class I and II areas during the first decade of the Plan.

2. BIOMASS

a. Introduction

In this planning process, the term "biomass" refers to the entire above-ground portion of trees. This should not be confused with the scientific use of the term, which refers to the total volume or quantity of living organisms in a biological system.

Biomass plays a role in the Forest's ecology and also provides a source of energy. Its ecological functions include recycling nutrients to the soil, increasing the soil's moisture-holding capacity, and providing habitat for plants and animals. As a source of energy, the main uses for biomass are as firewood to heat homes (see the Firewood section of this chapter) and as fuel for producing electricity in wood-fired power plants.

Biomass is distributed throughout the Forest, but its availability for use is limited by factors such as slope, distance from roads, type and density of stands, competing demands, and other factors.

Efficient fire prevention and suppression practices have prevented fires from removing dead material on the forest floor, resulting in an increase in biomass. In addition, unusable material (cull logs, branches, and tops) has been left on many sites after timber harvesting. Slash left

from precommercial thinning (when young timber stands are thinned to maintain or improve growth of remaining trees) has also contributed to the increase. As a result of the fuel buildup, wildfires can become very hot and destructive. These aspects are discussed in the Fire and Fuels section of this chapter.

Recently the Forest has expanded slash treatment requirements to reduce fuel buildups. Some timber sale contracts have biomass removal objectives designed into them. In addition, increased slash treatment is required in contracts for timber sales and precommercial thinning and many thinning contracts require slash removal. Increased removal and utilization of cull logs and thinning slash has also reduced biomass buildup.

Several benefits result from the removal and use of excess biomass. Destructive wildfires are reduced, new employment is provided, and wildlife browse and range opportunities are increased. On the other hand, if practiced extensively, these uses can reduce the amount of biomass available for firewood. It is the Forest Service's national policy to give priority to personal use firewood.

b. Supply

The amount of biomass available for generation of electricity can be increased without reducing the amount available for firewood, due to a continuous supply of wood debris from timber sales and from thinnings. In 1981, a feasibility study was completed using a procurement zone of 15 million acres.

The results of this study, which included the Forest, indicated that over the next 40 years, available wood fiber supplies would range from one to five million oven dry tons per year. This estimate included (1) dead and down material, (2) residue from logging operations, (3) use of non-commercial species such as juniper for whole-tree chipping, and (4) use of brush such as greenleaf manzanita and chaparral species.

c. Demand

Currently, less than one-half of the available biomass on the Lassen National Forest is being used to generate electricity. Eleven wood-fired

power plants (six of them at lumber mills) now operate within or adjacent to the Forest. For the most part, the plants associated with the lumber mills rely on mill residue. The balance of the plants buy forest residue material to supply their needs. Projections are that approximately ten percent of the demand will be provided for by the Forest. See Table 3-2.

Little is known about minimum biological biomass requirements for soil, plant, and animal purposes. Good data is needed to help balance biomass utilization with on-site biological needs.

d. Data Reliability

The biomass yields are based on tree weight tables which have a variation of about ± 25 percent.

Table 3-2

Local Biomass Facilities (Thousand Oven-Dried Tons Per Year)

Location	Company	Total Needs
Susanville	Sierra Pacific Industries	50
Susanville	Susanville Forest Products	30
Chester	Collins Pine	30
Bieber	Big Valley Lumber	EO
Bumey	Bumey Forest Products	80
Bumey	Bumey Mountain Power	100
Bumey	Sierra Pacific Industries	30
Westwood	Mt. Lassen Power	100
Anderson	Wheelabrator Shasta Energy	400
Oronille	Pacific Oroville Power, Inc.	120
Wendell	Honey Lake Power	220

Source: Forest Data

3. CULTURAL RESOURCES

a. Introduction

Cultural resources are locations where prehistoric or historic activities have taken place. They include: areas used for the gathering or processing of resources, travel, trade, or communication routes; permanent occupation sites; seasonal camps; and areas used for expressing religious or ideological beliefs. These resources reflect human occupation and use of the area over the past several thousand years, as described in the Forest cultural resource overview (in the Planning Records).

Cultural resources provide information on the Forest's unique prehistoric and historic ethnic heritage, including evidence of a number of Native American groups (Achumawi, Atsugewi, Northeastern Maidu, Yana, and Paiute) and their predecessors. In addition to providing archeological evidence of past ways of life and adaptation to the environment, cultural resources also lend a historic perspective on today's technological and sociological change.

Prehistoric site types on the Forest range from winter village complexes to scattered hunting stations, tool manufacturing sites, and plant food processing areas. They also include petroglyphs, pictographs, bedrock mortars, rock shelters, and obsidian and basalt quarries. Of particular significance are the numerous sites relating to the famous Ishi, the last of the Yahi Indians.

The Forest is situated at a contact zone between several very distinct prehistoric populations: the nomadic foragers of the Great Basin, the dense village settlements in the Central California Valley, and a variety of cultures from the Columbia Plateau. A number of important historic transportation routes cross the Forest, including the Lassen and the Nobles Emigrant trails.

Of the historic sites on the Forest, the most common are homesteaders' cabins and ranchers' line shacks, logging railroads, camps, and flumes; and emigrant trails and wagon roads. Historic

ethnic groups — Native American, Basque, Swiss, Black, Chinese — made significant contributions to the local ranching, dairy, logging, and mining industries. Ethnic sites include Native American religious and resource gathering sites, Basque aspen carvings, and Chinese mining camps and gold diggings. The Civilian Conservation Corps has left its unique legacy on the Forest in the form of roads and trails, fire lookouts, administration sites, recreation facilities, and wildlife and fishery conservation projects. An intense period of Indian-white hostilities is also represented by massacre sites at Black Rock, Papoose Meadows, and Government Lake.

Cultural properties are identified in conjunction with other Forest resource management projects. When a Forest resource project, such as a timber sale, is proposed, the Forest reviews cultural resources within the project's area of impact. Cultural resources in the area are identified through archaeological inventories and reviews of historic documents. The Forest can then provide for the protection of any cultural resources identified.

When culturally important properties are identified, the Forest consults on their treatment with the State Historic Preservation Officer and the Advisory Council on Historic Preservation on their treatment. Treatment options include protection, preservation, documentation, restoration, or data recovery. If necessary, resource management projects are modified to preserve the cultural resource values, or to mitigate effects on them.

b. Cultural Properties

As of 1990, about 48 percent of the Forest lands had been inventoried for cultural resources, and 1,788 properties were identified. Of these, 60 sites have been evaluated for their eligibility to the National Register of Historic Places. One Archaeological District (Lake Benton) is currently on the Register. An estimated 3,000 cultural properties on Forest lands have not yet been identified. Table 3-3 summarizes by category the Forest's cultural resources.

Table 3-3
Cultural Resource Summary (1990)

	Number of Properties
National Register District (Lake Benton)	1
National Register Properties Determined Eligible	60
Properties Identified	1,788
Estimated Unidentified Properties	3,000
Acres Inventoried	541,000
Acres Not Inventoried	588,500

Source: Forest Cultural Resource Inventory Data

c. Public Interest

Cultural resources are of interest to the general public, local historical societies, the scientific community, and Native Americans. The story of Ishi has intrigued the general public, as do stories of nineteenth century emigrants. Local historians study the emigrant trails, early settlements, and railroad logging history of the area. Archaeological research has focused on the prehistoric occupations of Eagle Lake, Mill Creek, the Pit River, and the meadow that is now Lake Almanor. Ethnographers and linguists concern themselves with the culture and language of the Native Americans in the area. Local Native Americans show a strong interest in maintaining their unique cultural heritage, and in preserving traditional sites on the Forest.

The interest in and use of cultural resources on the Forest is expected to increase. Archaeological interest is expected to focus on the reconstruction of past ways of life, studies of ancient environments, and large-scale population interactions. Ethnographic and linguistic studies will continue, and local historical societies are expected to become more actively interested in the preservation of historic sites and information.

Several factors limit the full realization of cultural resource values. These include an incomplete inventory and a reduction in the informational value of the resource through natural deterioration and human disturbance (theft and vandalism). In addition, the evaluation and interpretation of identified properties is hampered by the loss of data through the deaths of individuals knowledgeable about historic periods, and lack of resources to collect cultural information. Cultural resource inventories and evaluations are largely limited to areas of potential impacts from projects; they need to be expanded to other areas. More protection is needed against natural deterioration and human actions. Public information has been provided only on a limited basis, and could be increased.

d. Data Reliability

The reliability of the information on cultural resources is variable. Because inventories and evaluations largely depend on other resource projects, they result in only a segmented understanding of the real significance of Forest cultural resources. Presently, researchers are developing some reliable predictive models of past land use on the Forest. Additional data collection and analysis are required before these models can be completed.

4. ENERGY

The Nation's energy resources are becoming more important and diverse, and this Forest is no exception. The Forest's energy resources fall into eight categories. This section describes four of them: hydroelectric, wind, solar, and consumption/conservation. The geothermal, and oil and gas resources are covered in the Minerals section of this chapter. Wood-based energy is discussed in the Firewood and Biomass sections. For discussion of utility corridors needed to transmit the energy, see the Facilities and Lands sections.

a. Introduction

Hydroelectric Hydroelectric power is the major energy resource associated with the Forest. Nine hydroelectric facilities are on or near the Forest, and a tenth is partially dependent on

water flowing from Forest land. They provide a total of **694** megawatts (MW) of electrical power per hour, which is enough to supply about 500,000 homes. In addition to the existing sites, many applications for new "small hydroelectric" facilities have been filed since passage of the Public Utilities Regulatory Policy Act of 1978 (PURPA). The Federal Energy Regulatory Commission (FERC) processes these applications. The Forest Service responds to each as it is filed with FERC by providing FERC with mitigation measures to lessen the project's effects. These mitigation measures are formally submitted as "Section 4(e)" Comments, (see 4(e) in the Glossary). FERC reviews 4(e) comments, and adds mitigation measures as articles in project licences. The Forest also conducts an environmental analysis and issues a special use permit for hydroelectric facilities, and an easement for a power transmission line.

Forest Service policy is to cooperate with FERC, with other Federal and State agencies, and with the prospective developer in helping to realize the hydroelectric potential of water flowing from National Forest lands. The Forest Service also has the responsibility to insure that proposed projects are compatible with environmental laws and policies for National Forest lands. Hydroelectric projects can have both beneficial and adverse environmental effects; they can help reduce flooding, and provide a clean, renewable source of electricity, but have the potential to block free-flowing streams and dry up stream segments. These projects can both degrade and create recreational opportunities, fishery habitats, and aesthetic qualities.

Hydroelectric generation can be increased by raising the water yield from Forest lands. A small increase in water yield is theoretically possible by vegetation manipulation; this is discussed under the Water section of this chapter.

Wind The only wind power facilities are several windmills used in rangeland water projects. There have been no private or government efforts to develop wind projects for generating electricity on the Forest.

Solar Solar power is energy from the sun. It can be either direct heat (water or space heating), or electrical power from photovoltaic cells. The Forest has photovoltaic solar systems on three of

its fire lookouts. The Antelope Mountain lookout was the nation's first completely solar-powered lookout.

Consumption and Conservation The management of a National Forest consumes substantial amounts of energy — gasoline, diesel, heating oil, propane, and electricity. The National Energy Conservation Policy Act of 1975 (NECPA) required a 20 percent reduction in energy consumption for the general administration of the National Forest by 1985 (this does not include private activities such as logging operations). NECPA also required retrofitting a percentage of the total building space per year. The Forest's vehicle fleet must meet fuel efficiency standards.

Each Forest-related activity can have both an energy consumption value and an energy yield value. The main energy consumers are timber harvesting, livestock grazing, recreation, road construction, and general administration. When the energy consumption is compared to the energy yield for these activities, however, livestock grazing (range) and timber harvesting (including biomass and firewood) have positive net energy yields.

There are several opportunities to decrease the Forest's energy consumption. Even-aged management of timber saves energy consumed in harvesting the stands, roads can be designed and constructed to reduce fuel used by logging trucks, and buildings can be retrofitted and vehicles selected to conserve fuel. All these conservation measures are already being taken when and where appropriate.

b. Supply

Hydroelectric The 694 megawatts of electricity produced by the ten hydroelectric projects amounts to less than two percent of California's total electrical production. About 36 applications for small hydroelectric projects have been received since 1981. These applications were processed, and many eliminated for a variety of reasons, including competition for the same water source, environmental concerns, and proponents voluntarily surrendering their applications, etc. The remaining applications were processed by FERC and the Forest Service. Construction of approved small hydros on the Forest was completed when the Lost Creek hydros were

built in 1990, except for the Rock Creek hydroelectric project located in the southwestern portion of Almanor Ranger District. That project would affect several streams, including North Valley Creek and Rock Creek. It has been delayed because of reduced economic viability and controversy over mitigation measures.

There is currently one large hydroelectric development on the Pit River (Pit #3) and one on Fall River (Pit #1) which are either partially on, or directly affect lands administered by the Lassen National Forest (These are Shasta-Trinity land that we administer). PG&E has proposed the addition of a new dam, powerhouse, and reservoir (Pit #2), which is not on National Forest system lands, but does indirectly affect them. This proposed facility is currently undergoing environmental analysis and public comment. In addition, there are five other existing hydro developments along the Pit River (Pit #4-7 and Muck Valley).

The public comment phase of these applications determined that development of hydroelectric facilities on Hat Creek was not appropriate, and therefore no applications will be approved for this creek. If Mill, Deer, or Antelope Creeks are designated as Wild and Scenic Rivers, this could also preclude or restrict hydroelectric development. Several hydroelectric developments were proposed along creek segments that were included in the 1984 California Wilderness Bill and approved as part of the Ishi Wilderness. Other reaches would be included in additional wilderness proposals.

Wind Several areas of the Forest, mainly exposed ridges, are classified as "excellent" for wind power, with a mean power density greater than 28 watts per square foot at a wind speed of 14 miles per hour. However, access, facility development, and electrical transmission costs appear prohibitive.

Solar Overall, the Forest is ranked "medium" in its suitability for solar power. The summers have many days that are clear and sunny, while the winters can often have sunny days between storms.

Consumption The general administration of the Forest consumes about 42 billion British thermal units (BTU's) a year. About 55 percent

of this is fuel to operate vehicles, and 45 percent is fuel and electricity for the Forest's buildings.

c. Demand

Hydroelectric The demand for renewable energy sources such as hydroelectric power is expected to continue to increase along with the State's population growth and the rising price of energy. While most of the suitable sites for major hydroelectric facilities have already been developed, potential sites for small hydroelectric facilities are theoretically numerous. Filings of applications increased sharply after passage of PURPA in 1978, but soon dropped off.

Wind Demand for wind energy utilization has not been significant, and is not expected to become significant even with projected increases in population and energy prices.

Solar Demand for solar energy utilization has been rather specialized and limited to Forest Service fire lookouts. Photovoltaic solar energy could be used in retrofitting other lookouts and remote administrative facilities, but large-scale uses of active solar are not expected. Solar water heating systems could be constructed at government facilities and would provide long-term savings.

Consumption NEPCA required a 20 percent reduction by 1985 in energy consumption for general administration. The Forest has made substantial investments in reducing the energy consumption of all its facilities.

Conservation For a discussion of energy conservation potential, see Chapter 4, section G.

5. FACILITIES

a. Introduction

Forest facilities include roads, trails, utility corridors, buildings, sewer and water systems, dams, and major stream crossings. Each of these types of facilities is discussed separately.

b. Roads

Construction and maintenance of the Forest road system is a public issue because many people use it for access to the Forest. The appearance, driving surface condition, and sta-

tus (open or closed) of the roads are readily apparent to the users.

As of July 1991, the Forest Development Road (FDR) system consisted of approximately 3,472 miles. Integrated with it were approximately 1,260 miles of State, county, and private roads. The combination of these systems provides for public access to, administration of, and movement of goods from National Forest lands.

The Forest's developed road system has three functional classifications: arterial, collector, and local. Arterial roads are the main travel routes designed for efficient through-traffic, such as State Highways 32, 36, 44, and 89. Collector roads connect local area traffic with arterial routes. Local roads serve "destinations" and local areas. See the Glossary for their full definitions.

The State and county road systems make up 98 percent of the Forest's arterial road system. Forest development roads make up 68 percent of the collector road system, and 81 percent of the local road system. Table 3-4 summarizes the miles of existing road within each of these classifications, and within each ownership category (i.e., Forest development roads, State roads, county roads, and private roads).

The Forest works with State and county agencies to insure that, as provided in cooperative agreements and memoranda of understanding, design and maintenance standards match with expected Forest-generated use levels.

Table 3-4
Road Mileage (1991)

<i>Functional Ownership:</i>					
Classification	Forest	State	County	Private	Total
Arterial	9	270	82	0	361
Collector	317	9	138	0	464
Local	3,146	0	163	598	3,907
Total Miles	3,472	279	383	598	4,732
<i>Source: Forest Road Mileage Data</i>					

In 1982, the Forest identified seven county roads that met the criteria for Forest Highway designation and needed improvement to better serve National Forest generated traffic needs. Several changes have occurred since 1982 regarding the designated Forest Highways. Three of these (listed in Table 3-5), are in the Forest Highway inventory for future work consideration. Four roads were completed or dropped.

Table 3-5

Road Improvements Proposed

<u>Countv and No.</u>	<u>Name</u>	<u>F H No.</u>	<u>Description</u>	<u>Approximate Length (Miles)</u>
Plumas 308 Butte 91422	Humboldt/Humboldt	118	SH32 to SH89	35.0
Lassen A-1	Eagle Lake	168	SH36 to SH139	27.3
Lassen 105/FDR 32N02	Summit Camp	105	SH44 to LAS A-1	14.0
FH Forest Highway SH State Highway				
<i>Source Forest Road Inventory Data</i>				

The collector road system consists of 317 miles. Most of these routes were constructed to meet design standards for multiple types of resources and traffic demands.

Most of the approximately 3,100 miles of local Forest development roads were built through timber sale contracts to allow access to the Forest for all management activities. Their primary uses today include timber management activities, firewood gathering, and dispersed motorized recreation.

There are also approximately 500 miles of uninventoried roads. As projects are planned in areas containing these roads, Forest management personnel will determine whether to add them to the Forest development road system or to obliterate them. The increased mileage from 1982 to 1991 reflects an improved inventory of previously uninventoried roads.

The Forest Development Road system is maintained to prevent resource damage while accommodating traffic needs. Each road is assigned a road management objective so that it can receive a level of traffic management and road maintenance commensurate with these goals. Based on road management objectives, each road or road segment receives one of five maintenance levels. Appendix J gives definitions of each. All system roads are maintained to at least maintenance level 1 (custodial care). Forest Service policy is to maintain roads at the minimum level necessary

for recreation, resource use, safety, Forest administration, and adjacent-area protection.

Forest commercial users (those who generate traffic by commercial operations under permit, license, or contract for the utilization of National Forest land and resources) share in costs associated with maintenance. Non-Forest commercial users, those who move commercial commodities from private lands through the Forest, also share maintenance costs according to their use.

If a joint-ownership road is needed, the Forest Service and the other owner exchange easements through maintenance agreements. These agreements provide that each party will cooperatively maintain and preserve the road to original standards of construction or reconstruction.

The present arterial road system may need to be reconstructed to handle traffic demand. However, the present collector road system is nearly adequate. The local road system may need to be expanded in the next decade to meet currently projected timber sale demands. The gathering of biomass for the wood waste power plants in Burney, Westwood and Wendel may also put additional demands on the Forest's road system. Some roads may experience a 100 percent increase in truck traffic. The assigned road management objectives may need adjustment to mitigate traffic conflicts between timber, recreation, biomass, and firewood users.

c. Trails

The 465 miles of developed trails consist of 30 miles of National Recreation Trails, 125 miles of Pacific Crest National Scenic Trail, and 310 miles of other trails. Table 3-6 shows the miles of trails in each category. Use of the trail system totals about 30,000 recreation visitor days per year. In general, trails are kept open and safe for use, but not all trails meet desired standards.

Table 3-6

Trail System (Including Wilderness) 1990*

Trail Category	Miles
Hiking	116
Pacific Crest Trail	125
Wilderness	98
Cross-country Skiing	17
Nature / Interpretive	4
Snowmobile	105
Total	466

Other Non-system trails
Lassen and Nobles Emigrant Trails total
107 miles

* Does not include 4-wheel drive trails which are classified as system roads

Source: Forest Trails Inventory Data

There is a current need for construction of additional trail miles in designated wildernesses, especially if further planning areas are added to this category. Trail development is also needed for dispersed non-motorized recreation, and can occur over existing roads in some cases (e.g., winter snowmobile trails). Trailhead construction to support the new trail systems will be required. In sensitive or heavily used areas, additional trails may be needed to disperse visitors or protect resource values. Some snowmobile cross country ski, mountain bike, and other recreational routes will be designated on existing roads and skid trails.

d. Utility Corridors

The Forest has approximately 82 easements or special use permits allowing utility lines over National Forest lands, with the rights-of-way between 10 and 40 feet wide. There is very little opportunity to consolidate these utilities into common corridors. The Western Regional Corridor Study for the State of California identified a potential need for an east-west utility corridor through or near the Forest; for further discussion, see the Lands section of this chapter.

A 42 inch gas pipeline is to be installed by PG&E in 1992-1993, adjacent to the existing 36 inch gas pipeline. It crosses through a portion of the Shasta National Forest, which is administered by the Lassen National Forest. The gas is being transported from Canada to Southern California to meet increasing energy needs. The Federal Energy Regulatory Commission (FERC) is the lead Federal agency on this project.

A consortium of power agencies called the Transmission Agency of Northern California (TANC) is constructing a 500 KV transmission line during 1991-1992. This project is referred to as the California-Oregon Transmission Project (COTP). This line only crosses approximately 1/2 mile of the Shasta National Forest lands, administered by the Lassen National Forest. It is separated from the existing 500 KV transmission line by about two air miles thereby decreasing the potential of damage to both lines at once by fire or natural disaster.

e. Buildings, Water and Sewer Systems

Table 3-7 is a summary of the structures on the Forest by building age, category, and gross square footage.

As shown, the Forest has 81 buildings amounting to 108,070 square feet. This total includes lookout towers, but not campground toilets. Because 48 percent of the buildings are over 35 years old, maintenance needed to protect the capital investment can be extensive, and replacements are needed. The 81 structures are located on nine Forest-owned administrative sites. In addition to the above, the Forest leases

Table 3-7**Forest Service Owned Buildings (1990)**

<u>Building Category</u>	<u>Building Age (Years)</u>						<u>Total</u>	
	<u>0-15</u>		<u>15-35</u>		<u>36 & Older</u>			
	<u>No.</u>	<u>Square Feet</u>	<u>No.</u>	<u>Feet</u>				<u>Square Feet</u>
Housing	2	2,200	7	10,766	13	13,031	22	25,997
Office Buildings	3	5,200	3	9,889	4	3,692	10	18,781
Storage, Semce	17	32,388	7	7,680	16	19,685	40	59,753
Other	0	0	3	2,306	6	1,233	9	3,539
Total	22	39,788	20	30,641	39	37,641	81	108,070

Source *Forest Building Inventory Data*

two buildings (the combined Supervisor's Office and Eagle Lake District Office, and the Hat Creek District Office) from private parties. Leasing requires less capital investment, but significantly increases annual costs for office space. Construction of Forest-owned buildings for these three offices could provide long term savings to the Government.

In 1993, a Forest-owned office for the Eagle Lake Ranger District will be constructed on National Forest land at the intersection of County Road A1 and Highway 36.

Administrative sites are groups of buildings (for example, a Ranger Station or Work Center) which have utilities such as domestic water systems and sewage disposal systems. Lookout towers and campgrounds were not counted as administrative sites. Because most utilities are as old as the structures they serve, they are reaching the end of their design life. Meeting current health and safety requirements is becoming costly, and replacement may be needed to protect employees and other users. Most cost-efficient energy retrofitting needs have been accomplished. The

cost to maintain the facilities will increase as the structures continue to deteriorate with age.

Between 1982 and 1991 the number of Forest owned administrative sites declined from 12 to 9 because the Durbin Nursery site underwent a land exchange, the Gallatin House site was changed to a Special Use Permit, and the Four Corners site was not developed. The number of leased administrative sites declined from 4 to 2 due to a consolidation of the Eagle Lake Ranger District and Engineering Office with the Supervisor's Office in Susanville.

The Lassen operates a total of twenty-nine water systems, four serve the administrative sites and the remaining serve the campgrounds scattered throughout the Forest. Fifteen of these systems are classified as groundwater sources, and the remainder are classified as surface or spring sources. The Forest Service will be constructing a new water system for the new Eagle Lake District Office in 1992.

Most of the campgrounds are served by vault toilets. The sewage is pumped and hauled to

municipal treatment plants. The other campgrounds, including Battle Creek, Almanor, Hat Creek and Eagle Lake are served by centralized collection systems. The Forest Service operates a zero discharge sewer treatment plant which treats all the sewage from the south end of Eagle Lake.

f. Dams

Of the 19 dams on the Forest, seven serve hydroelectric plants and are inspected by the State. The remaining 12 dams were constructed for livestock and wildlife water reservoirs, and are inspected and maintained by the Forest. The dams under the jurisdiction of the Forest Service are primarily earth-filled in construction. They vary between five and 15 feet in height, and hold between five and 30 acre feet of water.

Maintenance of these dams is needed to prevent damage to streams and downstream structures such as culverts and other dams. Although the risk of loss of life is very low, moderate environmental damage could result if one of the dams failed.

The need for additional dams depends on mid-life, range, and road needs. Existing dams will continue to need inspection and maintenance to protect investments and the stream environment.

g. Major Stream Crossings

The Forest has 18 road bridges and 10 trail bridges in addition to 68 major structures (multi-plate pipe arches, open bottom arches or large corrugated metal pipes). All of the structures require maintenance to protect capital investment, provide safe crossings, and protect fishery streams.

Most major stream crossings are in place and need only to be maintained or replaced as necessary to protect human life and the stream environment. Future stream crossings will depend primarily on the location of planned resource activities and their access needs.

6. FIRE AND FUELS

a. Introduction

Fire has played a major role in shaping the Lassen area over the past 10,000 years. Prior to 1900, there was little interest in controlling fires but as the area's timber resource became more valuable, fire suppression efforts began. For the past 80 years, managers have become increasingly effective in putting out unwanted fires and in using fire as a management tool.

Wildland fires can result in both negative and positive effects on Forest resources and the ecological communities in and around the Forest. Fires are of two general types: (a) wildfires, and (b) prescribed fires. Federal law requires the protection of Forest resources by well planned and executed fire protection and fire use programs.

The Forest is responsible for wildland fire protection on 933,000 acres of National Forest lands, and on 280,000 acres of private land through agreement with the California Department of Forestry (CDF). In turn, approximately 274,000 acres of land administered by the Forest are protected by CDF.

b. Wildfire

Wildfires are, by definition, unplanned forest fires that may require a suppression response. Many create more damage than benefits. Damage can include lost timber, reduced water quality, impaired aesthetics and property damage. Human life and safety may also be threatened. Wildfire is sometimes beneficial because underbrush and other fuels decrease, water runoff increases, and vegetation reverts to early seral stage habitat beneficial to certain animals.

c. Fire History

The Forest ranks about sixth among the 11 northern California National Forests in number of fires and acres burned. Lightning during summer and fall causes 70 percent of the Forest's

wildfires The remainder are caused by humans — arsonists, hunters, anglers, campers, and other Forest users In the 1950's and 1960's, a number of large fires scorched several thousand Forest acres During the 1970's, an average of 98 fires burned about 157 acres per year Only 18 fires during the decade were of significant size One in 1973 burned 264 acres and claimed one life, and one in 1977 burned 820 acres of timber In that decade, three large fires that started outside the Forest burned many acres on lands administered by the Forest In addition, major wildfires burned tens of thousands of timbered acres on neighboring National Forests to the north and south, as well as large tracts of private property near Chester, Susanville, Burney, and Fall River Mills These demonstrate the potential for wildfire on the Forest itself

The years 1980-1983 brought cooler, wetter summers throughout the State, while the summers of 1984 through 1990 were hot and dry Fires on the Forest have been frequent, but most have burned relatively little acreage Exceptions are the 23,000 acre Lost Fire in 1987, the 750 acre Campbell Fire in 1988, the 400 acre Feather Fire in 1989, and five large fires in 1990 a different Campbell Fire (180,000 acres of which 38,000 were on National Forest land), the Finley Fire (23,700 acres with 2,400 acres National Forest), the Day Fire (3,300 acres with 510 acres National Forest), the Long Valley Fire (570 acres National Forest) and the Gulch Fire (300 acres National Forest)

d. Programs

The main programs in fire management are prevention, detection, presuppression, suppression, and fuels management Prevention includes such activities as public contacts, law enforcement, building inspection, and patrols Detection is carried out using fire lookouts and aerial surveillance Presuppression involves arranging for fire forces, training, equipment, and structural improvements before their actual use Suppression includes the customary firefighting activities with hand crews, engines, helitack, retardant aircraft, etc Fuels management prevents or reduces fires by removing or rearranging logging slash, brush, or other accumulations of burnable material

e. Fire Organization

Approximately \$1.6 million is spent annually on the Forest's fire and fuels management program. Other agencies and private parties cooperate with the Forest to supplement the protection effort

In 1972, a nationwide fire planning effort identified the protection organization needed to limit each wildfire on the Forest to 15 acres, 90 percent or more of the time Budget and personnel reductions have limited its implementation Manpower programs, such as Young Adults Conservation Corps (YACC) and Comprehensive Employment Training Act (CETA), were used to fill gaps, but these sources are now unavailable. Recently, the Forest Service and other government agencies have adopted a cooperative, interagency approach to fire protection The best example is the Susanville Interagency Fire Center (SIFC), involving the Forest Service, Bureau of Land Management, Lassen Volcanic National Park, and California Department of Forestry SIFC dispatches the closest available suppression forces, monitors air operations, and coordinates other fire operations in an effective, cost-saving manner In addition to responding to wildland fire, the Forest may also respond to structure fires to prevent their escape to wildland resources, or where human life is threatened

Although the availability of suppression resources has decreased, each of the three ranger districts on the Forest maintains a fire and fuels management organization Each has one to three "outstations" for fire engines and suppression crews. An airbase at Chester supports air tanker operations, a helitack crew, and an air attack plane A 20-person Regional Hot Shot firefighting crew resides at the Bogard work center Four to six mountain-top lookouts are staffed each summer

f. Prescribed Fire

Prescribed fire is defined as the application of fire under predetermined conditions to achieve management objectives Its use has increased steadily since 1970 The Forest conducts prescribed burns on approximately 6,400 acres each year when weather conditions permit Nearly 1,000 of those acres are burned to reduce hazard-

ous accumulations of brush, to improve wildlife habitat and livestock forage, or to increase water yields. An additional 5,400 acres are burned to dispose of logging and thinning slash, and to prepare areas for timber stand or range regeneration.

The successful exclusion of fire is bringing about undesirable ecological changes in many areas of the Forest. In some places, exclusion has altered the natural vegetation so that fires of unnatural size and intensity may cause unwanted effects. This is of special concern in such areas as wilderness, recommended wilderness, and research natural areas, where the perpetuation and study of premeval character and influence is important. Here, prescribed fire from either unplanned ignitions (lightning) or intentional planned ignitions can be useful in returning fire to its natural role in the ecosystem. In the Caribou Wilderness, prescribed fire from unplanned ignitions is being used to achieve this objective, under the provisions of that area's Natural Fire Management Plan.

Where benefits to the Forest can clearly be shown, the Forest cooperates with CDF and adjacent landowners in using prescribed fire for coordinated resource management projects. The front country near lower Deer Creek provides an example of the effectiveness of regular cooperative burning.

g. Future Trends

The need for fire and fuels management depends directly on the value of the resources threatened by fire. As future demand for these resources rises, more will be invested in managing them. Even-aged timber management will generate more acres of fire-susceptible plantations. As timber stands are harvested and replaced with new plantations, the fire regime changes significantly. Except under severe conditions, fires in mature timber are characterized by low rates of spread and low to moderate intensities. These fires are generally easy to control and do little damage to the mature timber. Plantations, on the other hand, tend to burn more like brush fields. Fires tend to burn through the crowns of the young trees, producing fast-moving high-intensity fires which are difficult to control. The young trees are also much more susceptible to damage from fire, even low intensity fire. As

acres of mature timber are regenerated and replaced with plantations, the risk of losses from wildfire increases significantly. If these losses are to be avoided, the level of protection must be increased.

The need for protection is also increased by the continuing construction of private residences adjacent to Forest lands. Since these are often in areas with large volumes of highly flammable fuels, the potential for severe fire losses is growing. This generates an increased demand for prevention and protection measures, including public education and improved hazard reduction on both Forest and private lands. There are also opportunities to utilize fire as a more effective management tool to increase both the productivity and the outputs of Forest resources.

7. FIREWOOD

a. Introduction

Firewood is an issue of great public interest on this Forest. Because many local residents depend on firewood from the Forest for home heating, the public is particularly interested in how it is managed. Firewood cutting is administered under two systems, one covering personal use and the other covering commercial use. Forest policy is to insure that firewood is available to meet the demands for personal use. Until 1983, permits for personal use firewood were issued at no charge. In 1983, the Forest began charging a fee of \$5 per cord to cover expenses of administering the program. Small amounts of green timber are offered for sale by bid to firewood dealers under the commercial use system.

b. Supply

Firewood is a component of biomass (see the Biomass section above). Firewood gatherers depend on dead wood to fulfill their firewood needs. Typically, this is standing snags, blowdowns, cull deck logs, and other logging residues. Cull deck logs are often being purchased outright, and improved lumber production techniques have reduced the amount of logging residue available for firewood. Blowdowns are a fluctuating source and, when they occur in large amounts, they are usually removed in salvage sales for sawtimber.

Standing snags are the main source of firewood. Pine, especially lodgepole pine, is the most popular type, followed by cedar. Designated snags and certain species and sizes of snags are reserved for midlife, and lack of road access prevents snags from being harvested in many areas.

c. Suitability

Firewood suitability depends primarily upon the species, size of material, access, and slope. Personal use woodgatherers and commercial operators demonstrate different preferences for type of material, but this spectrum of preference is dynamic and is broadening as supplies lessen. General suitability for each species is described below.

Oak Oak in all sizes is highly valued as firewood, but is relatively scarce and inaccessible on the Forest.

Lodgepole Pine Lodgepole is also a preferred species. Firewood permits require utilization of the trunks down to three inches in diameter. There is no upper DBH limit on lodgepole suitability.

Other Pines This group includes ponderosa pine, Jeffrey pine, and sugar pine. The limbs of these species make excellent firewood. Bole wood from Jeffrey and ponderosa pines is preferred over sugar pine. The boles of these trees are often too large for personal use woodcutters to harvest. Any material larger than 36 inches in diameter may not be considered suitable.

Incense Cedar All incense cedar bole wood makes excellent firewood. It is popular but not abundant.

Juniper Juniper wood makes excellent firewood and is well utilized on the northeast part of the Forest.

True Fir The true firs, red fir and white fir, are being increasingly used for firewood. Many of the cull decks resulting from timber sales are largely true fir. Unfortunately, much of this cull material is over 36 inches in diameter and not desirable for personal use. Such logs are, however, suitable for the commercial firewood market.

A recent phenomenon is the increasing willingness of firewood gatherers to take materials that were previously shunned. These include pre-

commercial thinning slash, which is mainly 3-9 diameter poles, and less desirable species such as true fir.

The slope of the terrain limits woodgathering activity. In areas where slopes are less than 10 percent, permittees drive off the roads and into the timber stands. Firewood can be gathered intensively about 200 feet into these stands on both sides of the road. Slopes from 10 to 35 percent usually require firewood gatherers to manually carry the wood downhill to the road, and very little wood is carried more than 100 feet. Firewood located on slopes exceeding 35 percent is not used by most woodcutters.

The Forest is experiencing increased off-road firewood harvest by woodcutters. This is especially true in lodgepole stands, which are predominantly unmanaged and usually unroaded unless adjacent timber stands have been harvested. Some of this off-road use inflicts very little resource damage, and may actually be beneficial by reducing the fire hazard. However, woodcutters sometimes drive through and damage areas of wet meadows, young seedlings, and sawtimber. In addition, merchantable green trees and future crop trees are often cut to gain access to lodgepole snags.

Theft of firewood is one of the Forest's major law enforcement problems. Efforts to deter violations include spot-checking loads at highway check stations and personal contacts with woodcutters by Forest personnel in harvest areas.

d. Lodgepole Pine Management

The management of existing stands of lodgepole pine is in transition. Wildfires in these stands have been largely excluded for nearly a century and they are now dominated by trees older than 100 years. Natural deaths from old age, coupled with high mortality from insect infestation, creates a large supply of snags for firewood. Since timber management of lodgepole pine stands is expected to intensify in the next two to three decades, the number of snags is expected to decrease. A small supply of lodgepole pine firewood may be provided, however, by the unmerchantable trees remaining from sawlog harvest operations.

e. Demand

Firewood demand is best discussed by separating it into past, present, and expected future needs. Until recently, the demand for firewood has been small. Before 1973, the Forest administered firewood removal primarily through the free use system. Free use permits were given only to "bonafide settlers, miners, residents and prospectors." Residents were defined as persons living within or very near a National Forest. The Arab oil embargo, cold weather, and fuel shortages of 1973 resulted in dramatically increased demand. The Forest Service relaxed the residency restriction on free use that year, and began granting permits to anyone.

Nationally, firewood use from National Forests has increased a dramatic 1,200 percent since 1972. The increase on this Forest, as reflected by the number of permits issued, has been 508 percent since 1973 (Figure 3-7). By 1981, most local residences had converted to wood heat. In 1983, the Forest Service began charging \$5 per cord, and the number of permits issued began declining. Meanwhile, the non-local demand (that originating beyond 25 miles from the Forest boundary) has been increasing rapidly. A 1980 study determined non-local demand was 25 percent of the total.

In California, the demand for firewood from the Forest is well dispersed from Redding south to Chico, in Nevada, it is concentrated in the Reno/Lake Tahoe area. For economic reasons the Nevada demand is primarily commercial rather than domestic use and will probably remain so.

This growing competition is heightened by the construction of wood-fired power plants near the Forest. Although studies indicate that adequate supplies of wood for both biomass and firewood uses exist, conflicts may soon arise over desirable types and locations of firewood. The Forest Service's National policy is to give priority to personal use firewood gatherers in the allocation of biomass. In some cases, to make firewood more available, the Forest may take steps such as keeping roads open after a timber sale and opening free-use cutting units. For further discussion of firewood and biomass uses, see the Biomass section above.

There is no scientific way to project future firewood demand. Figure 3-8 shows estimated personal use, based on the projected population growth rate of the area. The non-local, commercial demand is also projected to rise as fossil fuel and electricity costs rise. This will put firewood for homes in direct competition with other uses of wood.

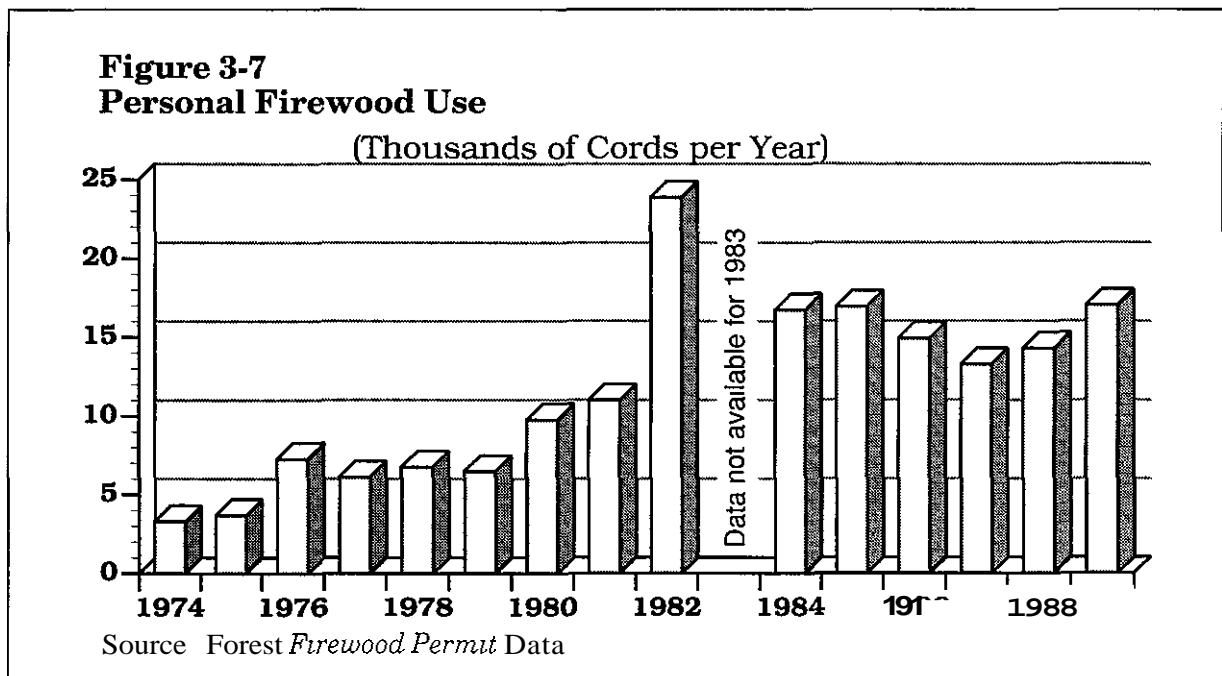
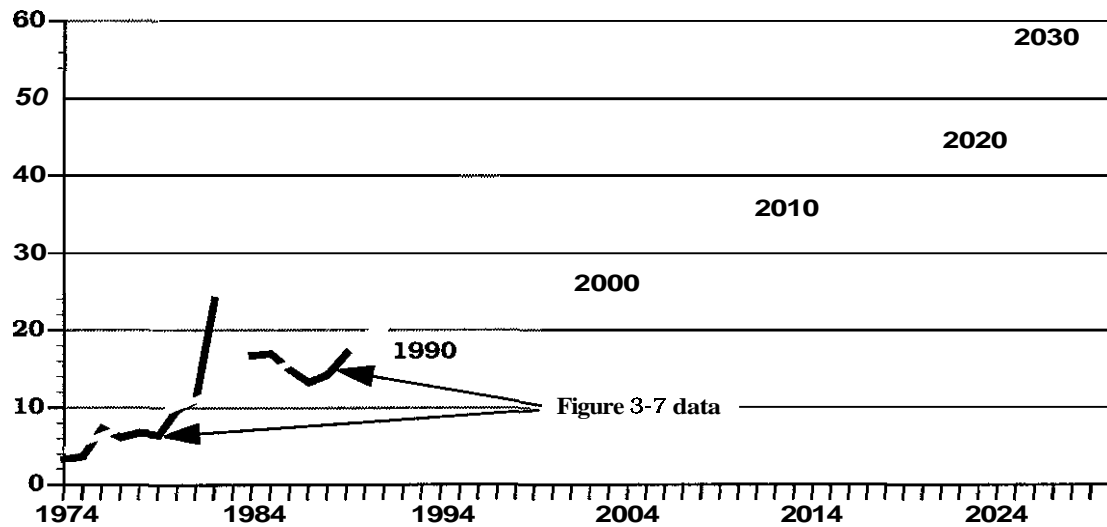


Figure 3-8
Projected Personal Use Firewood Demand
(Thousands of cords per Year)



Source Forest Firewood Permit Data

8. FISH

a. Introduction

The Forest is noted for its trout fishing, which attracts anglers from throughout California and the west. Much of the total recreation on the Forest is related to fishing, both in streams and lakes. Less well known, but regionally significant, is its anadromous fishery (steelhead and spring-run chinook salmon) limited to three stream systems in the western foothills. The Forest manages the fish habitat, not the fish populations themselves. The fishery resource is discussed below in the four categories: major lakes, resident fish in lakes, resident fish in streams, and anadromous fish.

b. Supply

There is a significant fishery habitat resource on and adjacent to the Forest. Forest lands hold approximately 3,500 acres of lakes, 350 miles of resident trout streams, and 86 miles of existing and potential anadromous fish habitat. In addition, Eagle Lake, Lake Britton, and Lake Almanor offer about 28,000, 1,200, and 24,000 surface acres, respectively.

There are no known Federally-listed Threatened or Endangered fish on the Forest. The rough sculpin, State-classified as Threatened, occurs in the Pit River drainage, but is not expected to be affected by Forest Service practices.

At least 29 species of fish occur on the Forest (see Appendix R). Of greatest economic importance are chinook salmon, steelhead trout, and rainbow trout. Each of these is a Management Indicator Species (MIS) and is used to assess habitat conditions for other species. Habitat Capability Models (Shimamoto and Airola 1981) identify specific habitat characteristics for MIS and other important fish species as well. Examples of these models are found in Appendix O of the accompanying Forest Plan.

(1) Eagle Lake, Lake Britton, and Lake Almanor

Eagle Lake is a natural lake with no outlet and is famous for its unique Eagle Lake trout. This trout has adapted to the alkaline lake water and reaches trophy size in three years. Originally this race of trout ascended to the headwaters of Pine Creek and Papoose Creek to spawn, but the entire population is now dependent on an egg-taking operation conducted each spring by the California Department of Fish and Game. Any

actions that would reduce lake volume, increase alkalinity, speed up eutrophication, or replace the trout's primary forage species (the tui chub) would have a significant adverse impact on the Eagle Lake trout. Increases in lake volume and the resulting decreases in alkalinity could allow establishment of competing game and non-game fish. Both the Eagle Lake rainbow trout and Eagle Lake tui chub are listed by the California Department of Fish and Game as species of special concern.

Lake Britton was created in 1925 by Pit #3 Dam of Pacific Gas and Electric Company. It supports both warm and cold water fish, but over 80 percent of the fish are non-game species. Currently, recreational fishing is very light. Although Lake Britton once supported a high quality largemouth bass fishery, frequent fluctuations in reservoir level have reduced reproductive success. Possibly the fishery would recover if the reservoir levels were stabilized during the spawning months. A major benefit of the fishery is to provide food for resident and migrant bald eagles.

Lake Almanor was created in the early 1900's and is one of California's first hydroelectric power facilities. Water levels fluctuate widely depending upon the runoff and the power demand. The rainbow trout fishery in Lake Almanor formerly ranked as one of the best in the State. Rainbow trout, brown trout, chinook salmon, and smallmouth bass occur and are in high demand, but fishing has declined in recent years. Reasons for the decline include competition between Japanese pond smelt and young rainbows, competition between brown trout and tui chub, and reduced passage of the rainbow trout spawning run caused by a diversion dam on the North Fork of the Feather River. Maintaining access to suitable spawning habitat within the North Fork would help increase fish production. A lack of underwater cover keeps habitat quality for bass below potential.

(2) Resident Fish - Other Lakes

At least 108 lakes on the Forest support fisheries. Most lakes support cold water species, but some larger lakes contain warm water species as well. There are few strictly warm water lakes.

Based on surveys and criteria found in Habitat Capability Models, over 40 percent of the lakes (amounting to 50 percent of the total surface

area) have low quality habitat for fish. Only about eight percent of the lakes (by surface area) have high quality habitat. Twelve lakes, totaling nearly 1,300 acres (33 percent of the total lake acres), have potential to become high quality habitat. The greatest opportunity for habitat improvement is to maintain permanent pools in large reservoirs such as McCoy Flat, Hog Flat, Philbrook Lake, Snag Lake, and Long Lake. However, water rights for these lakes are controlled by parties other than the Forest Service. Improvement of shoreline and underwater cover by controlling shoreline grazing and placement of underwater structures could also improve habitat in many lakes.

Another important opportunity to improve resident fisheries in lakes is to alter the management of fish populations. This includes stocking new areas, adding different game species, and increasing stocking frequency. These actions fall under the jurisdiction of the California Department of Fish and Game.

(3) Resident Fish - Streams

Of the 350 miles of resident trout streams, 79 percent have medium or high habitat quality. Potentially 90 percent of the streams could be in medium to high habitat quality. A portion of one stream, Yellow Creek, is classified as a Wild Trout Stream by the California Department of Fish and Game.

Improvements needed in many streams include bank protection, enhancement of riparian vegetation, and removal of instream barriers and miscellaneous debris. Bank and riparian degradation from livestock grazing are problems identified on 32 miles, or nine percent of total stream miles. This occurs primarily on stream segments in meadow areas. Accumulation of debris (beaver dams, logging slash, and natural accumulations) are reported on eight percent (27 miles) of streams. Since some woody debris is often desirable for fish habitat, debris problems require evaluation on a case-by-case basis.

Other significant problems include inadequate instream flows and poor instream habitat conditions. The Pit River and the Susan River are examples of the former, water rights on these streams are controlled through impoundments by PG&E and the Lassen Irrigation District, respectively. Pool and cover development could improve habitat on at least 17 miles of streams.

with poor habitat conditions. Minor fishery problems include inadequate stocking in small streams that could support fish, and sediment from land disturbance on adjacent lands.

Debris removal, and pool and cover development are within Forest Service jurisdiction. Instream flow problems, however, are generally outside Forest Service jurisdiction, except during Federal Energy Regulatory Commission (FERC) licensing or relicensing, through a water rights protest, or by cooperative agreement to release adequate water. Fish stocking is under the jurisdiction of the California Department of Fish and Game.

Data on both lake and stream fisheries are based on mid-late 1970s surveys. Although data quality is variable, they are adequate to support the preceding general statements. Existing habitat conditions in Forest watersheds will be better assessed utilizing the Region's standard Fish Habitat Assessment procedure to be implemented within the plan decade.

(4) Anadromous Fish

Chinook salmon and steelhead trout are found in Deer, Mill, and Antelope Creeks. These streams are unique to both the Forest and northern California because they remain relatively pristine, free-flowing tributaries to the Sacramento River. The Forest administers approximately 60 percent of the total mileage of anadromous habitat within these streams. Deer Creek has 38 miles, Mill Creek has 32 miles, and Antelope Creek has 23 miles within the Forest. Since much anadromous fish habitat in the Sacramento River system has been lost or degraded over the last 130 years, these streams have become increasingly important to anadromous fish production.

Table 3-8 shows the estimated size of the anadromous fish runs based on data through 1982. In recent years (mid-late 1980's) the total average adult spring-run chinook salmon population estimate for the three drainages is less than 1,000 fish. No current spawning run estimates are available for steelhead. Chinook salmon occur in these streams as distinct spring and fall runs. Spring-run salmon leave the Pacific Ocean and enter the streams in the spring, spend the summer in deep holding pools, spawn in the fall, and

die. The spring-run on the Forest accounts for approximately 30 percent of the total Central Valley spring-run of salmon. Fall-run salmon enter the creeks in the late fall or winter, and spawn in the lower reaches of the streams, probably only in areas below the Forest boundary.

Table 3-8

Anadromous Fish Runs on Forest Streams (Average Estimated Spawning Adult Fish Per Year Through 1982)

	Deer Creek	Mill Creek	Antelope Creek*	Total
Spring-Run				
Chinook Salmon	1,300	2,300	500	4,100
Steelhead				
Trout	1,200	1,100	300	2,600

* Values obtained from *California Fish and Wildlife Plan (1965), Vol. III*

Source: Forest Data

Steelhead trout, the anadromous form of the rainbow trout, migrate upstream in winter runs from November through March. Unlike salmon, some steelhead return to the ocean after spawning, and juveniles usually remain in fresh water from one to two years.

A number of conditions that may affect anadromous fish habitat availability and utilization have been identified on Forest lands. These include (1) lack of adequate instream protection, overhead cover, and pools in specific areas; (2) numerous partial and complete natural barriers that may block migration of fish in upper portions of Deer and Antelope Creeks; and (3) possible wilderness designations within the watersheds that could limit stream restoration and improvement projects for anadromous fish. Downstream from the Forest, problems include (1) loss of upstream migrating adults and ocean-bound juveniles to off-Forest water diversions, (2) high predation near diversions, (3) habitat alteration in the Sacramento River and delta, and (4) excessive ocean harvest.

There are five potential opportunities to improve habitat and increase populations of anadromous fish on the Forest.

- 1 Upper Mill Creek from just above Highway 36 downstream to the Mill Creek homesites lacks pools and cover for spawning and rearing fish. This segment also lacks riparian vegetation, and contributes excessive sediment because of channel instability. Watershed restoration actions could alleviate this problem.
- 2 Currently, Upper Deer Creek Falls blocks migration for salmon and steelhead to upper reaches of Deer Creek. Replacement or rehabilitation of an existing fish ladder would provide access to 13 miles of potential holding, spawning, and rearing habitat for salmon and steelhead.
3. Deer Creek Meadows along upper Deer Creek is currently in private ownership. This area would provide potential salmon spawning habitat if fish had access above Upper Deer Creek Falls, and if riparian habitat and bank instability problems within the meadows were corrected. Acquisition of this property through exchange or another method would enable correction of these problems.
4. The upper reaches of the North and South Forks of Antelope Creek and Deer Creek tributaries contain natural rock barriers. Removal would increase potential available habitat.
- 5 Artificial rearing ponds could be developed to increase production of salmon and steelhead on Deer, Mill, and Antelope Creeks. This work requires support from the California Department of Fish and Game.

c. Demand

Each year, anglers on the Forest spend approximately 90,000 Wildlife and Fish User Days (WFUD's) fishing for resident cold and warm water fish and in related activities (a WFUD is a 12-hour activity day). Almost 70 percent of this recreation is spent fishing and most of the remainder occurs as hiking or camping. This recreation is valued at approximately \$1,370,000 annually.

Ocean sport fishermen spend 1,100 WFUD's as they fish for salmon that are produced in streams on the Forest. Commercial harvest of chinook salmon produced on the Forest is approximately 11,000 pounds per year as based on the 1986-1990 average. The annual economic value of the spring-run chinook salmon and steelhead fishery produced on the Forest is estimated at \$48,000.

Current Forest goals are to increase anadromous fish production by 4,200 pounds by the year 2000, through habitat enhancement. To achieve this, the Forest must (1) minimize detrimental watershed disturbances, (2) develop an aggressive habitat enhancement program, (3) achieve adequate release flows from diversions in lower portions of the streams, and (4) receive adequate escapement through regulation of commercial and sport harvest. These activities require participation by a number of outside agencies.

9. FOREST HEALTH

a. Introduction

Forest pests have evolved during the course of a forest's development and are an integral part of that environment. Specific pests appear during certain periods in stand development, such as shoot borers in young stands, and decay-causing organisms in old growth. Other pests may be favored by certain tree conditions (e.g., injured, weakened, and/or poorly growing trees are more susceptible to bark beetles). Certain pests are favored by certain management activities, for instance, pine engravers often become a problem where much green pine slash is left on the ground in spring.

Different types of pests may act together to cause damage to timber stands. The most common of these pest complexes are the dwarf mistletoe/bark beetle complex, and the root disease/bark beetle complex. Stands that are less vigorous due to overstocking are more susceptible to damage from such pest complexes. Certain pests are particularly damaging during or just after environmental catastrophes (e.g., drought usually drastically increases bark beetle-related tree mortality). While no Forest pest can be fully controlled, their effects can be prevented or con-

trolled to varying degrees. The Forest's Integrated Pest Management program recognizes the interrelationships of the entire pest-host system and treats one or more components in an integrated manner.

b. Major Timber Pests

Annosus Root Disease Root rots cause death of individual trees and clusters of trees, or weaken them until they succumb to bark beetle attack. *Heterobasidion annosum*, the most prevalent root disease, affects all conifer species in all major timber types. Approximately 15 percent of the Forest's true fir stands are infested, while eastside pine stands may have infection levels of 20 percent or more. Damage in a stand usually appears as clusters of dead trees. Stand growth and site productivity are reduced. The impact may be lessened by applying borax to fresh-cut stumps in pine stands, favoring resistant species, and reducing logging injuries to trees.

Dwarf Mistletoe Species of dwarf mistletoe infect all commercial conifers on the Forest except incense cedar. Their main impact is tree growth loss and decreased vigor, which increases the possibility of insect-caused mortality. Symptoms are swollen branches, "witches brooms", and trunk swellings or cankers. While most dwarf mistletoe species attack only one host species, western dwarf mistletoe attacks both ponderosa and Jeffrey pine, and is the most damaging. It infests approximately 25 to 30 percent of the area of Forest that contains these pine species. Sugar pine dwarf mistletoe can be found in about 10 percent of the area containing sugar pine. Lodgepole dwarf mistletoe occurs in up to 25 percent of the area containing lodgepole pine, and the true fir dwarf mistletoes are in approximately 25 percent of the area containing white fir and in 40 percent of the area containing red fir. Mistletoe can be effectively controlled through silvicultural treatments of the stands.

Stem Decay Stem decay (or rot) causes significant wood losses in old growth stands on the Forest by destroying the heartwood. As old growth stands are regenerated, decay will be less of a concern. Multiple entries and thinning both cause basal wounds on residual trees. This is especially serious in the true firs, which are non-resinous and highly susceptible to decay. About one percent of the board foot volume may be lost

annually to decay in true fir as a result of logging damage during commercial thinning.

Blister Rust Dead, yellowed needles on twigs, branches, and entire trees are signs of blister rust, a serious obstacle in the silviculture of sugar pine. Blister rust surveys in the late 1960's put its incidence on the Forest at about 10 percent of all sugar pine. Blister rust especially infects younger trees, so sugar pines planted in the early 1960's have an estimated infection rate of 50 to 90 percent. The Forest has begun a program of planting sugar pine seedlings that are chosen for genetic resistance to blister rust.

Elytroderma Disease Elytroderma disease of ponderosa and Jeffrey pine is visible in many areas of the Forest. Symptoms are premature needle death and deformed twigs and branches. When infection is heavy it can cause reduced growth and vigor. Death of trees may result, usually as part of a pest complex including bark beetles. The heaviest infections are usually around lakes, meadows, and stream bottoms. Direct control methods are not available. In areas of high risk based on past outbreaks, nonsusceptible species should be favored. Thinning the stands of susceptible species in high-risk sites may improve tree vigor and lessen the probability of mortality because of bark beetle attacks.

Pine Bark Beetles Bark beetles often kill a tree outright by girdling the cambium. An entire tree with dead, orange, or yellow needles is a frequent sign. The most important bark beetles on the Forest are the mountain, western, and Jeffrey pine beetles (*Dendroctonus ponderosae*, *D. brevicornis*, and *D. jeffreyi*, respectively). In general, bark beetle problems are often associated with trees and stands that have been weakened or stressed. Stress factors include root diseases, dwarf mistletoes, drought, and competition caused by overstocking. When many trees are stressed, bark beetle populations increase and healthy trees may also be killed. The best way to mitigate bark beetle-related damage is through prevention, such as managing the vegetation to promote healthy stands, and taking steps to reduce stress conditions such as disease. When trees undergo temporary stress, such as fire or drought, individual tree protection by treatment with preventative chemicals may be warranted.

Pine Engraver Beetles *Ips spp* beetles can also cause significant damage, usually in the form of top-killed pines. *Ips spp* beetles usually breed in fresh green slash; but when high population levels develop, they often attack standing trees. Weakened trees are also more susceptible to top-killing. Problems can be prevented by proper slash disposal, by timing of timber harvest activities to reduce the amount of green slash available in spring and early summer, and by thinning dense young-growth stands to help maintain their vigor.

Fir Engraver Top-killed firs are the sign of *Scolytus ventralis* beetles. This insect is common in white fir and red fir stands. Associated tree mortality is usually caused by a combination of stand and site conditions that promote decline of the host tree—overstocking, unsuitable site, annosus root disease, and/or dwarf mistletoe. The fir engraver beetle may infest tops and scattered patches of cambium without killing the tree outright. The best way to mitigate damage is through prevention: maintain proper stocking, favor pine on pine sites, and take steps to reduce or prevent diseases.

Douglas-Fir Tussock Moth On this Forest the Douglas-fir tussock moth infests white fir. Outbreaks have tended to occur on poor sites, ridge tops and upper slopes between 5,000 and 6,000 feet elevation, and in open-grown stands that are 50-60 percent white fir mixed with pine and incense cedar. Because many of these sites are usually better suited for a mix of species, reducing the percentage of fir can lower the potential for tussock moth outbreaks. The Forest uses pheromone-baited traps to monitor the moth population to predict increases and possible defoliation. Biological and chemical insecticides are registered for control of the larvae. None had been used on the Forest since the mid 1960's, until June of 1989 when Bt, a biological agent, was used to combat a Tussock moth outbreak.

Animal Pests Pocket gophers, deer, porcupines and cattle cause damage by eating seedlings and small saplings, particularly in plantations. Currently, this damage is slight except in isolated areas. Porcupines also cause costly damage by gnawing on signs, buildings, and even radiator hoses and brake lines of cars parked at trailheads. The Forest uses vexar (plastic mesh) tubes to protect planted seedlings from deer

where damage is heavy. Fencing to restrict cattle grazing is also utilized.

c. Non-Timber Pests

A recurrent problem has been high populations of rodents (ground squirrels, chipmunks, mice, rats, gophers, moles) in some campgrounds. Such populations can spread outbreaks of bubonic plague, Rocky Mountain spotted fever, relapsing fever, leptospirosis, salmonella, or tularemia. Preventive measures used range from improved sanitation, facility redesign, habitat modification, and public education, to direct trapping, removal, or extermination of rodents or dusting their burrows with insecticide. Rodent populations and mortality are monitored in campgrounds, which may be closed if a potential hazard to human health exists. Control of public health problems is coordinated with the California Department of Health Services and local health agencies.

d. Integrated Pest Management (IPM)

The IPM approach calls for integration of pest management activities (including prevention, surveillance, detection, evaluation, suppression, and monitoring), into management planning and decision-making. This includes considering pest information in developing and implementing silvicultural prescriptions. The goal of IPM is to prevent and/or reduce resource losses that the resource manager finds unacceptable in impact on human activities and management objectives. In selecting appropriate control methods, all techniques, including chemical, biological, mechanical, manual, and cultural, are considered on a case-by-case, project-level basis. The preferred method(s) are selected on the basis of biological effectiveness, costs, and effects on human health and the environment. Under the IPM approach, the level or intensity of pest management practiced will vary to meet the needs (management emphasis and targeted outputs) of each management alternative. For example, Forest Plan alternatives with high levels of vegetation management, increased recreation site construction, and high resource outputs will provide both the need and opportunity for high levels of IPM. This would involve frequent surveillance, detection, and reporting, a high level of pest management training, increased site-

specific biological evaluations, and increased likelihood of the need for direct control. Timely use of new methodologies and effective coordination with research would become more important. A high level of IPM would also mean increased opportunities to integrate pest management considerations into management decisions and to take preventive actions, particularly through vegetation management, that should reduce future need for direct control.

The Forest has an opportunity to prevent/reduce pest problems by applying sound silvicultural practices to commercial timber lands and forested lands where other resources, particularly developed recreation, are emphasized. Alternatives with lower resource outputs and less vegetation management would require less frequent pest management, and would also provide fewer opportunities to implement preventive strategies.

10. GEOLOGY AND GROUNDWATER

a. Geology

The Forest is named after Lassen Peak, an active volcano located within Lassen Volcanic National Park. Millions of years of volcanic activity have covered about 85 percent of the Forest with volcanic terrain. In the southwestern part of the Forest, this terrain has steep slopes, deeply-cut streams, and some landslide potential. The southern part of the Forest has non-volcanic geology—granitic, metamorphic, and sedimentary rocks. The highest elevations of the Forest were carved by glaciers during the last Ice Age.

Occasionally, the geology of an area can threaten human safety. There are three types of geological hazards on the Forest: landslides, volcanic activity, and earthquake activity. Each is discussed separately. For discussion of the economic aspect of the Forest's geology, see the Minerals section of this chapter. Geologic land types are further discussed in the Special Areas section and the Visual Resources section of this chapter.

Stability Hazard The non-marine sediments in the southern part of the Forest can pose

stability problems where slopes are steep (over 35 percent). Local instability and slumping can also result when these soils are excavated deeper than two feet below the surface. Mass movements of soil can be triggered by such slumps. Some steep granitic slopes in the southeast part of the Forest also are unstable. Several such areas have had landslides. About two percent of the Forest that is located on non-marine and granitic soils has a high stability hazard, while less than one percent has a very high hazard. About four percent of the Forest has a moderate stability hazard. Most of the Forest, however, has low-relief volcanic topography with a low stability hazard.

Volcanic Hazard The second type of geological hazard is volcanic. Although the Forest itself has no significant active volcanic features, most of it is in a potential volcanic hazard area (State of California 1973). Lassen Peak last erupted in 1914-21. Examples of relatively recent volcanism—cinder cones, plug domes, composite volcanoes, shield volcanoes, ash layers, and many lava flows—cover the northern half of the Forest. Predictions of eruptions are not yet reliable, but past eruptions of Lassen Peak were explosive and included ash falls, mudflows, and lateral steam blasts with accompanying hot avalanches. They were similar to, but smaller than, the recent eruptions of Mt. St. Helens. These phenomena would likely occur in any future eruptions. Risk to human life, however, would be low because of limited access and low population density (Kilbourne and Anderson 1981). The Forest has an active role in Lassen Volcanic National Park's volcanic emergency plan (USDI 1982). The Forest would provide personnel and material to help in evacuation, road closure, communications, and surveillance.

Seismic Hazard The third type of geological hazard is seismic (earthquake) hazard. It is not possible to prevent, control, or accurately predict earthquakes, but broad seismic hazard ratings are available (State of California 1973). The north and east sectors of the Forest lie in a "moderate" seismic severity zone; the south and west sectors are in a "low" seismic severity zone. These zones correlate with the known faults on the Forest, which trend northwest-southeast and are especially concentrated in the north and east.

b. Groundwater

Groundwater is water held in saturated underground zones called aquifers. It surfaces as springs and (with some assistance) as wells. It also emerges beneath some lakes and streams. Springs and successful wells tend to be along faults, at contacts between bedrock and alluvium, and along porous or fractured basalt or granite layers. Geothermal groundwater is a possible resource on part of the Forest and is discussed below in the Minerals section.

Quantity Forest managers have developed springs and drilled wells to tap the groundwater resource over much of the Forest. About 70 domestic groundwater systems serve campgrounds and administrative sites. About 15 wells have been developed for livestock, wildlife, road dust abatement, and fire control. These uses are heaviest in the summer when the supply is scarcest, especially in the dry north and east portions of the Forest where demand exceeds supply. Therefore, the Forest has undertaken a gradual water development program to improve or develop wells and springs. Developing the 700 foot deep Hall's Flat well, which taps the regional aquifer, is part of that program. Because of the Forest's variable geology, there is much guesswork in choosing well sites. In the northeast part of the Forest, the groundwater supplies are too deep for affordable drilling. In some areas, such as along the Pacific Crest Trail in the Hat Creek Rim area, drilling has not found enough water for desired uses. However, where wells can tap regional aquifers, groundwater supply is sufficient to meet most needs.

Geological and geotechnical studies would aid in locating the most likely sources to develop groundwater for projects. Very little is known about the Forest's total groundwater resource. No comprehensive groundwater basin study has been done.

Quality The Forest has few pollution sources, and the quality of the groundwater is high. Water quality is monitored regularly at campgrounds and

administrative sites, in compliance with State and Federal standards. Since over 35 percent of Eagle Lake's inflow is believed to be groundwater, particular attention is given to maintaining the integrity of its watershed. Throughout the Forest, the public expects a high level of groundwater purity, and these standards are being met.

11. LANDS

a. Introduction

The Congressionally-designated Lassen National Forest boundary encompasses about 1,375,000 total acres. In the base year of 1982, this included about 315,000 acres of private land and 1,060,000 acres of Lassen National Forest land. The Forest also administered 83,060 acres of Shasta National Forest and 1,321 acres of Modoc National Forest lands. The Plumas National Forest administered 14,799 acres of the Lassen. Thus, a total of 1,129,585 acres were administered by the Lassen National Forest and are the subject of this FEIS. Table 3-9 shows the acreages by county and by Forest.

Table 3-9

Forest Acres by County and Administration (1982)

county	Lassen NF Admin by Lassen NF	Shasta NF Admin by Lassen NF	Modoc NF Admin by Lassen NF	Lassen NF Admin by Plumas NF
Butte	35,000			14,239
Lassen	422,707			
Plumas	149,311			560
Shasta	249,223	46,203		
Tehama	188,903			
Siskiyou		33,162	520	
Modoc		3,695	501	
Subtotals	1,045,204	83,060	1,321	14,792
Totals				
Lassen NF Designated Boundaries			1,060,003	
Lassen NF Administered			1,129,585	
<i>Source: Forest Lands Status Records</i>				

b. Land Ownership

Land ownership patterns vary on the Forest from large solid blocks of National Forest land, to areas where National Forest land is scattered in isolated parcels. About one-quarter of the land within the National Forest boundary is privately owned, mostly by large timberland companies. A small amount of intermingled land is owned by the State. Both public and private lands border exterior boundaries of the Forest. The Bureau of Land Management has large tracts of land bordering the north and northeast portions of the Forest. Lassen Volcanic National Park is completely surrounded by the Forest. On the Forest's western boundary, the State of California manages the Tehama Wildlife Refuge and the Latour State Forest.

Intermingled ownership can impede management of both the Forest land and the private land. Program objectives can become difficult or impossible to achieve. Soil and water protection can be diminished, the range of recreation can be limited, fire protection can be impaired, timber and wildlife management programs can be hampered, management of the visual resource may be uncertain, etc. Costs increase for administrative tasks such as boundary line establishment and maintenance, right-of-way acquisition, road construction and maintenance, fire protection and general administration, trespass and title claim resolution, and special uses. Such problems can be reduced by improving land ownership patterns through land adjustments.

Land adjustment is defined as land purchase, exchange, donation, or other authorized real property action. It is the means to add to, or eliminate areas from, the Forest to achieve optimum land ownership patterns and to promote environmental quality in the management of all Forest ownerships.

Several land adjustments have been accomplished since 1982. By the end of 1990, lands inside the Lassen National Forest boundary included approximately 318,000 acres of private land and 1,039,409 acres of National Forest land. The Forest administered 102,832 acres of Shasta National Forest and 1,321 acres of Modoc National Forest lands, while 14,799 acres were administered by the Plumas National Forest, for

a total of 1,143,562 acres administered by the Lassen National Forest.

The Forest's land adjustment program currently involves one large land exchange and six small exchanges. Two other exchanges are in the negotiation stage.

c. Special Uses (Non-Recreational)

The Forest issues special use permits to allow uses on National Forest land that facilitate development of private or other lands, when there is a demonstrated lack of land in other ownership to accommodate such uses, and when such uses do not conflict with National Forest management. The Forest collects an annual fee for each special use permit, with some exceptions. Table 3-10 summarizes those permits currently issued by the Forest.

A permit for use or occupancy of National Forest land limits, in most cases, the management options available. Pasture permits, for example, authorize use of 1,160 acres on the Forest. Forest

Table 3-10

Non-Recreational Special Use Permits (1990)

Type of Use	Cases	Right-of-Way (miles)	Acres	Fees (\$)
Agriculture	32	7.3	1,264.8	530
Community	11	0.0	386	100
Industrial	15	0.1	77.6	300
Research, Study, and Tramping	4	0.0	45.4	350
Transportation	124	327.6	1,021.8	2,300
Utilities and Communication	115	200.6	6,779	9,630
Water	53	9.9	788	23
Total	354	546.5	3,204.9	13,233

Source: Forest Special Use Permit Data

Service options are very limited on these acres, although the permits can be terminated at Forest Service discretion. Other significant uses that limit options include powerline permits (425 acres), buried telephone cable (110 acres), and electronic sites (80 acres). On the other hand, Class E road permits, which authorize private use of Forest roads, do not limit management options because the roads are already committed to transportation uses.

d. Utility Corridors

Approximately 82 easements or special use permits exist for utility lines over the Forest. As noted above, management options are limited in these areas. The Western Regional Corridor Study for the State of California identified the potential need for an east-west utility corridor through or near the Forest. Pacific Gas and Electric Company has studied two such routes on the Forest, however, preliminary findings are that the preferred location would be south of the Forest.

A 42 inch gas pipeline is to be installed by PG&E in 1992-1993, adjacent to the existing 36 inch gas pipeline. It crosses through a portion of the Shasta National Forest which is administered by the Lassen National Forest. The gas is being transported from Canada to Southern California to meet increasing energy needs. The Federal Energy Regulatory Commission (FERC) is the lead Federal agency on this project.

A consortium of power agencies called the Transmission Agency of Northern California (TANC) is constructing a 500 KV transmission line during 1991-1992. This project is referred to as the California-Oregon Transmission Project (COTP). This line only crosses approximately 1/2 mile of the portion of Shasta National Forest lands administered by the Lassen National Forest. It is separated from the existing 500 KV transmission line by about two air miles, decreasing the potential for damage to both lines at once by fire or natural disaster.

e. Withdrawals

Several areas have been withdrawn as authorized by various Acts of Congress or Executive Orders. A withdrawal has the effect of reserving land for a certain use and/or withdrawing the land from entry under the General Mining Laws.

There are currently 21,000 acres withdrawn for administrative or recreation sites, scenic roadways, experimental forests, or research natural areas, and 24,000 acres withdrawn for power and reservoir projects. Of the latter category, approximately one-third have existing projects on them (such as power plants), while two-thirds have only potential projects.

The California Wilderness Act of 1984 brought the total number of wilderness acres on the Forest to 78,060. These areas are also withdrawn from entry under the mining laws, from mineral leasing, and from sale or disposal.

Steps are underway to withdraw the Cub Creek Research Natural Area from mineral entry. This will add another 4,000 acres to the total withdrawn acreage.

In the Eagle Lake Planning Area, several local, State, and other Federal agencies have adopted policies opposing all geothermal, oil and gas, and other mineral leasing or development. Such activities might worsen the fragile water quality balance of Eagle Lake, which has no outlet and is already threatened by increasing nutrient loads. Nutrient sources include tributary watersheds, waterfowl, livestock, and several subdivisions. To improve management consistency and increase resource protection, the Forest is initiating steps to recommend that National Forest lands within the planning area be withdrawn from mineral entry and from mineral leasing. (For more information on Eagle Lake's water quality, see the *Final Environmental Impact Statement for Gallatin-Marmot-Future Development Policy* [1988].)

In compliance with Section 204 of the Federal Land Policy and Management Act (FLPMA), the Forest will review each withdrawal in conjunction with the U.S. Department of Interior to determine whether the withdrawal should continue and for how long.

f. Rights-of-way

Access to National Forest lands is needed for the proper protection, administration, and utilization of the Forest. Rights-of-way are acquired for roads, trails, and other improvements in the form of easements and, in certain instances, permits.

The rights-of-way acquisition program functions primarily in support of timber sales. The Forest works to acquire easements to reach areas formerly avoided because of difficult access. During this decade, the case load will be about 15 cases per year, but it is expected to taper off in the following decade and finally level off at less than five per year until all needed rights-of-way have been acquired.

g. Land Line Location

There are approximately 2,400 miles of property boundary with private land on the Forest. National direction requires that the Forest Service or project proponent mark and post property boundaries to legal standards before any project is undertaken adjacent to those boundaries. Approximately 1,800 miles of boundary remain to be posted and marked, a program expected to be completed by the year 2020.

h. Occupancy Trespass

As these land lines are surveyed, the Forest expects to encounter several occupancy trespass cases. Occupancy trespass occurs when a private party builds an improvement such as a house or fence on public land. Because a large portion of the Forest's boundaries lies against private land managed for timber, the number of such cases is expected to be small.

i. Landowner Coordination

As land management intensifies both within and adjacent to the Forest, the need for, and benefits of, closer coordination between adjacent land ownerships are increasing.

Eagle Lake The Eagle Lake basin is an area of high environmental sensitivity and public interest. Forest lands lie in the western half of the basin and along the southern shore. Land management is closely coordinated among the Forest and other agencies that administer land or resources in the basin. These include Bureau of Land Management, California Department of Fish and Game, State Lands Commission, and Lassen County. The Eagle Lake Interagency Board of Directors consists of a member from each of these five agencies and meets regularly to achieve coordinated, consistent land and resource management in the basin.

Lassen Volcanic National Park The Forest coordinates with Lassen Volcanic National Park on areas of mutual interest. The Forest Service and the National Park Service jointly provide a fire engine and crew stationed at the Park's Manzanita Lake entrance. They have cooperative agreements for fire detection at the West Prospect Lookout and for garbage collection. The two agencies have yearly coordination meetings, but otherwise coordination is similar to that with adjacent landowners. The Forest informs the Park of proposed projects near Park boundaries through notices of intent or phone calls. On special projects such as the environmental assessment on geothermal leasing south of the Park, personnel from the Park are invited to participate in the team meetings.

Lake Britton Lake Britton supports a bald eagle population and borders McArthur-Burney State Park. Pacific Gas and Electric Company manages the reservoir and much of the lake frontage under terms of a license issued by the Federal Energy Regulatory Commission. The Forest Service submitted comments during the licensing process, as did the California Department of Fish and Game and the California Department of Parks and Recreation. The Forest has a fire protection agreement with the California Department of Forestry making them responsible for the Lake Britton area. Otherwise, coordination efforts are mostly informal, such as seeking input from other agencies through notices of intent and phone calls. Recently, however, the Forest has held four formal consultations with the U.S. Fish and Wildlife Service to determine impacts of proposed projects on the bald eagles.

j. Land Adjustment Plan

The current land adjustment plan specifies, for a portion of the Forest, what land ownership adjustments are to be made and in what priority. It will be superseded by a new plan after this Forest Plan is approved.

12. LAW ENFORCEMENT

Managing the Forest involves certain responsibilities such as the protection of resources, facilitation

ties, Forest users, and Forest employees. Protection of the Forest is required by Federal law and Federal regulations. Law enforcement is the Forest manager's tool to gain compliance with those laws and regulations. The Forest Service is not a law enforcement agency, however. It is a land management agency with a law enforcement responsibility.

The United States Code (USC) Title 16 gives the Forest Service authority to enforce certain laws. The Forest Service also administers special legal orders, called the Secretary of Agriculture regulations. The Forest Service, together with other Federal agencies, is responsible for enforcing specific laws and carrying out the criminal procedures described in USC Title 16, 18, and 21. It also administers State laws and local ordinances in cooperation with State and local law enforcement agencies. In addition, Regional Forester's Orders can be issued and enforced to address Region-wide law enforcement needs, and Forest Supervisor's Orders can be issued for specific Forest situations (usually recreation or fire use restrictions).

Inadequate law enforcement can lead to disruption of legitimate activities. Forest work targets may not be met; or worse, the Forest resource, user, or employee can be endangered. Arson, for example, threatens all three.

The Forest's four major law enforcement problems are (1) theft of timber, primarily firewood, (2) vandalism and removal of cultural resources, (3) facility security, and (4) marijuana cultivation. Three problems of lesser magnitude are (5) arson, (6) trespass fires, and (7) civil disorder. The Forest has a law enforcement plan completed in 1983 which describes these situations and how the Forest will address them.

Law enforcement activities on a National Forest fall into four categories: (1) prevention, (2) protection, (3) investigation, and (4) cooperation. Each is summarized below.

Prevention Prevention means avoiding violations by informing the public and employees of laws, rules, regulations, and of successful prosecution of past violations. Both education before the fact and publicity after the fact can be meaningful deterrents.

Protection Protection includes various measures taken to insure a safe environment for the public, for employees, and for government property. For example, well-placed forest road signs and the use of two-way radios by field personnel can increase the level of safety precaution on the Forest.

Investigation Investigation becomes necessary once a violation is committed. It consists of gathering enough evidence to successfully prosecute the matter.

Cooperation The Forest Service cooperates with other Federal, State, and local agencies as appropriate to provide coordinated law enforcement coverage, such as providing campground patrols and determining civil and/or criminal liability in cases of violations.

13. MINERALS

a. Introduction

The presence of minerals on the Forest is a function of the geology. The volcanic terrain offers little in the way of valuable minerals (except geothermal resources). Most minerals are located in the granitic, metamorphic, and sedimentary rocks of the southern portion of the Forest, and in the lake deposits around Lake Benton in the northern part of the Forest.

Minerals are divided into three categories. (1) locatable minerals, (2) mineral materials, and (3) leasable minerals.

Locatable minerals are hard rock minerals such as gold, copper, silver, and other precious or semi-precious minerals, that may be acquired under the Mining Law of 1872, as amended.

Mineral materials are common varieties of sand, gravel, cinders, etc. that may be acquired under the Materials Act of 1947, as amended.

Leasable minerals are coal, oil and gas, geothermal resources, and other minerals that may be acquired under the Mineral Leasing Act of 1920, as amended, and under the Geothermal Steam Act of 1970. In addition, all minerals

located on acquired lands are leasable under the Mineral Leasing Act for Acquired Lands of 1917

The Organic Act of June 4, 1897 authorizes the prospecting, locating, and development of mineral resources on National Forests. It also allows the Secretary of Agriculture to set out rules and regulations for operations authorized by mining law. These regulations, which minimize impacts on the resources or define procedures, can be found in 36 CFR 228 (locatable minerals and disposal of mineral materials) and 36 CFR 293.14 (mineral leases and permits in Wilderness).

Generally, the Secretary of Interior retains the authority to manage locatable mineral resources on National Forests. Agreements, embodied in Memoranda of Understanding between the Secretaries of Agriculture and Interior who share various work processes, are found in FSM 1500, External Relations. The Forest Service retains authority for the management and disposal of locatable minerals and mineral materials (including, but not limited to common varieties of sand, stone, gravel, pumice, pumicite, cinders, and clay). The Forest Service is also responsible for managing surface resources on National Forest land in any mining or mineral leasing activity.

The detailed authorities and direction for locatable minerals, mineral leasing, and mineral sales are in Forest Service Manual 2800, Minerals and Geology.

At present, diatomite mining near Lake Butte is the main mining activity on the Forest. The Forest Service safeguards the surface resources such as soil, water, and wildlife by inspecting for compliance with the approved plans of operation for mining activities (36 CFR 228). There are no active mining operations for gold, or exploration or development of geothermal or oil and gas. A patented mine (situated on once-public but now-private land) in the southern portion of the Forest, the Carr Mine, is mined intermittently for gold. When active, it has produced an estimated 1,000 ounces annually, but it is currently inactive.

Profitable mining of a mineral deposit often depends on the ability to access it economically. Access for mineral exploration and development is generally unrestricted, subject to mitigation of

impacts to surface resources. Exceptions are wilderness, special areas (Research Natural Areas, Special Interest Areas, etc.), Wild and Scenic Rivers, and other specially designated land. Access to these areas is limited to valid existing rights and is restricted to the extent that the integrity of the area involved must be maintained. The specific restrictions for these areas are contained in the Forest Standards and Guidelines, Prescriptions, and Management Area Direction of the Forest Plan.

Weeks Law Lands A parcel of land with Weeks Law status is subject to the Act of March 4, 1917 which makes all minerals leasable, rather than locatable. The Forest thus has discretion whether or not to lease. One hundred and sixty acres on the Forest have Weeks Law status, 140 acres lie along Mill Creek in Tehama County, within the new Ishi Wilderness. Evidence indicates mineral potential for this area is low. The other twenty acres are northwest of Lake Almanor in Plumas County, and are occupied by the Forest's Almanor District office and airbase. Although the parcel's mineral potential is largely unknown, mineral leasing would be improbable because of the administrative use of the site.

Outstanding and Reserved Mineral Rights Outstanding and reserved mineral rights are rights to the mineral estate held by someone other than the holder of the surface rights. Approximately 1,300 acres of the Forest have outstanding mineral rights. These rights are vested in Leland Stanford Jr. University in perpetuity and consist of an undivided one-half interest in all oil, gas, or other hydrocarbon substances. The other one-half interest is held by the United States.

b. Supply

Nationally, the value of minerals produced annually increased 190 percent (in constant dollars) from 1950 to 1975. In California, the increase was 66 percent. On the Forest, past mineral activities have been limited, consisting mainly of some gold and diatomite mining. The Forest has approximately 1,200 mining claims and receives about six operating plans a year for mining.

Data gaps exist for occurrences of all minerals on the Forest. Extensive geologic work including a

Geologic Resources Inventory is necessary to improve knowledge of the mineral resource

Figure 3-9 is a map of the mineral potential for locatable minerals on the Forest, and Figure 3-10 is a similar map for leasable minerals. Each mineral potential category is defined as follows:

(1) *Locatable*

VH Very High Includes areas with active mines. Mineral development will take place during the planning period within at least a small part of the area.

H High Does not include areas with active mines, but mineral development will take place in the planning period within at least a small part of the area.

M Moderate Mineral development is expected during the planning period within at least a small part of the area.

L Low Mineral development may take place during the planning period within at least a small part of the area.

LIU Probably Low Based on existing data, the area appears to have a low potential, but the data base is inadequate to classify the area without question as low.

U Unknown There is not sufficient data to determine the potential for development within the planning period.

Locatable ratings are based on known mineral resource occurrences, past or present mineral-related activities, and the geology.

(2) *Leasable*

LE-VH Very High Includes areas within a Known Geothermal Resource Area (KGRA). Leasable mineral development will take place during the planning period within at least a small part of the area.

LE-H High Leasable mineral development is expected during the planning period within at least a small part of the area.

LE-M Moderate Leasable mineral development may take place during the planning period within at least a small part of the area.

LE-U Unknown There is not sufficient data to determine the potential for development within the planning period.

Leasable ratings are based upon known leasable resource occurrences, past or present activities (such as lease applications), geology and other data (thermal springs and wells, water chemistry, etc.).

Gold The Forest's major locatable minerals are gold and diatomite. Gold on the Forest is limited to deposits at the northern end of the Sierra Nevada province. Significant gold mining occurred historically. Although production records are incomplete and data are approximate, a mining district at the south end of the Forest produced at least 25,000 ounces of gold (and 1,300 ounces of silver) between 1889 and 1940, mostly from placer operations. Several gold-bearing gravel deposits in that area have been determined to be "subeconomic" (USDI 1983). Supply estimates for the entire Forest, however, would only be a guess.

Diatomite Diatomite or diatomaceous earth consists of microscopic siliceous skeletons of plants called diatoms. Total diatomite resources in the western U.S. have been estimated at 600 million tons. California produced 631,000 tons of diatomite in 1976 and has long been the source of 60 percent or more of the diatomite produced in the United States (Clark 1978). Some of the most extensive known deposits of freshwater-origin diatomite are found in the Lake Britton area. Although a supply estimate has not been made for these deposits, they are exposed over tens of square miles, many of them on Forest land. Some of the diatomite is covered by basalt lava flows. Mining is underway on Forest land south of Lake Britton and may expand to private and Forest land north of the lake. Until recently, two operators were removing about 150,000 tons of diatomaceous earth a year from open pits, for use as a silica source for cement.

Volcanic Materials Volcanic cinders are a mineral material abundant over the Forest's

Figure 3-9
Locatable Mineral Potential

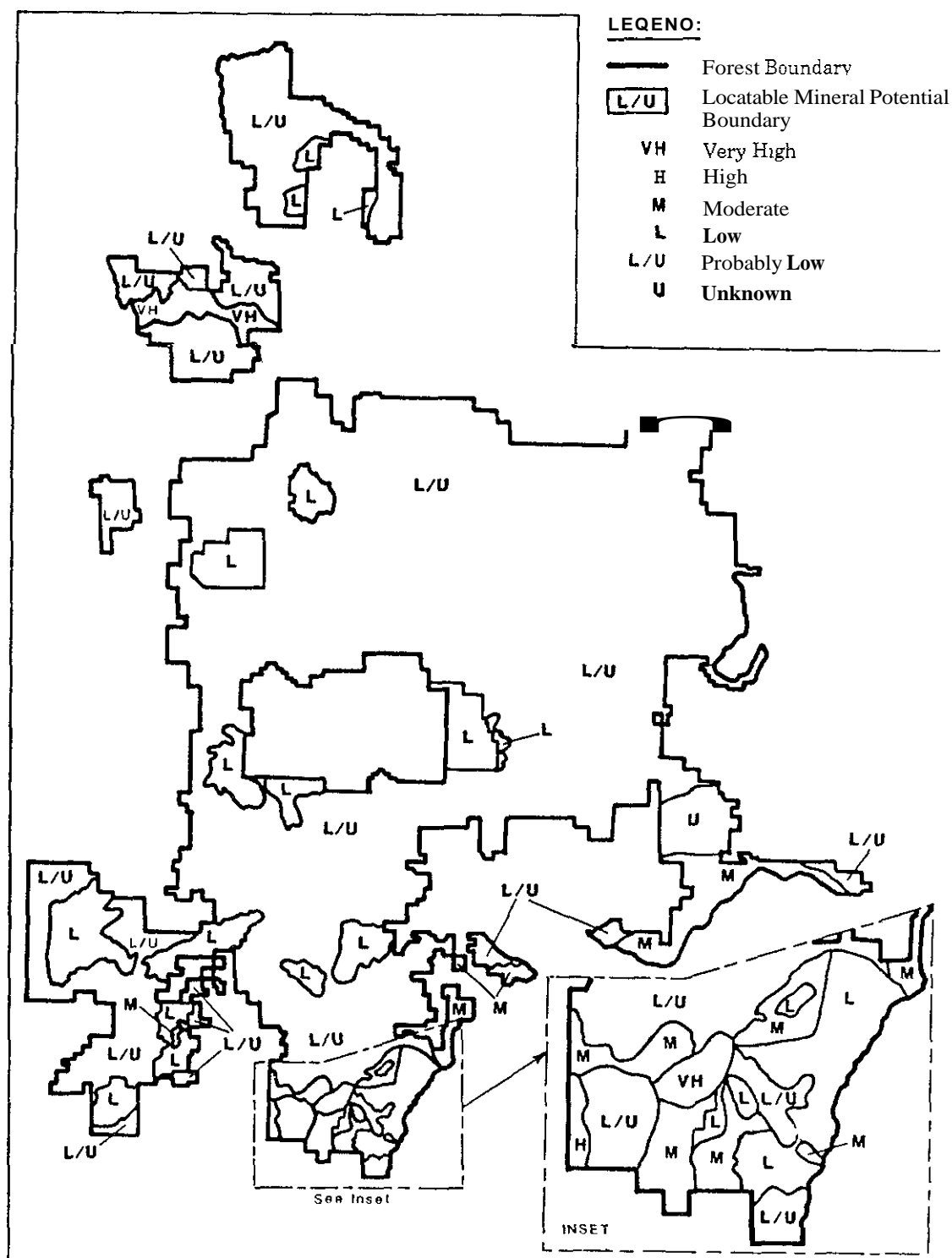
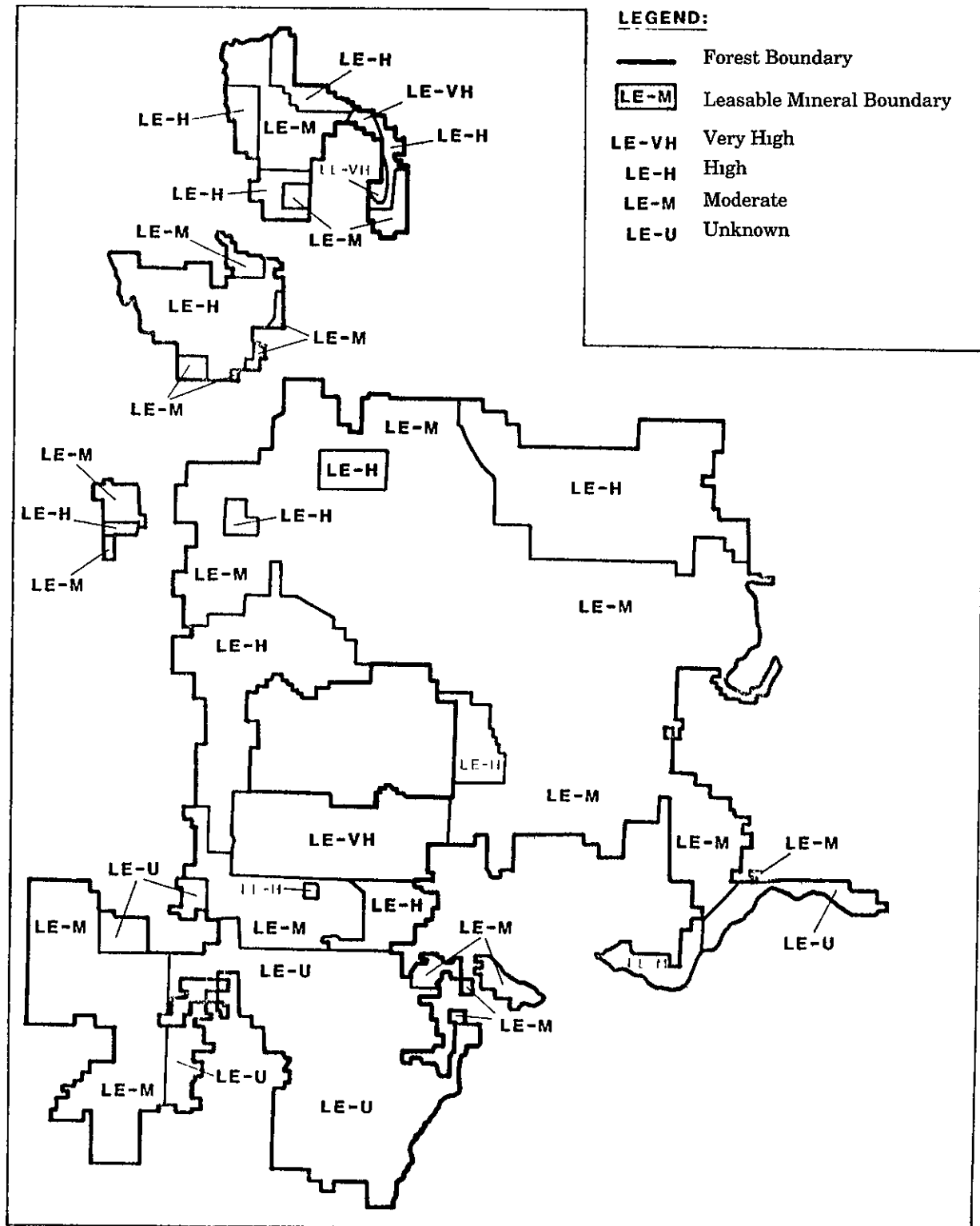


Figure 3-10

Leasable Mined Potential



volcanic terrain. More than 200,000 tons are removed each year, mainly for road fill or surfacing, with minor use as aggregate in asphalt and building blocks. One-third of the total tonnage is used by the Forest Service or its contractors, and the remaining two-thirds by public agencies for road building and maintenance, including "sanding" roads in winter. There are 40 active cinder pits and another five potential sites on the Forest; cinders are also commonly available on private land.

Flat, volcanic basalt, commonly referred to as "moss rock" is available on the north end of the Forest. The mineral material is used in landscaping and as a facing material on buildings and wall. Volume removed fluctuates between 50-500 tons per year.

Geothermal Signs of a potential geothermal resource include the hydrothermal features in and around Lassen Volcanic National Park, the recency of volcanic activity, and the abundance of faulting. The U.S. Bureau of Land Management has classified approximately the northern two-thirds of the Forest as prospectively valuable for geothermal resources. The BLM has also designated an area south of and adjacent to Lassen Park as a Known Geothermal Resource Area (KGRA). Total potential of the KGRA was originally estimated at 1,000 megawatts (Mw), but analysis of hydrothermal water has lowered that estimate to 100 Mw (USDI 1978), and more recently, to 75 Mw (Sorey and Ingebritsen 1984). A Forest Service/BLM Draft Environmental Impact Statement has been prepared. It analyzed where and under what conditions geothermal leasing may occur on National Forest lands in the vicinity of Lassen Volcanic National Park. The Final EIS and decision will be issued after BLM and the National Park Service reach agreement on possible impacts of development on Park features. The geothermal EIS is consistent with the more comprehensive Forest Plan EIS. In particular, the Forest Plan Appendix I, Mineral Lease Stipulation Criteria, contains direction derived from the geothermal EIS.

Oil and Gas A usable oil and gas resource may exist. The BLM has designated areas on the western edge of the Forest as prospectively valuable for oil and gas. Cretaceous rock strata that yield gas in the Central Valley occur in this area under Cascade volcanic flows. In addition Creta-

ceous rock strata with the general characteristics necessary for oil and gas formation occur on the northern portion of the Forest under 4,000 to 6,000 feet of volcanic rock. This area is part of the Hornbrook Basin. There is no known evidence that oil or gas reserves are present, and geophysical exploration in the area is continuing. Supply data on both geothermal and oil and gas are speculative. The nature and extent of these resources are not well known and will not be known until substantial exploration is underway.

c. Demand

The Nation is faced with substantial expansion of mining activity. U.S. production and demand for nearly all minerals has been rising and the trend is likely to continue. For example, production of non-metal minerals is expected to roughly double by the year 2000.

Gold Gold mining on the Forest is currently inactive but is expected to increase because a number of new claims have recently been filed. The price of gold appears to be the main factor that affects gold mining activity. A significant price increase would be reflected in increased mining at several sites on the Forest. Production from favorable lode deposits is expected soon; favorable stream deposits will also receive attention from both commercial and recreational miners.

Diatomite Diatomite demand is expected to increase in conjunction with the projected increase for all non-metallic minerals.

Volcanic Materials Any increase in the primary use of cinders—road building and maintenance—would increase demand for cinders from National Forest lands. The abundant supply will accommodate demand. No significant increase is expected, however, in the Forest Service demand for cinders. Demand for moss rock is continuing on a steady or slightly increasing trend, dependent on the housing and landscaping markets.

Geothermal Geothermal energy demand has been expressed by the filing of over 100 (as of 1984) non-competitive lease applications on the Forest. In 1982 the Forest conducted an environmental analysis and made recommendations on

approval of these leases, but the decisions were appealed and are under reconsideration. Most of these applications have been rescinded, while new ones are periodically received. The KGRA south of the Park has been divided into 20 lease areas that are proposed to be sold competitively. This will give the best indication of demand for the Forest's geothermal resource. From a regional perspective this KGRA ranks below both the Mono-Long Valley KGRA and the Glass Mountain KGRA in estimated potential (USDI 1978). Another environmental analysis is being conducted to document the rationale and environmental effects of lease/no lease recommendations on part of the Forest.

Oil and Gas Demand for oil and gas has been expressed by the filing of over 50 (as of 1984) non-competitive lease applications on the Forest. Three of these were addressed in an environmental assessment in 1982. The leases were denied because they lay within the Eagle Lake planning area, an area of high environmental sensitivity. As a result of this and other actions, the Forest is initiating steps to recommend that the area be withdrawn from mineral entry and from mineral leasing. The other lease applications will be processed through environmental analysis. As with geothermal, oil and gas applications are occasionally rescinded, while new ones are received. Geophysical exploration is underway, but the surge in lease activity that followed the decontrol of oil prices has waned. Demand is believed sensitive to oil and gas prices, so decontrol of natural gas prices or long term increases in oil prices may rekindle interest in exploration. Locally, results from the geophysical exploration on the Forest will influence future interest in this resource.

14. RANGE

a. Introduction

The Forest's range resource consists of approximately 410,000 acres that are suitable for livestock grazing. This includes the western foothills, consisting of California annual grassland, the central portion, consisting of wet sedge meadows interspersed with dense fir and pine stands, and the eastern portion consisting of mosaics of eastside pine, big sagebrush, and dry perennial grass meadows. The wide ranges in precipita-

tion and elevation cause a wide variety of range types and productiveness. Allotment assessments in 1980 rated the range resource condition as 28 percent good, 59 percent fair, and 13 percent poor. Overall, rangelands are in satisfactory condition, either stable or improving.

The Forest is divided into **65** grazing allotments. Four are closed to grazing because of conflicts with urbanization, wildlife, and management of other resources. The livestock in the remaining 61 open allotments consume over 49,700 animal unit months (AUM's) annually. (An AUM is 1,000 pounds of forage needed to support a cow per month.) Most of the allotments are grazed from June through October; 10 are grazed during spring, winter, or year-long.

Fifty-two permittees utilize the **61** grazing allotments with approximately 8,500 cattle. Two allotments were also grazed in common with 2,000 sheep (prior to 1983). The majority of the permittees own base ranches in the Sacramento Valley near the communities of Chico, Oroville, Red Bluff, or Redding, while others own base ranches in the Hat Creek Valley, Fall River, Susanville, Janesville, or Doyle areas. These permittees are dependent on the Forest range resource as part of their ranches' year-round livestock operations and for maintenance of an economic ranch unit. Generally, they summer their cattle on the Forest and winter them on their private base ranches.

In the southwestern portion of the Forest, the range resource is also affected by a herd of approximately 21 wild horses, which are under the protection of the Wild Horse and Burro Protection Act of 1971 (WHBPA). The herd management goal is to maintain a healthy population within the capacity of the herd territory that is compatible with other resources.

The current range management goal on the Forest is to maintain and enhance the range resource and condition, while providing long-term grazing for domestic livestock. To meet the goal, the Forest implements range management strategies on 61 allotments, range improvements (e.g. fencing, water developments, vegetation type conversions, and seedings), and range techniques (e.g. salting, riding, water hauling, coordination with other resources, and controlling the season of use).

b. Management Situations

The following are situations where management conflicts can occur

Grazing Conflicts Livestock are permitted to graze the range resource in timber stands, sage flats, foothill grasslands, meadows, wetlands, lake shores, and riparian areas. Livestock have a tendency to favor riparian areas because of the availability of water, forage, coolness, and the ease of trailing. This preference can lead to livestock concentrations and their associated effects of excessive foraging, vegetation trampling, streambank slumping and especially water quality degradation. These effects have raised public and State concern over water quality degradation, especially of Eagle Lake and its tributaries. This concern includes the effects of livestock grazing on the nine range allotments within the Eagle Lake watershed. These range allotments represent 25 percent of the Forest's annual AUM's production.

Traffic Hazards The Forest lies within counties that have open-range laws. Some highways are therefore not fenced and livestock roam freely across them in search of water or forage. A collision hazard exists between livestock and vehicles along these highways, especially in forested areas and at night.

Nesting Disturbances Some wetlands have been developed with islands for nesting waterfowl. In dry years, water in the wetlands recedes out to the nesting islands before the nesting season ends. As the water dries up around the islands, the livestock often graze the islands and disturb nests.

Management Intensity Intensive grazing practices can potentially detract from other resources such as wildlife and fisheries. The intensity of range development and use can be adjusted to accommodate these other values.

Techniques Techniques such as prescribed burning, mechanical treatment, or herbicides are used to manipulate vegetation. There are concerns over which techniques to use for vegetative management to maintain or enhance the range resource. When selecting the best technique, Forest managers consider costs, benefits, concerns, and effects on the biological environment.

Wild Horses There is concern over the stability of the wild horse herd and the range resource within its territory. Management of the herd and the range is based on their needs and guided by the Wild Horse and Burro Protection Act.

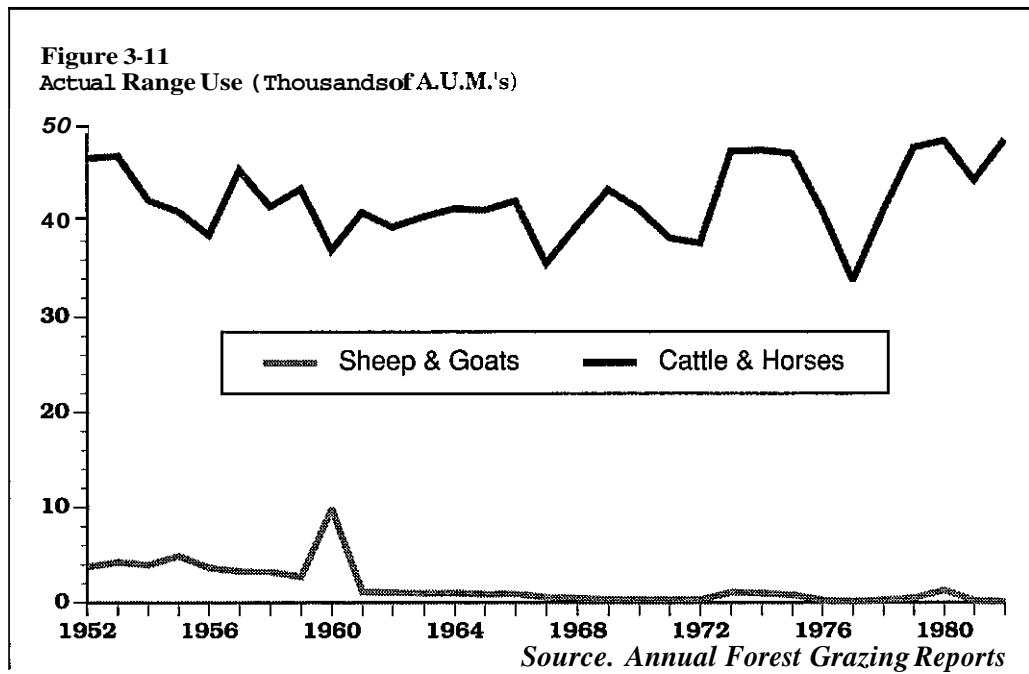
c. Supply

About 36 percent of the Forest's 1,129,585 acres are suitable for livestock grazing. The 61 open allotments now produce about 49,700 AUM's and can be expanded to 58,000 AUM's with more range improvements, livestock numbers, and transitory range use. Given this, the range benchmark indicates that Forest potential for five decades averages 69,700 AUM's per year. In order to meet this target while maintaining and enhancing the range resource, the following would need to be done: (1) establish stock water sources in secondary and transitory range where no water exists, (2) increase investments for fencing transitory range to protect plantations and control forage utilization, (3) implement additional range improvement investments by permittees and the Forest to increase forage production, (4) increase prescribed burning for forage production in eastside pine, (5) clean up areas with thinning slash on the ground to promote forage production, and (6) increase investments to fence out riparian areas to protect riparian vegetation, fisheries, and water quality.

The Forest's 58,000 AUM grazing capacity is the third largest in the Pacific Southwest Region. The Forest collects about \$85,000 each year in grazing receipts, but this can vary annually depending on the amount of permitted use and the grazing fee. In 1982, the grazing fee for federal lands was \$1.86 per AUM. The current fee is \$1.97 per AUM but could change in the future. Twenty-five percent of grazing fee receipts collected are returned to the National Forest for range improvement. These receipts constitute the Range Betterment Fund.

The wild horse herd is being managed as the Wild Horse and Burro Protection Act dictates. Currently the herd numbers 21 and utilizes about 300 AUMs per year.

Range supply information comes from range allotment evaluations, allotment management plans, actual use records, and the Forest ten year range improvement plan.



d. Demand

The demand for the Forest's forage comes from the livestock industry in communities adjacent to and within the Forest. This demand began in the late 1800's before the National Forest was established. Since 1906, records indicate that cattle grazing on the Forest has shown a slight net increase. Recently it has fluctuated from a low of 33,890 AUM's in 1980 to a high of 49,700 AUM's in 1982 (see Figure 3-11). These variations are attributed to (1) severe weather conditions such as drought and heavy snowfall, (2) fluctuating interest rates, and (3) fluctuating per capita consumer consumption of beef. On the other hand, the demand for use by sheep has decreased drastically from 4,895 AUM's in 1955 to 0 AUM's in 1983. The sheep industry experienced a major reduction in per capita consumption of lamb and sheep products, along with the factors listed above.

Livestock industry demand for the Forest's forage will remain constant if costs to graze on public lands are less than costs for alternate feed sources. Demand would increase if the per capita beef consumption increases.

The demand for forage by the Forest wild horse herd will continue at current levels unless the

herd is affected by environmental or population changes.

e. Opportunities

Opportunities are good to improve the range resource and its management. This will depend primarily on three factors: (1) coordination with other resources such as timber, wildlife, watershed, and fire management, (2) coordination with the livestock permittees, and (3) stability of the livestock industry.

Coordination with other resources involves resource projects (e.g. chaparral burning, grazing systems, and stock ponds) that benefit livestock as well as wildlife and other resources. Cooperative or complementary activities such as these can reduce net cost while yielding multiple benefits.

The improved coordination with the livestock permittee involves the permittee accepting, implementing and investing in changes in range strategies and developments the Forest may propose to benefit both public and private range resources. Such changes may also require the permittee to make adjustments in his home ranch operation, herd size, cattle breed and/or type.

The stability of the livestock industry will benefit the range resource because it allows the permittees to make long term investments on their Forest allotments to improve range conditions

f. Trends

Improved management of the range resource will be pursued through the development and implementation of Integrated Resource Management Plans (IRM). The intent of IRM is to consider all resources in a more balanced way during the preparation of allotment management plans

15. RECREATION

a. Introduction

The Forest offers a wide variety of year-round recreation opportunities, including camping, hunting, fishing, hiking, horseback riding, driving for pleasure, picnicking, snowmobiling, skiing, and off-highway vehicle use. National Forest recreation is divided into three categories: developed, dispersed, and wilderness. This discussion covers developed recreation (that associated with constructed sites) and dispersed recreation (that occurring away from developed sites). For discussion of wilderness recreation, see the Wilderness and Further Planning Areas section of this Chapter

In 1990, the Forest's recreation use totaled 1,242,600 recreation visitor days (RVD's). One RVD equals 12 hours of recreation use by one person or any combination thereof that equals 12 hours. Of that usage, sixty-two percent was at developed recreation sites, and 38 percent was for dispersed recreation (including one percent for recreation in wilderness)

In 1990, the Forest ranked thirteenth out of 18 Forests in the Region for recreation use. Most of the visitors come from northern California counties, including the major population centers of San Francisco, Sacramento, Chico, Red Bluff, and Redding. Streams, natural lakes, and man-made reservoirs are major attractions. Lake Almanor, Silver Lake, Eagle Lake, Deer Creek, Mill Creek, and Hat Creek receive the heaviest concentrations of use

b. Developed Recreation

(1) Developed Recreation - Public Sector

Table 3-11 summarizes the Forest's 64 developed public recreation facilities, four of which are developed campgrounds operated by Pacific Gas and Electric Company (PG&E). In 1984, the Forest began contracting operation of the Eagle Lake Recreation Area to a concessionaire under the terms of a special use permit. The current permit-holder is the Chico State Foundation of Chico, California.

Depending on the convenience facilities present, campground fees vary from \$5 to \$11 for individual campsites and \$10-\$16 for larger family campsites where they are available. Sanitary trailer dump stations are available at the Eagle Lake Recreation Area and at the Hat Creek

Table 3-11

Developed Recreation Facilities, 1990

Type of Site	Number	Persons at One Time
<i>Public Sector</i>		
Campground, Family*	40	5,321
Campground, Group	2	300
Picnic Ground	6	250
Boat Ramp	3	1,375
Observation	1	30
Interpretive	5	215
Swimming	2	1,450
Winter Sports	5	450
Total	64	9,391
<i>Private Sector</i>		
Hotel, Lodge, Resort	1	100
Organizational Site	4	1,020
Recreation Residence	400	2,160
Winter Sports Site	2	680
Boat Dock	1	300
Total	408	4,260

* Includes four campgrounds (150 PAOT's) operated by PG&E

Source Updated from 1982 Recreation Information Management (RIM) data

Recreation Area near Old Station The Forest operates the sewage treatment plant at Little Merrill Flat southwest of Eagle Lake

The use of campgrounds follows the same pattern each year They are open only in summer because visitors come mostly between Memorial Day and Labor Day Many campgrounds fill to capacity on weekends and holidays, but offer ample room on weekdays With the increase in the numbers of retired persons traveling by recreational vehicle or trailer, and the shift towards year round school, midweek campground use is increasing

The most desirable campgrounds and campsites within campgrounds are along lakes and streams These are filled to near capacity most of the summer while others are used mostly during peak times The Forest has six picnic areas, one of which is maintained by a private operator under special use permit at Eagle Lake Most are located along the major State Highways 89 and 44, and at the Eagle Lake recreation complex.

There are four winter OHV staging areas Ashpan, Morgan Summit, Swain Mountain and Jonesville Snowmobile Parks. A majority of the funding to construct and operate these facilities is provided through the State "Greensticker" grant process These sites access roads for winter use by snowmobiles and cross-country skiers One snow play area is located at Eskimo Hill

Interpretation (visitor information) facilities are an integral part of public recreation The Forest has five interpretive sites Two are trails, two are information sites, and one is a visitor center operated jointly with Lassen Volcanic National Park Unstaffed roadside information sites at Forest entrances are planned to implement the Regional directive for increased Forest visibility to the public

In recent years, budgetary constraints have greatly reduced interpretive programs Interpretive campfire programs and guided walks have been discontinued except at the Eagle Lake Recreation Area, where the concessionaire and the Eagle Lake Recreation District cooperate to provide interpretive programs during the summer months

The Forest has developed three boat ramps on popular lakes and two swimming areas for sunbathing, swimming, and water play

The overall quality of the developed site resource is high, that is, most structures are in good repair and receive regular maintenance

A few recreation sites are wearing out and major rehabilitation will be needed Many of the recreation sites on the Forest were constructed in the 1960s-1970s and do not meet current standards for barrier-free access and are not designed to accommodate modern recreational vehicles and trailers Major rehabilitation of the campgrounds and day-use areas will be needed to allow access to a wider range of users The Forest has had a good record of providing full-service management at most of its sites, although this has been reduced recently The vegetation in the campgrounds is generally healthy and shows no significant signs of deterioration due to recreation use. However, some campgrounds, particularly on the Almanor District, do show signs of soil erosion and compaction. Periodic rest would benefit those campgrounds by allowing an accumulation of ground litter and perennial vegetation, but there would be no facilities available to accommodate the users while these sites would be closed for rehabilitation

(2) Developed Recreation - Private Sector

The Forest administers special use permits for the following private recreational uses 400 recreation residences within nine separate tracts, four organization camps, one lodge-resort, two small ski areas, one manna; and one rest stop The special uses are largely concentrated on the Almanor Ranger District in the cool mixed conifer timber zone

Few conflicts exist between these special uses and other public needs Because of the single-use nature of recreation residence lots, the issue of exchanging affected public lands for desirable private lands has been raised There are some opportunities for such land adjustments

Of the 400 recreation residence lots, seven along the shores of Lake Almanor were identified in 1973 for permit termination in 1983 Since that time, the termination dates have been extended on an annual basis pending review of the 1973 Future Use Determination decision and project planning for campground expansions

Two ski areas operate on the Forest, Coppeviale Ski Hill Area and Stover Mountain Ski Area. They have a combined capacity of 680 skiers at one time (SAOT). These sites have limited expansion potential. The most promising area for potential future development is the proposed Carter Bowl Ski Area on Butt Mountain. (Estimated potential capacity is 6,000 SAOT on approximately 2,400 acres of skiable terrain.) A ski area in Lassen Volcanic National Park provides a triple chair lift and rope tow for skiers who are mainly from the Chester, Chico, and Red Bluff areas. Approximately 55,000 skiers used this area in 1984. The 1981 Lassen Volcanic National Park Master Plan indicates, however, that this facility will be phased out in 20 years, but only if another suitable facility is developed outside the National Park. Development of the Carter Bowl Ski Area would satisfy this need.

c. Dispersed Recreation

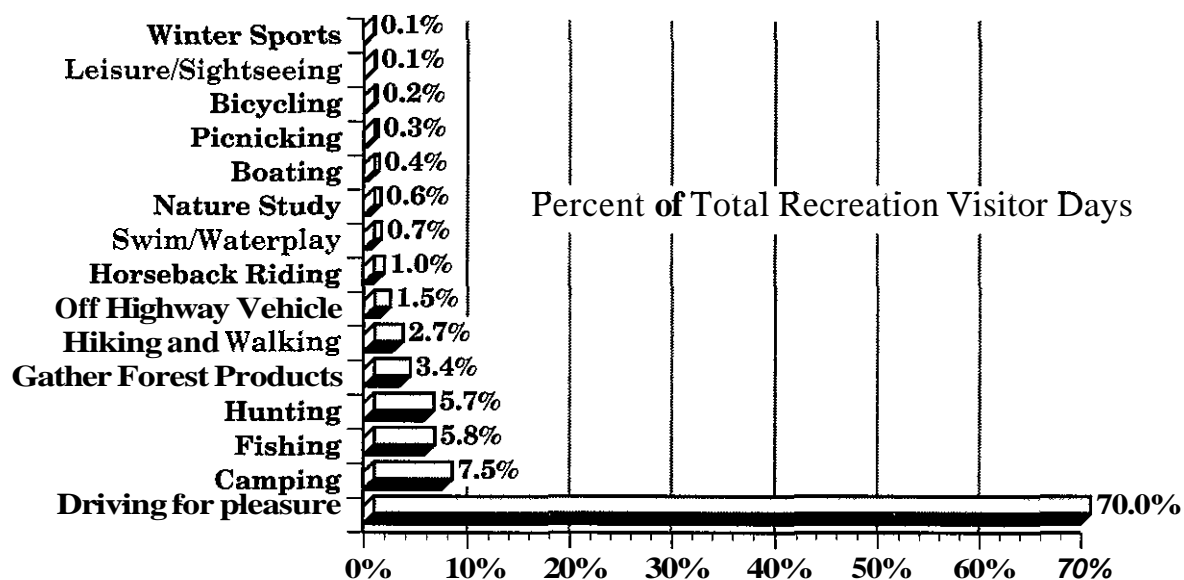
The Forest provides a wide variety of high quality dispersed recreation opportunities and experiences. In 1990, dispersed recreation was estimated to be 38 percent of total recreation use. By

far the most popular activity was driving for pleasure, followed by much lower figures for fishing, camping, hunting, and hiking/walking. Figure 3-12 shows the popularity of the 15 types of dispersed recreation.

Most dispersed camping and fishing occurs near 40 lakes and along 120 miles of streams, particularly along Deer Creek, Hat Creek, and Mill Creek. The Forest is also popular for hunting. A large population of black-tailed deer winters in the western foothills and disperses through most of the Forest in summer months. Mule deer and pronghorn antelope are common on the east side. Waterfowl and upland bird hunting is also popular. Big game species occurring in smaller numbers are black bear, bobcat, and feral (wild) hog.

Recreationists use approximately 465 miles of trails throughout the Forest for hiking and horseback riding. Winter sports such as cross-country skiing and snowmobiling take place on unplowed roads and in open areas as well as on trails. The Pacific Crest National Scenic Trail crosses the Forest on a north-south axis, and three National Recreation Trails provide high quality hiking/

Figure 3-12
Dispersed Recreation Use (Outside Wilderness), 1982



Source: Forest Recreation Information Management (RIM) Data

equestrian experiences the McGowan Cross Country Ski Trail, the Heart Lake Trail, and the Spencer Meadow Trail. Three miles of the Heart Lake Trail on the Hat Creek District will be nominated for inclusion in the National Recreation Trail System. The Lassen Emigrant and Nobles Emigrant National Historic Trails were established by emigrants entering California during the 1850's gold rush. These trails offer special historical value. Cross-country skiers ski the McGowan Cross Country Ski Trail and the Butte Lake Trail. Much of the Forest's road system is skiable during winter months. Table 3-6 in the Facilities section shows the mileage of existing trails by category.

Use of Forest trails is light to moderate. The user capacity of the trail system is undetermined. New trails will be built primarily to provide access into desired areas, enhance recreation experiences, and disperse use. Reconstruction of various segments of the existing trail system is generally a higher priority than new construction. The Forest and BLM have completed a management plan to jointly manage 26 miles of the new "Rails to Trails" Bizz Johnson Trail. The Pacific Crest Trail Management Plan calls for

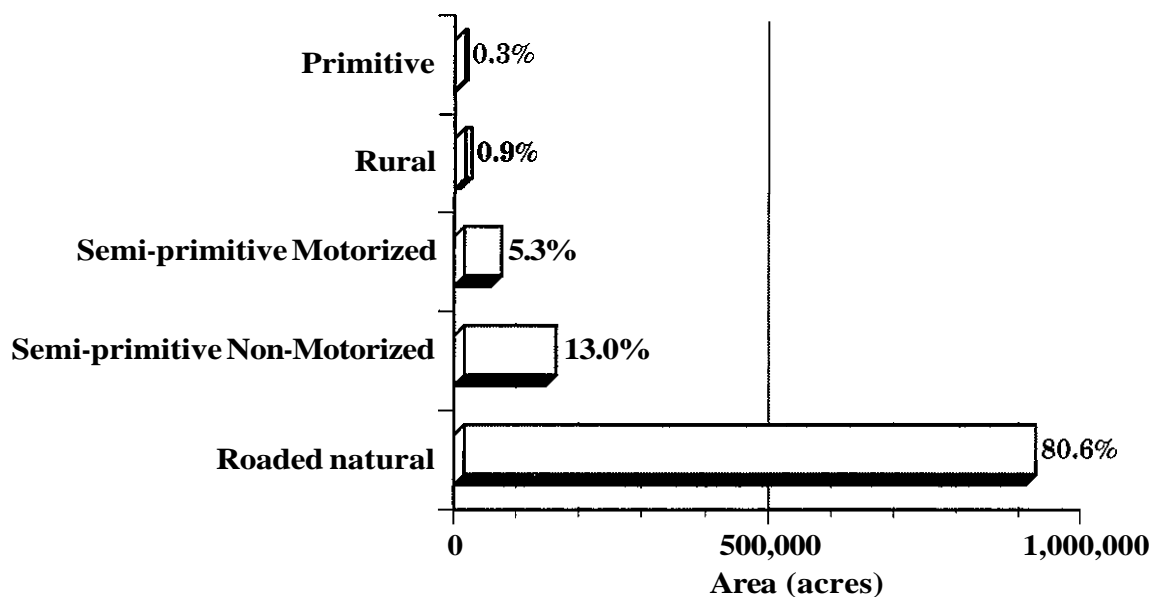
two additional trailheads—one at Domingo Springs near Chester, and the other at McArthur-Burney Falls State Park near Lake Britton. The latter facility is being constructed by cooperative efforts between the State and the Forest.

d. Recreation Opportunity Spectrum

The Recreation Opportunity Spectrum (ROS) provides a framework for stratifying and defining classes of environment for outdoor recreation opportunity. Each ROS class is defined by a combination of size, setting, distance from roads, activities, and probable experience opportunities. Figure 3-13 shows the existing inventory of ROS classes on the Forest as of 1982. Appendix K gives definitions of the five ROS classes.

The very small area of primitive ROS class lies within the Caribou Wilderness. Most of the semi-primitive non-motorized class lies within the Caribou, Thousand Lakes, and Ishi Wilderness Areas. Although these Wilderness areas do not meet the remoteness criteria for the primitive ROS class, they are managed to provide a primitive character. The other 50 percent lies primarily within the Forest's 21 unroaded areas.

Figure 3-13
Recreation Opportunity Spectrum (ROS) Acreages
(Including Wilderness), 1982



Source: Forest Data Base

including the six further planning areas. Among the 21 unroaded areas there are three areas (Lava, Mayfield, and Timbered Crater) totaling 30,247 acres that provide virtually no recreation opportunity due to the lava bed terrain. The roaded natural and rural ROS classes offer recreation opportunities with developed site facilities and moderate to high numbers of recreation visitors. Major travel corridors such as State Highways 32, 36, 44, and 89 offer concentrated use and more social encounters. The majority of developed campgrounds are located along these corridors.

Off-Highway Vehicles Most of the Forest is open to off-highway vehicles (OHV) with no restrictions (see Table 3-12). Off-highway vehicle drivers primarily use the 36 miles of designated four-wheel drive trails and the semi-primitive motorized ROS areas. OHV use in 1990 was approximately 1.5 percent of the total dispersed recreation use.

Table 3-12

Off-Highway Vehicle Recreation Opportunities

	Number of OHV Plan Areas	Total Acres
Open to OHV's No Restrictions	N/A	960,681
Open to OHV's With Restrictions	3	56,730
Closed to OHV's	22	112,174

Source: Forest Off-Highway Vehicle Management Plan (1976)

In 1984, 17,614 acres of semi-primitive motorized ROS class were reclassified as the Ishi Wilderness. This was a significant reduction in the opportunities for semi-primitive motorized experiences on the Forest. The Forest's Off-Highway Vehicle Management Plan will be amended to reflect this change after the Forest Plan is approved.

Mountain Bicycles Mountain bicycles are a recent and growing phenomenon. The Wilderness Act prohibits the use of mountain bicycles

within wilderness. Regional Forest Service policy prohibits their use on the Pacific Crest National Scenic Trail. The Bizz Johnson Trail is gaining popularity for mountain biking. Several organized group rides take place annually on the Bizz Johnson Trail and on a number of forest roads.

e. Supply

Current and potential supply has been estimated for several forms of recreation including developed, recreation residences, and general dispersed, which includes hunting, fishing, and OHV use.

Developed Recreation The maximum practical campground capacity is 567,155 RVD's per year. Use in 1990 was 420,400 RVD's (see Table 3-13). The supply of developed campgrounds is adequate to meet the present demand on most weekends. However, the more desirable campgrounds along lakes and streams are regularly full and reach or exceed capacity on heavy use weekends and holidays. Should the need arise, opportunities exist for new sites. The Forest has identified 184 sites for potential recreation development. These are distributed throughout the Forest, and range from campgrounds and picnic grounds to observation sites and winter sports sites. The most popular sites around lakes and streams are in constant demand, and there is very limited opportunity for future development of similar sites. Demand exceeds supply for multi-family units and large group sites. Expansion and rehabilitation of group camping and picnicking facilities are planned.

Recreation Residences The Forest supplies land for 400 private recreation residences. National policy precludes the establishment of additional recreation residence tracts on National Forest land. Private subdivisions and private lands have adequate potential to fulfill demands for second homes, resorts, and summer camps on private lands intermingled with the Forest.

Dispersed Recreation The Forest had 471,000 RVD's of dispersed recreation in 1990. Of that, 70 percent was associated with the Forest road system. Although much of the Forest is roaded, there are some roadless areas with great potential for recreation. Existing dispersed use for the Forest was compared with the capacity estimates by activity category and by ROS class.

Table 3-13**Developed Recreation Use, 1990
(Thousand RVD's)**

Public Sector		Private Sector	
Type of Site	M RVD	Type of Site	M RVD
Campground, Family	420.4	Hotel, Lodge, Resort	4.5
Picnic Ground	26.4	Organization Site	47.0
Boat Ramp	36.3	Recreation Residence	91.8
Observation	5.4	Winter Sports Site	4.2
Interpretive	9.0	Other Concessions	24.6
Swimming	15.2		
Sports & Games	22.0		
Tours & Walks	26.8		
Winter Sports	28.0		
Total	589.5	Total	172.1

Source: Updated from 1982 Recreation Information Management (RIM) data

These capacity estimates are based on theoretical national highs and lows. The Forest is far below its projected maximum carrying capacity for all dispersed activity categories. general dispersed recreation, fishing, hunting, and OHV. It should be noted, however, that the supply of semi-primitive motorized and non-motorized areas is presently sufficient, but not abundant. Adequate supply will depend on future land allocation decisions and the choice between motorized use versus non-motorized.

f. Demand

During the last decade most types of developed recreation increased in popularity. Winter sports uses increased the most, campground, organization site, and recreation residence site uses were relatively static, swimming and hotel/lodge/resort uses decreased significantly. Table 3-13 shows 1990 developed recreation by the various categories.

Demand, in an economic sense, is a relationship between price and quantity. The real price of recreation (a combination of equipment costs, travel costs, user fees, etc.) will affect the quantity of recreation demanded. It is assumed here that the real price (i.e., inflation adjusted price) of recreation will remain relatively stable.

Over the last ten years, recreation use has fluctuated up and down, but without a sustained trend. Statewide data on outdoor recreation suggests that, in the long run, use is primarily a function of population in the market area. The place of residence of the recreationists defines the market area. Place of residence of Lassen National Forest visitors was estimated using wilderness permit data and observations of District personnel. As Table 3-14 shows, most recreationists are California residents and are fairly evenly distributed throughout the State.

Population projections for the State of California, therefore, serve as a good estimator of changes in use for most kinds of recreation. Semi-primitive motorized recreation is the one exception. Ranger District personnel have observed a more localized market area for this type of recreation. To account for this, semi-primitive motorized recreation demand is projected using a weighted

Table 3-14**Place of Residence of Forest Recreationists**

Place of Residence	Percent of Users
San Francisco Bay Area	23
Sacramento	20
Southern & Central California	13
Northern California (North of Sacramento)	21
Local	8
Out of State	15

Source: Wilderness permit data, observations by Forest personnel

Table 3-15**Projected Recreation Use by ROS Class (Thousand RVD's per Year)**

Developed Recreation 1/	1982	1990	2000	2010	2020	2030
<u>ROS Class</u>						
Roaded Natural	269.4	260.0	312.3	375.0	450.0	540.0
Rural	<u>511.6</u>	<u>511.6</u>			<u>705.8</u>	
Sub Total	781.0	771.6	913.0	1,030.4	1,155.8	1318.2
Dispersed Recreation 2/						
<u>ROS Class 3/</u>						
Semi-Primitive Non-motorized	32.1	30.0	36.0	43.2	51.9	62.3
Semi-Primitive Motorized	30.5	35.6	42.8	51.4	61.7	74.1
Roaded Natural	385.9	384.2	461.4	554.1	665.5	799.2
Rural		<u>21.2</u>	<u>25.5</u>	<u>30.6</u>	<u>36.8</u>	<u>44.2</u>
Sub Total	464.4	471.0	565.7	679.3	815.9	979.8
1/ Developed recreation on private lands within the Forest is excluded						
2/ Note These RVD's include Wildlife and Fish User Days (WFUD's) discussed in the Fish and Wildlife section in this chapter. In other sections and chapters, use is displayed without WFUD's						
3/ Primitive ROS Class (0.3 percent of the Forest) not shown, no measurable use						
Source: State of California (1983) population projections applied to 1982-1990 Forest use data. Highest and lowest values discarded for each ROS Class						