United States
Department of
Agriculture

Forest Service

**Pacific
Northwest
Region**

1990

Appendices – Volume I

Final Environmental Impact Statement

Land and Resource Management Plan

Wallowa-Whitman National Forest

ACRONYMS AND ABBREVIATIONS USED IN THIS DOCUMENT

Those listed with an asterisk are further explained in the Glossary

AC - Acres
AMP - Allotment Management Plan *
AMS - Analysis of the Management Situation *
ASQ - Allowable Sale Quantity *
ATV - All Terrain Vehicle *
AU - Animal Unit *
AUM - Animal Unit Month *
BAP - Benzo (A) Pyrene
BCR - Benefit Cost Ratio
BF - Board Foot *
BIA - Bureau of Indian Affairs
BLM - Bureau of Land Management *
BMP - Best Management Practice *
BTU - British Thermal Unit *
CCC - Civilian Conservation Corps
CEQ - Council on Environmental Quality *
CFL - Commercial Forest Land *
CFR - Code of Federal Regulations *
CI - Capital Investment
CMAI - Culmination of Mean Annual Increment *
CMP - Comprehensive Management Plan (HCNRA)
CRITFC - Columbia River Inter-tribal Fish Commission
DBH - Diameter at Breast Height *
DEIS - Draft EIS *
DEP - Departure *
EA - Environmental Assessment *
EHF - Earned Harvest Factor
EIS - Environmental Impact Statement *
EO - Executive Order
EPA - Environmental Protection Agency *
FEIS - Final EIS *
FERC - Federal Energy Regulatory Commission
FIL - Fire Intensity Level *
FORPLAN *
FPFO - Forestry Program for Oregon
FRES - Forest Range Environmental Study *
FS - Forest Service
FSH - Forest Service Handbook
FSM - Forest Service Manual
FVB - Future Value of Benefits
FVC - Future Value of Costs
FY - Fiscal Year
GIS - Geographic Information System
GNP - Gross National Product
HCNRA - Hells Canyon National Recreation Area
HCRS - Heritage Conservation and Recreation Service
HEI - Habitat Effectiveness Index
ICO's - Issues, concerns, and Opportunities
I&DC - Insect and Disease Control
ID - Interdisciplinary
IPM - Integrated Pest Management *
IMPLAN *
INTEGER *
K-V Act - Knutson-Vandenberg Act *
KV - Kilovolt
LRMP - Land and Resource Management Plan
LTSY - Long Term Sustained Yield *
MA - Management Area
MAUM - Thousand Animal Unit Month
MBF - Thousand Board Feet
MCF - Thousand Cubic Feet
MIH - Management Information Handbook
MIS - Management Indicator Species
MM$ - Million Dollars
MMBF - Million Board Feet
MMCF - Million Cubic Feet
MOU - Memorandum of Understanding
MR - Management Requirement
MRVD - Thousand Recreation Visitor Days
MS - Management Strategy(ies)
MWFUD - Thousand Wildlife/Fish User Day
NA - No Action
NAS - National Activity Structure
NC - No Change
NDF - Nondeclining Flow *
NEPA - National Environmental Policy Act
NFMA - National Forest Management Act
NFMAS - National Fire Management Analysis System
NPB - Net Public Benefits
NRA - National Recreation Area (HCNRA)
NRT - National Recreation Trail *
O&M - Operation and Maintenance
OBERS - Office of Business Economics - Economic Research Service
ODFW - Oregon Department of Fish and Wildlife
ONRC - Oregon Natural Resources Council
ORV - Off Road Vehicle
PAOT - Persons At One Time
P&M - Protection and Management Funds
PILOT - Payment in Lieu of Taxes
PL - Public Law
PNV - Present Net Value
PNW - Pacific Northwest
POM - Polycylic Organic Matter
PVB - Present Value of Benefits
PVC - Present Value of Costs
R-6 - Region 6
RARE II - Roadless Area Review and Evaluation *
RIM - Recreation Information Management *
RNA - Research Natural Area *
ROD - Record of Decision
ROS - Recreation Opportunity Spectrum *
RPA - Forest and Rangeland Renewable Resources Planning Act of 1974 *
RVD - Recreation Visitor Day *
SAF - Society of American Foresters
S&G - Standards and Guidelines
SCORP - Statewide Comprehensive Outdoor Recreation Plan
SHCI - Smolt Habitat Capability Index
SHPO - State Historical Preservation Officer (Office)
SIC - Standard Industrial Classification
SMA - Special Management Area
SMU - Streamside Management Unit *
SPM - Semiprimitive, Motorized
SPNM - Semiprimitive, Nonmotorized
T&E - Threatened and Endangered *
TRI - Total Resource Inventory *
TSI - Timber Stand Improvement *
TSPIRS - Timber Sale Program Information Reporting System
TSPQ - Timber Sale Program Quantity *
TSP - Total Suspended Particulates *
USGS - United States Geological Survey
U S - United States
USDA - United States Department of Agriculture
USDI - United States Department of Interior
VAC - Visual Absorption Capacity *
VMS - Visual Management System
VQO - Visual Quality Objective *
WFUD - Wildlife and Fish User Day *
WRC - Water Resources Council
WRS - Wilderness Recreation Spectrum *

APPENDICES

CONTENTS

		PAGE
A	ISSUES, CONCERNS, AND OPPORTUNITIES IDENTIFICATION PROCESS	A-1
B	DESCRIPTION OF THE ANALYSIS PROCESS	B-1
C.	UNDEVELOPED AREAS	C-1
D	STANDARDS AND GUIDELINES FOR ALL ALTERNATIVES	D-1
E	DETERMINATION OF LAND SUITABILITY FOR TIMBER PRODUCTION ON THE WALLOWA-WHITMAN NATIONAL FOREST	E-1
F	SEDIMENT COEFFICIENTS	F-1
G	WILDLIFE/FOREST DIVERSITY	G-1
H	POTENTIAL RESEARCH NATURAL AREAS	H-1
I.	POTENTIAL WILD AND SCENIC RIVERS	I-1
J	MINERALS	J-1
K	SENSITIVE VISUAL CORRIDORS	K-1
L	COMPARISON OF CURRENT AND PAST TIMBER INVENTORY DATA	L-1
M	ANALYSIS OF MANAGEMENT REQUIREMENTS	M-1
N.	PUBLIC COMMENTS AND FOREST SERVICE RESPONSES (APPENDIX VOLUMES II AND III)	N-1
O	BEST MANAGEMENT PRACTICES	O-1

Nature and Purpose of Appendices

The appendix materials are intended to supplement the environmental impact statement by providing process, procedural, or substantive detail for those readers who are interested in the more technical aspects Because of its technical nature, some of the appendix materials, especially parts of Appendix B, will not be easily understood by all readers

APPENDIX A

Issues, Concerns, and Opportunities Identification Process

APPENDIX A

IDENTIFICATION OF ISSUES, CONCERNS AND OPPORTUNITIES

I. "Issues, Concerns, and Opportunities" Identification Process

During the period of 1972 through 1981 the Forest was involved in preparation of three unit plans (Wallowa Valley, Grande Ronde and Burnt Powder) and the Hells Canyon National Recreation Area Plan. Each of these plans was developed in accordance with the National Environmental Policy Act of 1969 Therefore, identification of issues, concerns and opportunities (ICO's) was the basis for alternative development and comparison for each. Not surprisingly, many of the ICO's were similar in each of the plans. These included effects on local economy, timber production levels, livestock grazing levels, acres of old-growth habitat, and others. In addition, management concerns were similar in each planning unit as were the recognized opportunities for resolving concerns or improving conditions.

It is with this background that the identification of ICO's for the Forest Plan was initiated. Forest managers and planners were reasonably certain that the issues identified over the previous decade were still valid.

On July 30, 1979, the 1,400 people on the mailing list at that time were contacted. A suggested list of issues was provided. In response to this mailer, 180 people verified, suggested changes or deletions, or gave suggestions for new issues to be considered. The results of this initial effort are documented in a report termed "Development of the Preliminary Decision Criteria, Wallowa-Whitman National Forest "

On November 16, 1979, a meeting was held with the Forest Planning Citizens Panel. The panel included 13 representatives of local agencies and interest groups. A purpose of the meeting was to refine and firm up the ICO's

On March 26, 1980, we again contacted the mailing list (which had been trimmed to 1,100) with a tentative list of decision criteria based on the issues. On January 9, 1981 we provided feedback to the mailing list members on the final decision criteria (See "Development of the Preliminary Decision Criteria", Wallowa-Whitman National Forest, on file at the Forest Supervisor's Office in Baker, Oregon.) From that time until July, 1983, 30 formal meetings and numerous informal meetings were held with service clubs, interest groups, industry representatives, and others in which the issues were discussed

On July 29, 1983, those on the mailing list were again contacted, as was the citizens panel. The purpose was to reconsider the ICO's, due to the time that had elapsed, and to consider the wilderness issue. Feedback was provided on March 8, 1984 The issues redefined or confirmed at that time are those that are carried forward in this analysis and EIS An exception is the wilderness issue which was eliminated as a major issue with the passage of the Oregon Wilderness Act of 1984.

During the five years of developing the Forest Plan, the issues have remained fairly constant but have taken several forms. Originally they were stated as brief paragraphs with a list of the facets (concerns and opportunities) and a notation of related issues. In response to National direction, they were later reformatted as decision criteria

Then, due to concern that we were straying from NEPA direction, we were directed to return to issue statements In order to be able to quantitatively or qualitatively address the issues, each began with a problem statement to be resolved Recently, after reviewing several environmental statements, the Chief of the Forest Service has encouraged use of the narrative format used in Chapter I of this Environmental Impact Statement

II Consultation With Others

The National Environmental Policy Act of 1969 and the National Forest Management Act (1976) require that National Forest land management planning be an open process that encourages public participation Examples from the NFMA rules and regulations are.

> 36 CFR 219 6(a) Because the land and resource management planning process determines how the lands of the National Forest System are to be managed, the public is encouraged to participate throughout the planning process.
>
> 36 CFR 216 6(d) Public participation activities should be appropriate to the area and people involved Means of notification should be appropriate to the level of planning. Public participation activities may include, but are not limited to, requests for written comments, meetings, conferences, seminars, workshops, tours, and similar events designed to foster public review and comment.
>
> *36 CFR 219.7(a) The responsible line officer shall coordinate Regional and Forest* planning with the equivalent and related planning efforts of other Federal agencies, State and local governments, and Indian tribes.

The Wallowa-Whitman lies in rural northeast Oregon Communications within the area are perhaps less formal than in metropolitan areas. In order to keep the local public informed, the Forest has relied on day-to-day informal contacts as much as on formal contacts. An atmosphere exists whereby any interested persons can, at their convenience, visit or call the Forest Supervisor or planning team members and discuss concerns about any aspect of the planning process. The Forest recognized, however, that this approach would not reach the more distant Forest users, nor would it involve all of the local public To fulfill these needs, the following methods were used:

1. A notice of intent to prepare the Forest Plan and environmental documents was published *in the Federal Register.*

2 A citizens' panel was established which included members of various local government agencies and representatives of prominent local special interest groups. The panel met on an as needed basis and was a useful means of involving local officials as well as others. The panel provided an ongoing "sounding board" for the planning team, provided useful information, and enabled the panel members to hear each others' views. The panel included 13 non-Forest Service members as follows: a livestock rancher, a county cooperative extension agent, members of the Umatilla Tribal Council, State Land Conservation and Development Commission, Izaak Walton League, representative of the Blue Mountain Resources Council, Oregon State Department of Forestry, Oregon State Employment Division, Northwest Pine Association, Oregon Department of Economic Development, Wallowa Resource Council, Oregon Department of Fish and Wildlife, and a county judge

3 A mailing list containing the names of all persons who asked to be involved was maintained by the Forest The list included some 1,100 names Persons on the mailing

list were contacted at key points in the planning process and invited to provide information or opinion The mailing list was also used to update interested people on the status of planning six times during the development of the Forest Plan

4. News releases were used to help keep the local and regional publics informed Because of the local interest in land management planning-related issues, news reporters from Portland, La Grande, Baker, Lewiston, Enterprise, and Ontario newspapers often reported or prepared feature articles on various aspects of the planning effort.

5. The Forest responded to all requests for speakers at service clubs, civic groups, or other organizations

Following, in order of occurrence, are formal contacts made to date.

Date	Type of Contact	Who Contacted	Subject	Approximate Number of Non-Forest Service People Involved
6/22/79	Meeting	Forest Panel	Planning Update & Feedback	8
7/30/79	Mailer	Mailing List	Issues & Concerns	1100
8/11/79	Meeting	Oregon Department of Fish and Wildlife	Wildlife Concerns	9
11/16/79	Meeting	Forest Panel	Planning Update & Feedback	9
3/26/80	Mailer	Mailing List	Planning Update & Feedback	1100
7/16/80	Mailer	Mailing List	Decision Criteria	1100
8/7/80	Meeting	Forest Panel	Planning Update & Feedback	8
1/8/81	Meeting	Ellingson Timber Company	Information Gathering	1
1/9/81	Mailer	Mailing List	Summary of Decision Criteria	1100

1/13/81	Meeting	Blue Mountain Resources Council	Socioeconomic Concerns	7
2/5/81	Meeting	Northwest Pine Association	Timber Concerns	6
5/18/81	Tour	Timber Industry	Land Suitability	5
7/1/81	Mailer	Adjacent Private Landowners	Encourage Participation	1460
1/13/82	Meeting	Timber Industry	Planning Concerns	7
2/19/82	Meeting	Forest Panel	Planning Update & Feedback	10
3/25/82	Meeting	Wallowa Resources Council	Planning Concerns	5
4/21/82	Meeting	Union County Planner	Coordination	1
4/27/82	Meeting	Wallowa Resources Council	Planning Concerns	4
4/27/82	Meeting	Livestock Permittees	Grazing Concerns	24
4/27/82	Meeting	Wallowa County Planner	Coordination	3
6/2/82	Meeting	Oregon Department of Fish and Wildlife	Coordination	2
6/3/82	Meeting	Wallowa Resources Council	Planning Concerns	3
7/8/82	Meeting	Timber Industry	Planning Concerns	12
8/10/82	Meeting	Oregon Department of Fish and Wildlife	Coordination	5
8/19/82	Meeting	BLM	Coordination	2
8/21/82	Meeting	Umatilla Tribe	Encourage Participation	1

10/28/82	Meeting	Forest Panel	Update & Feedback	8
11/3/82	Meeting	County Officials	Baker City Watershed	2
1/6/83	Meeting	La Grande Chamber of Commerce	Planning Concerns	40
1/9/83	Meeting	Grande Ronde Resource Council	Planning Concerns	20
1/12/83	Meeting	Wallowa County Court	Encourage Participation	2
1/18/83	Meeting	Blue Mountain Resources Council	Planning Concerns	21
1/24/83	Meeting	Baker County Court	Coordination	3
1/25/83	Meeting	Boise Cascade Corporation	Planning Concerns	2
2/7/83	Meeting	Elgin Chamber of Commerce	Planning Concerns	30
2/8/83	Meeting	Timber Industry	Planning Concerns	5
2/10/83	Meeting	Wallowa County Chamber of Commerce	Planning Concerns	12
2/10/83	Meeting	Grande Ronde Resources Council	Planning Concerns	10
2/10/83	Meeting	Western Forests Industries Association	Planning Concerns	5
7/29/83	Mailing	Mailing List	Issues and Concerns	1100
11/4/83	Tour	Boise Cascade	Timber Concerns	1
11/29/83	Meeting	Forest Panel	Planning Update and Feedback	3
1/12/84	Meeting	Grande Ronde Resource Council and Izaak Walton League	Timber Sales and Planning	4

1/26/84	Meeting	Nez Perce Tribe	Planning Concerns	6
2/10/84	Meeting	Forest Panel	Planning Update and RPA	10
2/27/84	Meeting	National Wildlife Federation and Others	Planning	7
3/8/84	Mailer	Mailing List	Planning Update	1100
3/8/84	Meeting	Baker County Court	Planning and RPA	7
4/10/84	Meeting	Izaak Walton League	Planning Concerns	25
6/21/84	Meeting	Forest Panel	Planning Update	10
10/19/84	Meeting	Wallowa County Court	Planning Concerns	6
11/6/84	Meeting	Oregon Department of Fish and Wildlife	Planning Update, Concerns	2
11/14/84	Meeting	NW Pine Association	Planning Update	2
11/15/84	Meeting	Boise Cascade Corporation	Planning Update	2
12/16/84	Meeting	NW Pine Association and Boise Cascade Corporation	Timber Cost Data	2
2/26/85	Meeting	NW Pine Association and Boise Cascade Corporation	Timber Inventory Timber Land Suitability	5
3/25/85	Meeting	Oregon Natural Resources Council	Citizens Alternative	1
3/27/85	Meeting	Powder River Sportsmans Club	Citizens Alternative	1
3/27/85	Meeting	Wallowa-Whitman Timber Purchasers	Planning Update	30

3/28/85	Meeting	Oregon State Department of Forestry	Planning Update	1
4/5/85	Meeting	Powder River Sportsman Club	Citizens Alternative	1
4/10/85	Meeting	Powder River Sportsman Club	Citizens Alternative	1
4/12/85	Meeting	Powder River Sportsman Club	Citizens Alternative	1
4/15/85	Meeting	Powder River Sportsman Club	Citizens Alternative	1
5/7/85	Meeting	Umatilla Confederated Tribe	Planning Coordination	8
5/16/85	Meeting	Forest Panel	Planning Update	9
7/10/85	Meeting	Oregon Department of Fish and Wildlife	Planning Update and Old-Growth	2
11/7/85	Meeting	Baker County Chamber of Commerce Task Force	Planning Update	10
11/29/85	Meeting	Oregon Department of Forestry	Planning Update	1
3/13/86	Mailing	Environmental Protection Agency and Mailing List	DEIS and Draft Forest Plan	700
3/18/86	Press Conference	Local and Regional Press	DEIS Release	4
3/21/86	Meeting	Forest Panel	Planning Update and Feedback	7
3/24/86	Meeting	Baker County Court	Planning Update	6
3/25/86	Meeting	La Grande Rotary Club	Planning Update	70
4/1/86	Meeting	Union County Court	Planning Update	3
4/1/86	Meeting	Wallowa County Court	Planning Update	6

4/3/86	Meeting	Timber Industry Representative	Citizens Alternative	1
4/10/86	Meeting	Oregon Department of Fish and Wildlife	Plan Discussion	7
4/17/86	Meeting	Environmental Protection Agency	Planning Update	6
4/30/86	Meeting	State Agencies	Forest Plan Discussion	9
5/5/86	Meeting	State Agencies	Plan Discussion	12
5/8/86	Meeting	Timber Industry Representatives	Citizens Alternative	3
5/12/86	Meeting	Powder River Sportsman's Club	Citizens Alternative	2
5/19/86	Meeting	Union County Commercial Club	Plan Discussion	40
5/20/86	Meeting	Oregon Natural Resources Council	Citizens Alternative	1
5/20/86	Meeting	Earth First!	Citizens Alternative	1
6/5/86	Meeting	Forest Panel	Planning Update and Feedback	7
6/9/86	Meeting	Baker Rotary Club	Plan Discussion	22
6/10/86	Meeting	Baker Lions Club	Plan Discussion	35
6/11/86	Meeting	Umatilla Tribal Leaders and Others	Plan Discussion	24
6/13/86	Meeting	Nez Perce Tribal Council	Forest Plan Update	7
6/16/86	Meeting	Powder River Sportsman's Club	Citizens Alternative	2
6/16/86	Meeting	Vale Lions Club	Plan Discussion	14
6/16/86	Meeting	Wilderness Society	Plan Discussion	1

7/9/86	Radio Interview	Pendleton Listening Audience	Plan Discussion	Unknown
7/10/86	Meeting	Powder River Sportsman's Club	Citizens Alternative	2
7/15/86	Meeting	Baker Kiwanis Club	Plan Discussion	23
10/10/86	Meeting	State Agencies	Plan Discussion	14
11/20/86	Meeting	Oregon Department of Fish and Wildlife	Plan Discussion	5
12/15/86	Meeting	Enterprise Rotary Club	Plan Discussion	16
2/9/87	Meeting	Timber Industry Representatives	Citizens Alternative	3
3/31/87	Meeting	Oregon Natural Resources Council	Citizens Alternative	6
4/1/87	Meeting	Forest Panel	Planning Update and Feedback	8
4/10/87	Meeting	Snake River Valley Scaling Society	Plan Discussion	20
5/12/87	Meeting	Timber Industry Representatives	Citizens Alternative	1
5/26/87	Meeting	Timber Industry Representatives	Citizens Alternative	3
7/2/87	Meeting	Timber Industry Representatives	Citizens Alternative	2
7/10/87	Meeting	Timber Industry Representatives	Citizens Alternative	1
8/31/87	Meeting	Timber Data Corporation	Plan Discussion	1
10/9/87	Meeting	State Agency Heads	Plan Discussion and Field Trip	5
1/20/88	Meeting	Northwest Forestry Association	Citizens Alternative	11

3/1/88	Meeting	Union Commercial Club	Planning Update	10
8/25/88	Mailing	Mailing List	Forest Plan Supplement	700
10/17/88	Meeting	Cascade Holistic Economic Consultants	Plan Discussion	2
11/29/88	Meeting	Timber Industry	Forest Plan Supplement	6
2/29/89	Meeting	Pine, Eagle Valley Concensus Group	Citizens Alternative	35
3/6/89	Meeting	Pine, Eagle Valley Concensus Group	Citizens Alternative	6
3/16/89	Meeting	Pine, Eagle Valley Concensus Group	Citizens Alternative	6
3/16/89	Meeting	Northwest Forestry Association	Planning Update	5
3/28/89	Meeting	Pine, Eagle Valley Concensus Group	Citizens Alternative	18
4/4/89	Meeting	Pine, Eagle Valley Concensus Group	Citizens Alternative	6

III. Selected Issues, Concerns, and Opportunities

As described in Part I of this Appendix, the Forest had recently completed unit planning at the time development of the Draft Forest Land and Resource Management Plan was initiated Unit planning involved many of the same public groups, and the same lands, that were to be involved in developing the Forest Plan. Therefore, the planning team had a reasonable idea of the prominent issues and did not have to begin from zero in the scoping* process

All public comments gathered during the three times the public was contacted in regard to the ICO's were carefully sorted and tabulated Additional suggested issues or concerns were screened by the following criteria·

1. Is it appropriately addressed in a Forest Plan? (Many suggestions dealt with day-to-day administrative matters or projects which were already approved and being implemented in accordance with the National Environmental Policy Act of 1969)

*See Glossary

2 Is it part of a larger issue already described? (Many suggestions were made which were incorporated into the major issues originally described)

3. What is the level of public or administrative concern over a suggested issue? The number and intensity of responses on a suggested issue were used to gauge the level of concern over a potential issue (not how the issue should be resolved, just the level of concern). Those issues of apparently lesser concern were often incorporated as facets of major issues

Issues and concerns that were not likely to vary significantly between alternatives were addressed through revision of standards and guidelines Some were dismissed as instances where respondents offered suggestions that had to do with day-to-day administrative matters or were beyond the scope of the planning process.

Several issues evolved significantly during this public involvement process.

Timber as an issue became much more specific It originated as a concern over total timber quantities offered and grew to encompass concerns as to the mix of size classes and tree species offered as well as the total volume The problem of below cost timber sales was the latest facet to become a part of this issue

Roadless areas came full circle from emphasis on management of unroaded areas, including maintaining options for the future, through emphasis on which areas should be allocated to wilderness, and returning to an emphasis on how these unroaded areas should be managed now that the Oregon Wilderness Bill has become law

Responses to the DEIS and supplement, along with comments received on project level analysis while the FEIS was being developed, indicate that fish habitat is a major issue on the Wallowa-Whitman. This prompted the addition of fish habitat and water quality as an issue to be considered in this EIS. The two are treated in the same issue because they are so closely related in the context of land management.

The public, however, found difficulty in accepting our explanation of why we did not have a fish habitat or water quality related issue. In response to the DEIS, there were many comments about water quantity, riparian habitat, and fisheries In taking another look at the matter, and considering the high degree of public concern, we determined that fish habitat/water quality was a major issue and revised the final documents accordingly

Although not identified as issues in the scoping process, present net value, first-decade cash receipts, budget costs, and noncash benefits*, are by Forest Service direction to be used to compare alternatives. Therefore, they are treated as though they were issues. Also included is the benefit/cost ratio for each alternative

Since the required alternatives define the range of alternatives from commodity emphasis to amenity emphasis, the planning team task became one of "filling in the gaps" in order to ensure a range of reasonable alternatives from which a preferred alternative could be selected Rather than emphasizing certain issues with minimal consideration for others, Alternative D, C, C-departure, G and H were developed with more issue compromise in mind than is true with the other alternatives

*Noncash benefits occur when the National Forest provides goods or services at less than the amount users are willing to pay. The difference between the willingness to pay and the amount actually charged is the noncash benefit, i e the potential Federal income that is transferred to the user.

The primary issues are as follows

- Transportation System Management
- Timber Production
- Management of Undeveloped Areas
- Local Economy
- Recreation Diversity
- Livestock Grazing
- Old-Growth Timber
- Minerals
- Wildlife Habitat--Deer and Elk
- Fish Habitat/Water Quality

These issues are described in Chapter I of the EIS.

Of the nine major issues, nearly all are competitive to some degree. Examples of these conflicts are.

- Timber production vs old-growth ecosystems
- Timber production vs landscape appearance
- Timber production vs wildlife habitat
- Timber production vs undeveloped areas
- Transportation system vs undeveloped areas
- Transportation system vs wildlife habitat
- Local economy vs undeveloped areas
- Local economy vs old-growth habitat
- Livestock grazing vs fish habitat/water quality

Some issues were found to be competitive only above certain levels of production. For example, timber production and big-game habitat are complementary in Alternative F. When higher outputs of timber were sought in the remaining alternatives, these issues became competitive

Certain issues had to do with administrative matters or did not lend themselves to being resolved through the land management planning process. These were deferred for resolution *outside the process and are as follows*·

- Seasonal Road Closures for Recreational or Wildlife Purposes (to be addressed *through the annual Forest Travel Plan*).

- Botanical Area Needs (deferred to the next Forest Plan)

- Collocation of Forest Service administrative facilities in Wallowa County (determined through separate study)

- Specific management of the portions of the Oregon Trail on the Forest (separate project plan).

- Concern about lack of funding to implement the Hells Canyon National Recreation Area Comprehensive Management Plan on schedule

- Wild and Scenic River recommendations within wilderness and the Hells Canyon National Recreation Area. This decision was rendered moot by the President's signing PL

100-557, the Omnibus Oregon Wild and Scenic Rivers Act of 1988 This act includes virtually all the eligible streams within the Forest in Oregon, including those within wilderness and the National Recreation Area. The final documents have been revised to reflect this change.

- Various organizational and size of work force matters.

Other issues were identified that had minimum standards established by law. Therefore, although the outputs and effects may vary among alternatives, they were addressed by standards and guidelines and treated the same in all alternatives. They are as follows:

- Treatment of Threatened and Endangered Species
- Maintenance of Air Quality
- Protection of Wetlands and Floodplains
- Protection of Prime Forest, Range and Farmlands
- Consideration of Civil Rights
- Indian Treaties

APPENDIX B

Description of The Analysis Process

Appendix B

TABLE OF CONTENTS

DESCRIPTION OF THE ANALYSIS PROCESS

	PAGE
INTRODUCTION	1
Planning Problems	2
Planning Process	2
Inventory Data and Collect Information (Planning Step 3)	2
Analysis of the Management Situation (Planning Step 4)	3
Formulation of Alternatives (Planning Step 5)	3
Estimation of Effects of Alternatives (Planning Step 6)	3
INVENTORY OF DATA AND INFORMATION COLLECTION	4
Forest Data Base	4
Capability Areas	4
Production Coefficients	4
Suitable Lands	5
Developing Allocation and Scheduling Alternatives	5
Monitoring	5
Plan Implementation Programs	5
Sources of Data	5
THE FOREST PLANNING MODEL	7
Overview	7
The Analysis Process and Analytical Tools	8
Objective Function	10
Constraints	10
FORPLAN Interactions with Other Models	10
Identification of Analysis Areas	11
Identification of Prescriptions	17
Overview	17
Purpose, Criteria, and Assumptions for Prescription Categories	18

01305

Development of FORPLAN Timber Prescriptions 20

Management Practices and FORPLAN Management Intensities 20
Management Intensity 22
Range of Timber Management Options Considered 23

Development of Per Acre Yield Coefficients 24

Timber Yield Coefficients for Existing Stands 25
Timber Yield Coefficients for Regenerated Stands 26
Determining Silvicultural Systems 26
Standards for Dispersing Even-Aged Harvest Units 30
Predicting Timber Yields 30
Predicting Sawtimber Mortality Salvage 35
Resource Yield Tables 37

ECONOMIC EFFICIENCY ANALYSIS 39

Descriptions of Economic Efficiency Analysis Concepts 39

Priced Outputs 39
Nonpriced Outputs 40
Discounting 40
Present Net Value (PNV) 40
Opportunity Costs 41
Net Public Benefits (NPB) 41
Welfare Distribution Effects and Impacts 41

Parameters and Assumptions Used in Economic Efficiency Analysis 42

Discount Rates 42
Demand Functions and Real Price Trends 43
Real Cost Trends 44
Real Dollar Adjustments 44

Benefits and Costs Used in the Economic Efficiency Analysis 44

Fixed Costs 44
Variable Costs 46
Costs Not Included in the Economic Efficiency Analysis 49
Benefits Considered in Economic Efficiency Analysis 49
Benefits Whose Values Are Determined in the Marketplace 50
Benefits Whose Values Are Not Determined in the Marketplace 52
Consideration of Nondollar-Quantified Costs and Benefits 52

01306

SOCIAL AND ECONOMIC IMPACT ANALYSIS 66

Social and Economic Overview 66

Forest Area of Influence Established for Economic Analysis 66
Baker County 69
Union County 70
Wallowa County 72

Determination of Social Effects 73

Social Effects 73
Categories of Social Effects Considered, but not in Detail for each Alternative 74
Constants 74

Use of the IMPLAN Computer Model To Estimate Effects on Jobs and Personal Income in the Local Area 74

Input-Output Models (Alward and Others, n d , Palmer, 1976) 74
Development of IMPLAN 75
Use of IMPLAN on the Forest 80

ANALYSIS PRIOR TO DEVELOPMENT OF ALTERNATIVES 86

Overview of Benchmark Analysis 86

Development of Management Requirements (MR's) 86

The Benchmarks 90

The Minimum Level of Management Benchmark 90
Maximize Efficiency Benchmark Under Nondeclining Flow--Market Values 91
Maximize Efficiency Benchmark Under Nondeclining Flow--Market and Assigned Values 91
Maximize Efficiency Benchmark Without Nondeclining Flow--Market and Assigned Values 92
Maximize Efficiency Banchmark Without Nondeclining Flow--Market Values Only 92
Maximize Timber with Management Requirements 93
Maximize Timber Without Management Requirements 93
Maximize Domestic Livestock Production 94

Benchmark Analysis 95

Regionally Required Runs 95
Timber Harvest by Proclaimed National Forest 101
Relationship Between Market and Nonmarket Outputs of Maximum PNV Benchmarks 101
Summary of Benchmark Results 101

01307

Uncertainty in the Analysis 117

Use of Average or Representative Values 117
Projections and Sensitivity Tests 118
Inventory Data and Logging System Assumptions 118
Accounting Information 119
Effects on the Local Economies 120
Recreation 120
Budgetary Considerations 121
Big Game Numbers 121
General 121
Timeliness 121

FORMULATION OF ALTERNATIVES 124

Overview 124

Stage II Analysis Summary/Role of Economics Within Alternative Formulations 127

Common Constraints 132

Development of Alternatives Considered in Detail 133

General 133
Alternative A 133
Alternative B 134
Alternative B-departure 135
Alternative C 136
Alternative C-departure 139
Alternative D 139
Alternative E 141
Alternative F 141
Alternative G 143
Alternative H 144
Alternative NC 145
Summary 145

ESTIMATING EFFECTS OF BENCHMARKS, DISCRETIONARY CONSTRAINTS, AND ALTERNATIVES 148

Introduction 148

Testing of Constraints 148

Analysis of Tradeoffs Among Alternatives 148

01308

Specific Points of Comparison 154

Net Cash Flow 154
Factors Affecting Timber Receipts 154
Costs 161
Disaggregation of Benefits Between Those with and Those Without Market Values 161
Incremental Differences in Economic Efficiency Criteria 163

Implications of FORPLAN Runs on Current Management Direction Costs 169

Analysis of Constraints Within and Between Alternatives 169

LITERATURE CITED 183

01309

APPENDIX B

DESCRIPTION OF THE ANALYSIS PROCESS

INTRODUCTION

Summary of modeling changes between draft and final

1 All alternatives (except Alternative NC) and the maximum present net value benchmark (Run No. 7) have been adjusted to reflect the addition of wild and scenic rivers by the Omnibus Oregon Wild and Scenic Rivers Act of 1988 This caused a reduction in timber harvest levels Adjustment was made to analysis area acreages.

2 All alternatives (except Alternative NC) and the maximum present net value benchmark (Run No. 7) now maintain small diameter (less than 20 inches) snags on all timber harvest units at all times to provide wildlife habitat. This caused a reduction in timber harvest estimates Adjustment was made to the timber yield tables

3 Lodgepole pine trees less than seven inches in diameter have been removed from the calculation of sawtimber volume to conform with standards of the Pacific Northwest Region This change shows up as a reduction in timber sale offerings The lodgepole pine volume was reduced via electronic spreadsheet using results from FORPLAN.

4 All alternatives' and the maximum present net value benchmark's (Run No 7) job coefficients for sawlogs were updated from 10.6 jobs per million board feet to 6 2 jobs per million board feet. Adjustment was made on an electronic spreadsheet using the results from FORPLAN.

5 All alternatives and maximum present net value benchmark (Run No. 7) personal income coefficients for sawlogs were adjusted from 213 4 thousand dollars per million board feet to 115.8 thousand dollars per million board feet

6 All alternatives (except Alternative NC) and the maximum present net value benchmark (Run No. 7) have been adjusted to reflect FORPLAN data set error corrections made between draft and final.

7. The following modeling changes were made to Alternative C as a result of public input and management concerns

- The area of big game habitat emphasis area (Management Area 3) has been reduced by 62,000 acres to help increase the level of timber harvesting Analysis area acres were moved from Management Area 3 (MA 3) to Management Area 1 (MA 1)

- The miles of road corridor managed for higher visual quality objectives (foreground retention and partial retention) have been reduced by 18 percent to help increase allowable timber harvests. Adjustments were made to analysis area acres and the middle ground constraint was changed.

- Ponderosa pine harvest levels in the first decade of plan implementation have been increased from 29 MMBF to 34 MMBF per year in response to public input The ponderosa pine-Douglas-fir working group timber target was set at 70 MMCF in the first decade and at 50 MMCF in the second decade

Planning Problem

The Forest Service is responsible for determining how best to manage National Forest lands based on public desires, needs, and land capabilities

Public interest includes divergent viewpoints about the use of market commodities such as timber, grazing and energy and nonmarket commodities such as wilderness, unroaded recreation, scenery, wildlife, old-growth, and habitat diversity. The Forest's major planning goal is to provide enough information to help decision-makers determine which combination of goods, services, and land uses will maximize net public benefit (This concept is further discussed in Section IV of this Appendix.)

The National Forest Management Act (NFMA) and the regulations developed under NFMA (36 CFR 219) provide the analytical framework to address this objective; they also state that the requirements of the National Environmental Policy Act of 1969 (NEPA) and its regulations (40 CFR 1500-1508) must be applied in this analysis process

Planning Process

The planning and environmental analysis process brings a new outlook and a new technology to National Forest land management, principally.

(1) Processes formerly used to make individual resource decisions are now combined to help make integrated resource management decisions; and

(2) New mathematical modeling techniques are used to assist in the proposed land use problem, including identifying the most cost-efficient pattern of land management

The 10-step planning process is discussed in the NFMA regulations and in Chapter I of the EIS. Appendix B describes the analysis phase of this process covering steps 3, 4, 5, and 6. The judgment phase, steps 1, 2, 7, and 8, is described in Chapters I, II, and in Appendix A of the EIS The execution phase, steps 9 and 10, is presented in the Proposed Land and Resource Management Plan (Forest Plan)

All of the documents and files that chronicle the Forest planning process, including the environmental analysis of the Wallowa-Whitman National Forest, are available for review at the Supervisor's Office, Federal Building, 1550 Dewey Street, Baker City, Oregon 97814 These documents and files, known as planning records, contain the detailed information and decisions used in developing the FEIS and the Forest Plan

The analytical elements discussed in Appendix B are as follows.

Inventory Data and Collect Information (Planning Step 3)

The Interdisciplinary Team (representing the professions of forestry, hydrology, range management, engineering, wildlife biology, sociology, and economics) determined what data were necessary based on the issues and concerns. Analysis of the management situation (AMS), formulation of alternatives, and monitoring require data on re-

source capabilities, existing supply and demand, expected outputs, benefits, and costs Existing data were used whenever possible but were supplemented with new data to help resolve sensitive issues or management concerns Data are on file in the Forest Supervisor's Office in Baker City, Oregon.

Analysis of the Management Situation (Planning Step 4)

This analysis examines resource supply and market conditions and determines suitability and feasibility for resolving issues. A land allocation and activity scheduling model (FORPLAN) was used to address a number of specific requirements, including benchmarks Requirements include.

(1) The projection of the Forest's current management program,

(2) Determining the Forest's ability to produce a range of goods and services from minimum management to maximum production;

(3) Evaluating the feasibility of reaching the National production goals (RPA targets) and of meeting social demands identified as issues and concerns, and

(4) Identifying monetary benchmarks which estimate the output mix which maximizes present net value of resources having an established market or assigned value.

The summary of this analysis of the management situation (AMS) is Chapter 2 of the Forest Plan Chapter III of the EIS shows the development of anadromous fish capacity estimates. Recreation and wilderness capacity estimates were developed by the Forest Recreation Staff using procedures outlined in the Recreation Opportunity Spectrum. A Framework for Planning, Management, and Research (Clark and Stankey 1979)

Formulation of Alternatives (Planning Step 5)

The information gathered during the first four planning steps is combined and analyzed to formulate alternative management plans. The alternatives reflect a range of resource management direction Each major public issue and management concern was addressed in one or more alternatives. Management prescriptions and practices were formulated to represent the most cost-efficient way of attaining the objectives for each alternative Both priced and nonpriced outputs are considered in formulating the alternatives.

Estimation of Effects of Alternatives (Planning Step 6)

The physical, biological, economic, and social effects of each alternative were estimated and analyzed to determine how each responds to the range of goals and objectives assigned by the RPA Program. FORPLAN was used to estimate some of the economic and physical output effects, while other methods were used for the remaining effects The analysis included. (a) direct effects; (b) indirect effects; (c) conflict with other Federal, State, local, and Indian tribe land use plans; (d) other environmental effects, (e) energy requirements and conservation potential, (f) natural or depletable resource requirements and conservation potential, (g) historic and cultural resources, and (h) means of mitigation

INVENTORY DATA AND INFORMATION COLLECTION

Forest Data Base

Inventory data were collected for many resources so that issues could be addressed, limitations defined, and capability determined. Some of the data were necessary to develop the Forest Planning Model and to determine capability and analysis areas

Analysis area identifiers are identified by six levels in a numerical order Each additional level is a more detailed descriptor of the level above. Each analysis area is defined uniquely by three level identifiers (Level 1, Level 2, Level 3), Working Group, Land Class, and Condition Class. See Section III C , Identification of Analysis Areas, for more information on this process

Capability Areas

Capability areas were delineated by the overlay of land type, logging systems, working group, and forest regeneration difficulty information. The composite maps, at 1 inch/mile are on file at the Forest Headquarters in Baker City, Oregon

Land types divide the Wallowa-Whitman Forest into generalized slope classes (less than or equal to 35 percent and greater than 35 percent) and potential cover forage relationships of dominantly timbered, mixed timbered-grass, and dominantly grass, i e , non-timbered Logging systems further split the steep lands into those that can be logged utilizing short-span skyline technology, and those that must be logged with long-span skyline or helicopter logging systems.

Working groups represent generalized community type associations (the CD-CP, CW-CE, and lodgepole pine dominated)*. They also identify nonforest and nonvegetated areas The timber working groups are indicative of productive potential for the Forest

Regeneration difficulty information was used to delineate inclusions of forest land within these land type/working group combinations which cannot be regenerated within five years, or which require additional investments to establish regeneration on high elevation lands or reduce the competition of ninebark shrubfield. The various resource maps were somewhat generalized in order to delineate more contiguous capability areas. Slivers or obvious inclusions were not considered in mapping Capability areas are more fully described in Section III C of this appendix.

Production Coefficients

The ID Team developed coefficients for timber, range, wildlife, recreation, water, and costs. Many of the nontimber coefficients were calculated outside the model using information from some of the model's reports

*The CD-CP working group represents stands dominated by ponderosa pine or Douglas-fir. The CW-CE stands are dominated by true firs (white fir, grand fir, and subalpine fir) or Englemann spruce.

Suitable Lands

The suitable land classification breaks the National Forest land on the Wallowa-Whitman into the following categories. water, existing roads, and other nonforested lands; forested lands which are capable but not available for timber harvest; forested lands available and capable, forested lands technologically not suited; and available, capable, and tentatively suitable forest lands. These classifications were incorporated into the analyses area identifiers in FORPLAN. The suitable lands determination is more fully discussed in Appendix E and in Chapter III of the EIS.

Developing Allocation and Scheduling Alternatives

The condition classes of existing vegetation were used to schedule management activities over time for the various benchmarks and alternatives.

Monitoring

At intervals established in the Forest Plan, management practices will be evaluated to determine how well objectives have been met, how accurate effects and cost projections are, and how closely management standards and guidelines have been applied. The results of monitoring and evaluation will be used to analyze the management situation during review and revision of the Forest Plan in future years.

The Forest Planning data base will provide a means by which changes in resource production rates and differences in inventory data can be measured and will also be used to monitor implementation activities

Plan Implementation Programs

The data base provides biological and physical data that will help develop subsequent programs for Plan implementation As more information becomes available, the data base will be updated and improved.

Sources of Data

1. Slopes, logging systems, and distribution of cover and forage areas are mapped into land types at 1" to the mile

2. Regeneration difficulty and unstable soils are classified and mapped at 1" to the mile.

3. Working groups (generalized potential vegetation types) are mapped at 1" to the mile

4. The streams and rivers were inventoried by stream class. These describe the condition of the stream or river and classify it according to its relative importance to domestic use or fisheries Stream classes are mapped at 1" to the mile.

5. In 1978-1979 all of the tree stands which met the definition of forested land were mapped and described. This resulted in over 50,000 stands being delineated The mapping and descriptions are continuously updated A data base "frozen" in 1980 provided much of the information used to identify analysis areas Updates to 1984 for recent timber harvest or sale activity were derived from the current data base.

6 Elk and mule deer winter ranges were mapped with participation and concurrence of the Oregon Department of Fish and Wildlife Hiding and thermal cover were correlated with timber stand inventory in No 5 above

7. Existing timber volumes and growth were based on the 1979 timber inventory Appendix L describes the reconciliation of 1968, 1979, and FORPLAN inventory data.

8 The Forest's recreation potential was identified through the Recreation Opportunity Spectrum. Existing conditions were mapped at 1" to the mile and future conditions estimated.

9. The visual resources of the Wallowa-Whitman were mapped at 1" to the mile and were later updated to 2 64" to the mile.

10 Information from range analysis and Allotment Management Plans was used to determine potential forage allocations and identify problems in need of correction

11. Wetlands, floodplains and riparian areas were inventoried and mapped.

12 Habitat for the existing northern bald eagle nesting territory was mapped and habitat conditions described in general.

13. Land status information was used and continually updated as conditions changed It included all categories of land status: private, County, State, National Forest, and BLM

14. Transportation planning areas were available and used to evaluate the implications of alternatives to transportation efficiency and cost.

15. Economic data was derived from RPA, Regional direction, or Forest statistics.

16 Information on Wild and Scenic Rivers was based on an inventory conducted by the National Park Service in 1980, supplemented by Forest staff review.

It has since been updated to reflect the additions of wild and scenic rivers by the Omnibus Oregon Wild and Scenic Rivers Act of 1988.

17. Information on minerals was derived from (1) a variety of published and unpublished references on geology, mineralization, historical production and sample data; (2) communication with property owners and operators, (3) consultation with representatives of the Oregon Department of Geology and Mineral Industries; and (4) Bureau of Land Management mining claim records

THE FOREST PLANNING MODEL

Overview

Forest planning is a complex process in which a large amount of information and interdependent decisions must be considered before an alternative management plan can be recommended as the one which best addresses the issues, concerns, and opportunities which were identified at the outset of the planning problem Because of this, several interrelated computer models and analytical tools have been developed and utilized to help determine the decision space within which alternatives can be developed and to evaluate their associated outputs and effects.

One of these models is called FORPLAN. The name is an acronym for Forest Planning Model FORPLAN is a computerized linear programming model which has its roots in RAM (Resource Allocation Model) and MUSYC (Multiple-Use Sustained Yield Calculations) It is composed of a matrix generator, a linear programming solution system (FMPS), and a report writer Within the bounds of the matrix generator and the FMPS solution package, the user is allowed a great deal of latitude in formulating the mathematical representation of the Forest planning problem to be analyzed.

The Wallowa-Whitman Planning Team played a role in debugging and testing the early versions of the FORPLAN software system. Since then, several releases of two different versions of the model have been developed. The bulk of the Forest modeling was performed with Version I, Release 14 The system is maintained and operated at the USDA Computer Center in Fort Collins, Colorado.

The Wallowa-Whitman FORPLAN model was specifically designed to help the interdisciplinary planning team analyze the economic and production tradeoffs associated with the recreation, timber, visual, and wildlife resources, and to help evaluate the extent to which various alternative management scenarios were able to address and resolve the identified planning issues. One step in the development of the FORPLAN model was to divide the total Forest into "analysis areas". Analysis areas are tracts of land with relatively homogeneous characteristics in terms of the outputs and effects that are being analyzed in the FORPLAN Model.

Their delineations are intended to capture the significant social, biological, and economic differences in the way the land responds to alternative management areas. And, of course, the focus of the delineations was upon the planning issues

In the FORPLAN model, analysis areas were allocated to management emphases in order to achieve the resource management objectives of a particular benchmark analysis or alternative "Management emphasis" is a FORPLAN term and is directly related to the "management area" described in the EIS. Each management area contains a set of standards and guidelines addressing how the resources in that particular allocation are to be managed in order to meet particular multiple use objectives From one to nine different management emphases were available to each analysis area depending upon its resource production opportunities

In turn, more specific "FORPLAN prescriptions" were developed to achieve the multiple use objectives of each management area. FORPLAN prescriptions are combinations of management emphasis and intensities which specify a schedule of activities and practices, and their associated outputs and effects. The outputs and effects associated with the prescription choices are represented as mathematical coefficients in the respective decision variables

FORPLAN had from one to eight prescriptions to choose from for each management emphasis for each analysis area. In general, each analysis area contained from one to twenty-four prescription choices. Most mature-timber analysis areas were represented by 16 to 21 prescriptions

Which prescriptions FORPLAN selected depended upon the objective function and the set of constraints used to represent a particular benchmark or land management plan alternative. The objective function was usually to maximize present net value or maximize the production of timber. These were subject to first satisfying all the specified constraints

The constraints were designed to guarantee the spatial and temporal feasibility of land allocation and harvest scheduling choices in order to achieve the multiple use objectives of a benchmark or alternative. Once the model had determined that a feasible solution existed by satisfying all of the constraints, it would then search for the set of prescriptions and timing choices which permitted it to optimize the solution according to the specified objective function.

The Analysis Process and Analytical Tools

As directed in the Planning Regulations (36 CFR 219 12(f)(8)):

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

The Interdisciplinary Team analyzed economic efficiency at several stages of the planning process in order to be reasonably assured that the alternatives developed and displayed in the EIS complied with the intent of this direction. The discussion of the analytical process and tools used will follow this general outline

1) Analysis prior to FORPLAN,
2) How FORPLAN was used in the analysis,
3) Analysis done in addition to FORPLAN model analysis

Once the issues, concerns, and opportunities were identified, and the planning criteria were developed, the Interdisciplinary Team began to formulate management areas and their associated standards and guidelines. This step was one of the more difficult and laborious, and possibly the most important task of the interdisciplinary planning process. Management areas coupled with their respective standards and guidelines provide specific direction for implementation, and serve as a framework for how to use, develop, and protect the Forest's resources in a manner consistent with the goals and objectives of the Plan

Concurrently with the formulation of management areas and the standards and guidelines, the Interdisciplinary Team also began to identify the analysis areas that would be used in the FORPLAN model (see Section III C) For this task, the Total Resource Information (TRI) System's 2000 (S2K) Forest data base was augmented with information on land types and suitability on various 1" per mile overlays with appropriate combinations stored on the Forest's computer.

A sort-merge program was used extensively to analyze different analysis area combinations that could be used to model and evaluate the production and economic tradeoffs between the recreation, timber, visual, and wildlife resources on the Forest The objective of this exercise was to delineate the analysis areas in such a way as to capture the important variations in the

biological, social, and economic characteristics of the land and yet keep the FORPLAN model size to a minimum so it was quicker and less expensive to run.

Once the final analysis area delineation was settled, the next step was to develop the prescriptions for the FORPLAN model This included the development of timber yield tables (see Section III F), other resource yield coefficients, and the economic costs and benefits (see Section IV) associated with each FORPLAN prescription. These prescriptions were designed to enable FORPLAN to analyze the timber-related outputs and effects associated with alternative land allocations and multiple use objectives.

To provide FORPLAN with the timber harvest scheduling flexibility it needed to satisfy the multiple use objectives of each alternative, a wide range of timber yield tables was developed for each management area and working group combination. The development of existing stand yield tables was based on the Region 6 Empirical Yield Table Processor and linear regression analyses of 1979 National Forest Inventory (NFI) plot data The managed yield tables were developed with the stand PROGNOSIS computer program

Professional judgment played an important role in determining the reasonability of the results from the growth and yield predictive models. As the yield tables were developed, they were reviewed by the respective resource specialists to determine if they achieved their intended objectives (e g , thermal cover or retention foreground) A soil expectation value was calculated for each

In some cases prescriptions were dropped if another prescription achieved the intended objectives equally as well but had a higher present net value. But for the most part, if FORPLAN had the room and the prescriptions contributed to the range in scheduling choices, they were included in the model so it had the option of using them to satisfy its objective function and constraints.

Timber stumpage values and logging costs were based on an analysis of timber sale data (2400-17 Forms), Cut and Sold Reports, and consultation with Forest logging specialists Costs for reforestation, site preparation, timber stand improvement, sale preparation and other timber management related activities were developed by the timber staff and silviculturists based on recent experience and anticipated future conditions.

The development of recreation output coefficients was based on an analysis of the Forest Recreation Inventory Management (RIM) data base. Capital investment, and operation and maintenance costs were based upon recent budgets, use figures, the stated objectives of the HCNRA Comprehensive Management Plan, professional judgment as to how recreation patterns would react to alternative levels expenditures.

FORPLAN was used to analyze the production and tradeoffs between the recreation, timber, visual, and wildlife resources on the Forest. The model was designed to analyze the most economically efficient timber-related outputs and effects associated with the achievement of the multiple use objectives of an alternative. The wildlife, recreation and range outputs and effects associated with that same alternative were evaluated with the use of an electronic spreadsheet.

The land allocation and resource management investment options which resulted in the most economically efficient solution was determined through iterative model and spreadsheet analyses. For example, the Maximum Present Net Value (PNV) Benchmark (market plus assigned values) was arrived at by first examining the solution to the Maximum PNV Benchmark (market values only) and adding the costs and benefits associated with nonmarket outputs.

The other benchmarks were analyzed with FORPLAN through combinations of different objective functions (maximize timber or maximize present net value) and constraints on harvest flow, rotation length, management requirements (MR's), and discretionary constraints needed to achieve the respective multiple resource objectives (Refer to Section VI) Again, the FORPLAN analyses were augmented with a spreadsheet analyses of the wildlife, recreation, range, and other resource management options

Objective Function

Once the benchmark analyses were completed, the Interdisciplinary Team proceeded to evaluate the range of alternatives that were developed to address the issues, concerns, and opportunities (Refer to Section VII.) Each issue, concern and opportunity was addressed in the alternatives through land allocations, timber harvest scheduling, standards and guidelines, or policy statements Alternatives were modeled through the specification of an objective function and a set of constraints that were necessary to achieve the intent of a particular alternative.

The objective function was usually to maximize present net value. This guaranteed the economic efficiency of the timber harvest solution once all of the specified constraints were satisfied The analysis of which wildlife, recreation, and range management program most efficiently met the objectives of the alternative was performed with an electronic spreadsheet.

Constraints

In addition to the objective function, many constraints were specified in order to achieve the multiple use objectives of each alternative. These included·

1) constraints on timber harvest flow, rotation length, and ending inventory;

2) dispersion and wildlife MR constraints,

3) constraints on the amount of analysis areas available to certain management area prescription sets;

4) rate of timber harvest constraints in scenic viewsheds and intensive recreation allocations;

5) constraints for thermal cover on elk winter range allocations; and

6) other miscellaneous constraints such as accelerated lodgepole pine harvesting, species mix, and funding levels

Once these constraints were satisfied, the model was then able to search for the solution which best achieved its objective function

FORPLAN's Interactions with Other Models

The FORPLAN analysis was followed up by several other analytical steps in the process of evaluating alternatives Three of these additional analytical tools were software programs developed by the Interdisciplinary Team to generate custom reports. One program (see Appendix G) interpreted the dynamics of the FORPLAN Forest inventory in terms of five successional stages by working group for fifteen decades. This better enabled the wildlife biologist to evaluate the effects of the harvest schedule solution on the habitat requirements of certain key indicator species.

A second program disaggregated the FORPLAN solution between the proclaimed Wallowa and Whitman National Forests. The third program integrated costs and benefits from FORPLAN with those modeled outside FORPLAN to generate the total PNV for a given alternative

Sometimes the results from these additional analyses indicated the need to do more FORPLAN runs in order to improve the overall evaluation of the outputs and effects of a particular alternative

Once the Team was satisfied with the outputs and effects of the alternatives, their implications with regards to income and jobs in the local economy were analyzed with the IMPLAN input/output model (see Section V). The Interdisciplinary Team along with the Forest Management Team then evaluated how well each alternative addressed the issues, concerns, and opportunities that were identified at the outset of the planning process. Based on this analysis, the Regional Forester selected the preferred alternative.

Identification of Analysis Areas

One of the first steps in the development of FORPLAN (Forest Planning Model) was to divide the Forest into analysis areas. For this task, the TRI (Total Resource Information) System 2000 database was used extensively.

Analysis areas are tracts of land with relatively homogeneous characteristics in terms of the outputs and effects that are being analyzed within the FORPLAN model. They serve as the basic unit of land in the model for which a range of prescriptions are developed to achieve various multiple use objectives. Their delineations were intended to capture the significant social, biological, and economic differences in the way the land responds to alternative management areas, and yet keep the model size to a minimum so that it was quicker and less expensive to perform analysis

The focus in delineating analysis areas was on addressing certain issues, concerns, and opportunities identified at the outset of the planning process Incorporation of the existing Forest inventory model was necessary to link FORPLAN to inventoried volumes and growth projections for existing stands

The Interdisciplinary Team began developing the FORPLAN model during March 1980 Since then, and as the planning process has evolved, several different analysis area stratifications and model formulations have been explored. The land stratification that was used for this EIS is discussed in Appendix E. It divided the 2.35 million acres of the Wallowa-Whitman National Forest into 355 analysis areas Of these, 147 account for the 1.08 million acres of suitable and available forested land from which FORPLAN can schedule timber harvesting.

In general, most analysis areas are larger than 200 acres The largest is 97,792 acres. They are often not contiguous. The following discussion presents the rationale behind the identification and delineation of the analysis areas according to the six FORPLAN levels of analysis area identifiers.

The analysis area identifiers which were used in FORPLAN are stratified at six levels in a hierarchical fashion. That is, each additional level is an increasingly more detailed descriptor of the level above.

Level 1 Identifiers are primarily geographic, recognizing important legally established boundaries.

1 EC WLD - Eagle Cap Wilderness

2 HC WLD - Hells Canyon Wilderness

3 ALLOTH - Wallowa-Whitman National Forest lands exclusive of Wilderness, Wild River, Scenic River and National Recreation Area

4 NRAOTH - Hells Canyon National Recreation Area· outside of Wilderness or Wild River or Scenic River

5 MMTWLD - Monument Rock Wilderness

6 NFKWLD - North Fork John Day Wilderness

7 WLDRIV - Snake Wild River

8 SCENER - Snake Scenic River

Level 2 Identifiers are further geographic splits of Level 1 identifiers.

1 EC ADD - Eagle Cap Additions/Oregon Wilderness Bill

2 EC OTH - Eagle Cap Wilderness in existence prior to Oregon Wilderness Bill

3 HC ADD - Hells Canyon Additions/Oregon Wilderness Bill

4 HC OTH - Hells Canyon Wilderness existing prior to Oregon Wilderness Bill

5 G ROND - Unroaded portion of the Grande Ronde River drainage. Substantial additional road construction is necessary to access timber in this area

6 LAKEFK - Unroaded portion of the Lake Fork Creek drainage Substantial additional road construction is necessary to access timber in this area

7 MONUMT - Monument Rock Wilderness

8 BALDY - Wallowa-Whitman portion of North Fork John Day Wilderness.

9 OREGON - Subsets of NRAOTH or ALLOTH lands in Oregon

10 IDAHO - Subset of NRAOTH lands in Idaho

Level 3 Identifiers are capability areas They include combinations of the timber working groups, and the land types as used in unit planning (see below)

These land types have been refined by making high elevation land types S1, S2, and G5 consistent with those areas mapped as high elevation regeneration difficulty or areas of high elevation that are unsuited because of soil instability The pattern interpretations of S3, S4, and S5, and G2, G3, and G4 have been refined and are significant to the interpretation of inherent cover-forage relationships An additional identifier of H was added to the steep land types to

identify those areas where the need for helicopter or long-span skyline logging systems has been identified

Land Type G2

Flat basalt plateaus, gently sloping ridgelines, and valley bottoms which are predominately timbered (over 70 percent), and generally found below 6,000 feet elevation Gentle terrain and a wide variety of vegetation permit a wide range of possible uses and activities Nearly all wildlife species indigenous to the Forest, game and nongame, are found This land type provides important livestock grazing Because the mechanics of timber harvest is relatively uncomplicated , this type has historically had high timber harvest priority.

Land Type G3

Gentle topography, marginal timberlands, a mixture of land types G2 and G4. Scablands and open grassland make up about 50 percent of the area, while the remainder is timbered. Each cover type is rather evenly distributed, creating a large amount of "edge," valued as important habitat for deer as well as other wildlife

Land Type G4

Flat grassland, scablands and "biscuit lands" found on basalt plateaus or benches. Timber is limited to thin stringers along fault lines, comprising less than 30 percent of the total area.

Land Type G5

Flat basalt plateaus and gently sloping granitic ridges and basins which are predominately timbered (over 70 percent) and generally found at 5,400-7,000 feet elevation. The terrain is gentle with an upper forest association normally dominating the overstory (spruce, subalpine fir, white fir, western larch, lodgepole pine). Timber harvesting is limited because of the lower-valued timber, its slow growth, and the difficulty involved in establishing new stands of trees

Land Type S1

Typical of the high Wallowa, Elkhorn and Seven Devils Mountains, and similar to many of the alpine areas throughout the northwestern United States The terrain is very rugged, generally over 60 percent slope, with rock outcrops dominating the landscape Snow remains yearlong on a few of the high elevation north aspects Some gently sloping basins with meadows or small lakes are present. High elevation tree species occur in small pockets and between avalanche paths Considered highly scenic, these areas provide much of the memorable visual experience of the Eagle Cap Wilderness. Elevations and landform combine to greatly limit the range of management opportunities.

Land Types S2 and S2H

Steep (over 35 percent slope), often immediately below the alpine type (S1) and within what could be termed the "upper forest." The principal tree species are subalpine fir, lodgepole pine, white fir and aspen. Elevation limits wood fiber and forage production; all forest lands within this land type have been identified as potential regeneration difficulty areas due to cold soils, cold air drainage and frost pockets. This type includes

01322

forest land classified as unsuited due to extreme soil instability The H suffix indicates that the land would be logged using helicopters or long-span logging techniques

Land Type S3 and S3H

Steep (over 35 percent slope) continuously timbered. Slope shapes are relatively smooth, less dissected than land types S2 or S4 and have few rock outcrops Nearly every major tree species found in the Forest can be found in this type. The H suffix indicates that the land would be logged using helicopters or long-span logging techniques

Land Type S4 and S4H

Characterized by steep slopes (over 35 percent), heavily timbered and brushy north aspects, timber or grass on east and west aspects and grass type on south aspects. Included are stringer meadows and streams in some canyon bottoms This land type is made up of many small steep canyons tributary to the major canyons There are many rock outcrops, rims and occasional talus slopes Alternating timber and grassland (approximately 50 percent of each), as the aspect of the tributary canyons change, give a striped pattern to this landscape which is common to much of the Blue Mountains. The H suffix indicates that the land would be logged using helicopters or long-span logging techniques

Land Type S5 and S5H

Characterized by steep (over 35 percent slope), predominantly open grassland. Timber or brush type is found on some north or east aspects but make up less than 30 percent of the area

This land type occurs on south, east and west aspects of major canyons but is occasionally found on north aspects, particularly at lower elevations This area provides usable forage for grazing animals, but because of the sensitivity of the soil on the steep slopes and narrow bottoms, proper grazing on this land type requires intensive management Approximately 10 percent of the area is in basalt rimrock, which impairs management activities The H suffix indicates that the land would be logged using helicopters or long-span logging techniques.

The second part of the capability area descriptors identify working groups. Because of limits on the number of Level 3 identifiers, all unsuited timberlands are identified as UN These areas are more precisely split out at the working group level. High elevation regeneration difficulty is identified by the high elevation land types All other working group abbreviations within the capability areas of Level 3 are redundant to the working group level The capability areas (Level 3 identifiers) are identified in Table B-1

Table B-1
LEVEL 3 IDENTIFIERS (Capability Areas)

FORPLAN Ref. Nos.	Capability Area Descriptor	FORPLAN Ref No	Capability Area Descriptor	FORPLAN Ref. Nos.	Capability Area Descriptor
1	G2 CD	21	G5 GR	41	S3H UN
2	G2 CW	22	S1 UN	42	S3H GR
3	G2 LP	23	S1 GR	43	S4 CD
4	G2 UN	24	S1 NV	44	S4 CW
5	G2 GR	25	S2 CW	45	S4 UN
6	G2 NV	26	S2 UN	46	S4 GR
7	G3 CD	27	S2 GR	47	S4 NV
8	G3 CW	28	S2H CW	48	S4H CD
9	G3 LP	29	S2H LP	49	S4H CW
10	G3 UN	30	S2H UN	50	S4H UN
11	G3 GR	31	S2H GR	51	S4H GR
12	G3 NV	32	S3 CD	52	S5 CD
13	G4 CD	33	S3 CW	53	S5 CW
14	G4 CW	34	S3 LP	54	S5 GR
15	G4 UN	35	S3 UN	55	S5H CD
16	G4 GR	36	S3 GR	56	S5H CW
17	G4 NV	37	S3 NV	57	S5H UN
18	G5 CW	38	S3H CD	58	S5H GR
19	G5 LP	39	S3H CW	59	S5H NV
20	G5 UN	40	S3H LP	60	XXXX XX

Definitions for abbreviations are contained on the previous pages which identify the first component of the descriptor, such as G2, S3 and S5H The latter part of each descriptor is identical to the working group (Level 4) identifiers which are defined below

Level 4 Identifiers (Working Groups) - The working groups are important for the differences in productivity and species mix they represent.

CD - Douglas-fir and ponderosa pine community types, except those stands dominated by lodgepole pine

CW - White fir, subalpine fir and Engelmann spruce community types, except those stands dominated by lodgepole pine

LP - All lodgepole pine-dominated stands.

CD-B - Douglas-fir and ponderosa pine having potential for severe brushfield competition after regeneration harvest.

CW-UNS - CW working groups unsuited for timber management because of shallow soils (77 percent) or soil instability (23 percent)

01324

LP-UNS - LP working groups unsuited for timber management because of shallow soils (53 percent) or soil instability (47 percent)

GR (GRASS) - Nonforest, grassland, scabland, meadow.

NV (NONVEG) - Rock, talus, cliffs, etc

CD-UNS - CD working groups unsuited for timber management because of shallow soil.

UN - Unsuited for timber management.

Level 5 Identifiers (Land Class) - Land classes are G (ground-based logging systems), S (short-span skyline) or H (helicopter or long-span skyline). These classes are key to the logging costs differentiation in the economics tables The information they provide is the same as slope information provided by the Level 3 identifiers This redundance does not increase model size and provides desirable report summaries

Level 6 Identifiers (Condition Class) - Condition classes for existing vegetation are descriptive of the identified silvicultural opportunity The condition classes are.

REGEN - Mature stand, eligible for regeneration harvest, includes all old-growth timber

REFOR - Reforestation opportunity - not necessarily reforestation backlog in that many of these acres are already scheduled for reforestation, but not forested at time of data collection.

COMTHN - Young tree stand, eligible for commercial thinning, may have scattered large overstory.

PRECOM - Very young tree stand, eligible for precommercial thinning.

OVERWD - Scattered large overstory over very young stand, eligible for overwood removal followed by precommercial thinning.

FBROPP - Stagnated pole or smaller stands, representing an opportunity to harvest wood fiber if economically feasible.

MULTI - Multi-treatment is an irregularly mixed stand encompassing two or more of the above conditions

A typical example of an analysis area available for timber harvest defined by the above identifiers is:

ALLOTH OREGON S3 CW CW S REGEN

This describes a mature ("REGEN") stand of timber growing on a steep, uniformly timbered ("S3 CW"), true fir ("CW/CE") community type, loggable by shortspan skyline ("S") in Oregon ("OREGON"), outside of wilderness, wild river, scenic river, or Hells Canyon NRA ("ALLOTH")

Identification of Prescriptions

Overview

The National Forest Management Act (NFMA) regulations define management prescriptions as "management practices selected and scheduled for application on a specific area to attain multiple use and other goals and objectives" (36 CFR 219.3). Management prescriptions consist of a goal statement which establishes the purpose of the prescription and a compatible set of management practices designed to develop and/or protect some combination of resources, and create or perpetuate a desired condition

Prescriptions were constructed within the requirements specified in 36 CFR 219.27. These requirements guide the development, analysis, approval, implementation, monitoring and evaluation of Forest Plans with regard to

(a) Resource protection
(b) Vegetation manipulation
(c) Silvicultural practices
(d) Even-aged management
(e) Riparian areas
(f) Soil and water
(g) Diversity

The process of identifying and subsequently developing management prescriptions began with an Interdisciplinary Team review of the issues, concerns, and opportunities (ICO's). Prescriptions were then identified to help address those ICO's which were related to decisions regarding standards and guidelines, scheduling, or land allocations There were other ICO's which were to be addressed through policy statements for which it was not appropriate to develop prescriptions

Standards and guidelines represent the necessary mitigation and resource coordination measures that are required by existing laws, regulations, and policies. Essentially, they provide the guidelines for how prescriptions are to be implemented on the ground.

Scheduling and land allocation related to ICO's were addressed with the FORPLAN model. For this purpose, coefficients of outputs and effects were constructed for the appropriate management prescriptions. These were then cast in terms of FORPLAN prescriptions The model was then used to evaluate the implications of alternative scheduling and land allocation choices with regard to addressing the relevant ICO's

Once the need and purpose for certain types of prescriptions were identified, goal statements for each management prescription were designed to respond to the questions raised by the ICO's. The Interdisciplinary Team then used professional judgment, evaluated existing policy, legislative direction, and research for guidance in developing multiple resource management prescriptions The resulting set of prescriptions represents a broad range of resource management emphases, practices, and capital investment levels General policies and standards and guidelines were also written by the Interdisciplinary Team to cover practices common to all prescriptions and resource management situations that are Forest-wide in scope.

In addition to addressing ICO's, the process of designing management prescriptions was also guided by the following criteria.

(1) Prescriptions should be achievable and contain realistic practices,

(2) They are to be general enough to accommodate site-specific conditions,

(3) They should be specific enough for the interdisciplinary team to develop accurate resource and economic output and effects coefficients, and

(4) They should be the most cost-effective means of achieving the intent of the prescription

In order to explore a wide range of alternative ways to manage the Forest for its multiple uses, the Interdisciplinary Team identified the capability of each analysis area to produce certain goods and services that were being analyzed within the FORPLAN model All prescriptions which were related to the production of goods and services capable of being produced from an analysis area were then assigned to it

The assignment criteria focused primarily on the geographical, physical, and biological characteristics of the analysis area as related to its ability to provide different types of recreation, visual, wildlife, and wood outputs Which prescriptions and the schedule of activities the model selected depended upon the multiple use objectives and constraints of the alternative being analyzed

Purpose, Criteria, and Assumptions for Prescription Categories

Prescriptions were developed for each of the eighteen management areas (management emphases) to which different parts of the Forest could be allocated For each management area a resource management goal and the general objectives to achieve a desired future condition are described Management practices are implemented within each prescription according to the resource management goals of the prescription and the standards and guidelines.

A map of the land allocation to each management area is available for each alternative This map in conjunction with the associated prescriptions and the standards and guidelines identify what activities will take place, where, and when during the implementation of any one alternative.

Eighteen management emphases were modeled in FORPLAN for the Wallowa-Whitman National Forest. These are broken into several categories

Management emphases in which MINLVL (no scheduled timber harvest) is the only management intensity provided They are:

EXROAD	-	Acres in existing roads
WLDRNS	-	Wilderness
BCK CO	-	Backcountry (Management Area 6)
STARKY	-	Starkey Experimental Forest
INDIAN	-	Indian Creek Research Natural Area
A LAKE	-	Anthony Lakes Ski and Summer Homes Area
DNV	-	Dispersed Recreation/Native Vegetation

FOR - Forage, Hells Canyon NRA
OLD GR - Old Growth
RECSIT - Developed Recreation or administration sites

Management emphases in which the full range of even-aged management intensities are allowed:

GNFR 1 (Management Area 1) - Harvest is constrained only to meet minimum dispersion standards for regeneration harvest units

GNFR 2 (Management Area 2) - Harvest is constrained to allow better cover development in existing regeneration harvest units before entering adjacent units

GNFR 3 (Management Area 3) - Harvest is constrained to provide near-optimum dispersion of cover for elk.

Management emphases in which selection harvest is the only timber prescription provided. They are

PHLLPS - Phillips Lake environs managed under agreement with the Bureau of Reclamation

VISUAL - Foreground retention or partial retention acres

RIPARI - Riparian zones where selection harvest prescriptions provide for special consideration per NFMA regulations.

Management Emphasis in which choice is allowed between selection harvest and a range of even-aged management prescriptions.

DRT - Dispersed Recreation/Timber Management of Hells Canyon National Recreation Area

The FORPLAN prescriptions are identified and described in terms of "management emphases" and "management intensities". In most cases, the management emphasis name in FORPLAN is the same as the Management Area name used in the EIS and Forest Plan. For example, GNFR 1 is the name of the emphasis representing Management Area 1. This is also true for Management Area 2 and 3 Riparian and the Visual Management direction incorporated as part of Management Areas 1, 2 and 3 are represented as a management emphasis in FORPLAN. The list below depicts these relationships.

Management Area	**Management Emphases**
MS-1 (Timber Emphasis)	GNFR 1 VISUAL RIPARI
MS-2 (Modified Timber)	GNFR 2 VISUAL RIPARI

MS-3 (Big Game Emphasis)	GNFR 3 VISUAL RIPARI
MS-4 (WILDERNESS)	WLDRNS
MS-5 (Phillips Lake Area)	PHLLPS
MS-6 (Undeveloped Dispersed Rec)	BCK CO
MS-7 (Wild and Scenic Rivers)	BCK CO OLD GR VISUAL
MS-8 (Snake River Corridor)	WLDRNS
MS-9 (HCNRA Dispersed Recreation/ Native Vegetation)	DNV
MS-10 (HCNRA Forage)	FOR
MS-11 (HCNRA Dispersed Recreation/ Timber)	DRT
MS-12 (Research Natural Areas)	INDIAN
MS-13 (Homestead Further Planning)	FOR
MS-14 (Starkey Experimental Forest and Range)	STARKY
MS-15 (Old Growth)	OLD GR
MS-16 (Administrative and Recreation Sites)	RECSIT
MS-17 (Power Transportation)	Not in FORPLAN
MS-18 (Anadromous Fish)	GNFR 3

Development of FORPLAN Timber Prescriptions

Management Practices and FORPLAN Management Intensities

Section III D above describes the eighteen management areas and their associated prescriptions It also discusses the relationship between the management areas and the Forest-wide Standards and Guidelines This section summarizes the development of FORPLAN timber prescriptions and their relationship to the Management Areas.

Once the management areas were identified which were needed to address the Planning ICO's, the ID Team determined which of them could achieve their objectives through scheduled (regulated) timber harvesting Of the eighteen management areas

depicted above, six included scheduled timber harvesting prescriptions which were analyzed within the FORPLAN model. These included:

Management Area 1
Management Area 2
Management Area 3
Management Area 5
Management Area 11
Management Area 18

The Management Areas 4, 7, 8, 12, and 15 do not permit any timber harvesting, while the remaining areas (6, 9, 10, 13, 14, 16, and 17) permit timber harvesting on an unregulated basis None of these Management Areas required the development of harvest scheduling prescriptions for FORPLAN.

The silvicultural options that were developed for each of these management emphases are referred to as "management intensities" in FORPLAN They reflect the different combinations of practices, and the different timing choices for implementing those practices In essence, they represent alternative investment levels in timber management to achieve the objectives of a management area The list below depicts some of the management practice terms used to describe the various management intensities considered for each management emphasis Not all practices that will be implemented as part of a prescription are included in this list.

Management Practices	**Practice Abbreviation**
Natural Regeneration	NAT
Plant	PLT
Precommercial Thin	P
Commercial Thinning	C
Harvest (Shelterwood or Clearcut)	H
Selection Harvest	SELECT

The next step was to develop and analyze a range of silvicultural prescriptions for each working group and management area combination This included the development of both empirical and managed yield tables. The empirical yield tables are used to portray alternative silvicultural treatment options for existing mature and immature sawtimber stands. They are called empirical because they are based on National Forest Inventory (NFI) plot data

The managed yield tables apply both to existing plantations, generally not older than 20 years, and to future managed stands which result from the regeneration harvesting of existing natural stands. The silvicultural prescriptions and their associated yield tables were developed based on the silvicultural characteristics of each working group and the stand management objectives for each individual management area.

Once the vegetation management objectives were identified for each management area, the appropriate Interdisciplinary Team members would work together to develop a range of harvest scheduling options. The overriding criterion in this process was that the silvicultural prescription and its associated yield table achieve the vegetation management objectives for the Management Area.

However, other criteria were also considered One of them was that a range of scheduling choices, rotation ages, and investment levels were examined, and whenever possible made available to the FORPLAN model For example, the model was given three different silvicultural regimes to choose from when deciding how to manage lodgepole pine plantations within Management Areas 1, 2, 3 and 18.

Seven different silvicultural regimes were allowed in establishing and managing other coniferous plantations. Each had different schedules of silvicultural practices and rotation lengths. All achieved the intent of the respective Management Areas The only difference among Management Areas 1, 2, 3 and 18 was the spacing arrangement of harvest units.

Finally, there were situations in which the vegetation management objectives for a management prescription were so specific that the range of silvicultural regimes that could achieve those objectives was very limited This was true for the VISUAL Management Emphasis, PHLLPS Management Emphasis and RIPARI Management Emphasis.

Management Intensity

Minimum level (MINLVL) is the only management intensity permitted within certain emphases noted above. It is also the only intensity provided for nonforest and unsuited forest lands within other management emphases. To assure economic efficiency, minimum level is available as a management intensity option under all management emphases except for riparian areas which are designated for selection harvest

The remaining management intensities reflect different investment strategies primarily for harvesting timber. (The stated rotation age is at least 95 CMAI in Benchmark Runs 2, 3, 4, and 5) They are

PLTPCH - Plant, precommercial thin, commercial thin and harvest (80-year rotation in CD, CW)

PLT PH - Plant, precommercial thin and harvest (70-year rotation in CD and CW)

PLT CH - Plant, commercial thin and harvest (100-year rotation CD, 110 in CW)

PLT H - Plant and harvest only (60-year rotation in CD, 80 in CW).

NATPCH - Natural regeneration, precommercial thin, commercial thin and harvest (90-year rotation in CD, CW; 70 in LPP)

NAT PH - Natural regeneration, precommercial thin and harvest (80-year rotation in CD, CW; 50 in LPP).

NAT H - Natural regeneration and harvest only (70 year rotation in CD; 90-year rotation in CW and 80 year rotation in LPP).

Selection harvest is a management intensity that is applied to riparian zones, visual foregrounds, the Phillips Lake area, and is an option in the dispersed recreation/timber allocation in Hells Canyon NRA As applied to riparian zones it is a modeling prescription only, intended to limit the rate of harvest sufficiently to allow for "special consideration "

The "plant" management intensities are more properly described as "full stocking" management intensities. They assume that many of the existing timber stands will be

regenerated by planting or by preparing the site to accept natural seeding and will achieve objectives of full stocking within five years. Twenty-two percent of the CD working group and 28 percent of the CW working group would be naturally regenerated based on the judgment of the District silviculturists on gentle (tractor) ground.

The natural regeneration prescriptions are a pure natural regeneration management intensity where no acres will be planted. Where natural regeneration is used, it will be designed to achieve adequate restocking within five years of final harvest.

Intermediate-type options such as interplanting or supplemental planting following a period of natural regeneration were analyzed outside of FORPLAN and eliminated. The option of planting (full stocking assuming natural regeneration on all acres where silviculturally sound) proved to be as economical as any of the intermediate options considered

Efficiency was a consideration for the development of all prescriptions For example, if a prescription involved timber harvesting, the goal statement for the timber management standard and guideline called for the optimum production of wood consistent with various resource objectives, environmental constraints, and economic efficiency Therefore, prescriptions were developed with enough flexibility to permit one practice to be selected over another if it proved to be more cost effective in achieving the objectives of the prescription.

Pursuant to the intent of 36 CFR 219 14 (b) and (c), economic efficiency was also considered in the development of the FORPLAN prescriptions for each management area which permitted scheduled timber harvesting In many cases a wide range of alternative silvicultural regimes was developed and made available to FORPLAN for a particular management area. These represented different schedules of management practices, outputs and effects, and economic consequences The model could then select which prescriptions most efficiently achieved the objectives of the alternative. More detailed summaries of prescriptions by analysis area are available at the Supervisor's Office, Baker City, Oregon.

Range of Timber Management Options Considered

As discussed in Section III C, analysis areas were delineated in part by four working group identifiers (CD, CW, LP, and CD-B) and seven existing vegetation condition classes (REGEN, REFOR, PRECOM, COMTHN, OVERWD, MULTI AND FBROPP These analysis area identifiers depicted stands which were classified as suitable and available lands for timber harvesting.

FORPLAN timber management prescriptions were developed for every combination of management emphases which called for scheduled harvesting and analysis areas which contained suitable and available forested land. For any one prescription, the model was also offered several timing choices on when to implement it. Also, for each management emphasis and analysis area combination which involved timber harvesting options, the model could select a prescription which called for no programmed harvesting All in all, FORPLAN could select from any of 40,000 to 50,000 prescription/timing choice options to meet its objectives for a particular alternative.

The silvicultural prescriptions and their associated yield tables that were developed for these analysis areas were based on regression analyses of the timber inventory data plus professional judgment As would be expected, the older the stand, the fewer the silvicultural options that were realistically available to manage it. For example, in most

cases the only option left for a mature stand was to harvest it and start a new managed stand

The prescriptions for two-storied stands (OVERWD) consisted of either a final harvest or an overstory removal The residual stand was then allowed the several options available to a newly established plantation. Precommercial thinning (PRECOM) stands offered more options Several patterns of precommercial/commercial thinning combinations were possible, or they could be harvested and regenerated. In total, the model contained 29 yield tables for existing stands

Managed yield tables were developed for prescriptions involving analysis areas in the reforestation or precommercial thinning condition (i.e., existing plantations), and for future managed stands resulting from the conversion of existing natural stands Twenty-three managed yield tables were included in FORPLAN.

The prescriptions included in the FORPLAN model covered a wide range of timber management options

a Plant Harvest (PLT H)

b Natural Regen-Harvest (NAT H)

c Plant-Precommercial Thin-Harvest (PLTPH)

d Natural Regen-Precommercial Thin-Harvest (NATPH)

e Plant-Commercial Thin-Harvest (PLT CH)

f Plant-Precommercial Thin-Commercial Thin-Harvest (PLT PCH)

g Natural Regen-Precommercial Thin-Commercial Thin-Harvest (NATPCH)

The full range of management intensities was available for the GNFR 1, GNFR 2, and GNFR 3 management emphases The other management emphases were usually restricted to selection harvest due to the specifics of their objectives

Development of Per Acre Yield Coefficients

FORPLAN evolved to consist primarily of a wide range of harvest scheduling prescriptions which were designed to achieve the multiple use resource management objectives associated with the various management area land allocation choices. In this section we summarize the processes used to develop the resource outputs and effects coefficients used in the final version of the FORPLAN model

Even though the timber and recreation resources were at the heart of many planning issues and together accounted for over 95 percent of the present net value associated with any of the alternatives, the outputs and effects of many other resources were also evaluated for each alternative These include the energy, minerals, range, soils, visual, wildlife, and water resources

The development of the coefficients for energy, minerals, and water are not covered in this discussion For the details regarding these resources, refer to process records in the Supervisor's Office Appendices F and G of this EIS further describe sediment and wildlife coefficients

The process for developing the economic cost and benefit coefficients for the FORPLAN prescriptions are presented in Section IV of this Appendix

Timber Yield Coefficients for Existing Stands

The development of timber yield tables was an important step in the Wallowa-Whitman National Forest planning process They are a component of the FORPLAN model which is used to calculate the allowable sale quantity, long-term sustained yield, and schedule of timber harvest activities.

An Interdisciplinary Team of wildlife biologists, landscape architects, economists, silviculturists, and timber management personnel at the Ranger District, Forest, and Regional Office levels were involved in the process. The yield tables were reviewed at several points. Initial review was made by District personnel who compared the tables with their personal experiences on the ground. Other reviews were made by researchers, neighboring Forests, and industry silviculturists.

Yield coefficients were developed for all management area prescriptions and analysis area combinations which permitted regulated timber harvest scheduling. This involved the development of both empirical yield tables for existing sawtimber stands, and managed yield tables for existing plantations and future managed stands. They are discussed separately in the following sections.

Timber yield tables for existing stands include regeneration harvest-only and intermediate entry options. Regeneration harvest-only volumes are from empirical yield tables developed by the Regional Office Intermediate harvests are modeled as follows

- CD and CW COMTHN condition classes receive harvest of 30 percent of existing empirical volume the first decade. Residual volume recovers at the rate of 5 percent per decade so that seventh decade volumes are the same as shown in the empirical tables

- CD and CW OVERWD condition classes receive harvest of 100 percent of existing empirical volume (9" dbh-6" dib) and show managed yields equivalent to entry of yield tables for regenerated stands at an assumed age class 2

- CD FBROPP condition classes receive harvest of 100 percent of existing empirical volume (9" dbh-6" dib) and access yield tables for no cultural treatment at an assumed physiological age class 4. No cultural treatment tables are accessed on the assumption that it will not be possible to gain stocking level control of the residual stand.

- CW MULTI was modeled as a regeneration harvest-only prescription.

- All existing precommercial thinning and reforestation condition classes access managed yield tables identical to the regenerated stand yield tables appropriate to the selected management intensity

- Selection harvest yield tables were developed by converting hypothetical 100-acre stands to a managed condition through group selection, maintaining a minimum average basal area (BA) across the 100 acres This minimum BA was 70 square feet for immature CW, 90 square feet for mature CW, 55 square feet for immature CD and 60 square feet for mature CD Because of the relatively low

confidence level in this kind of model all existing condition classes were grouped as either mature or immature

Other constraints which applied to this modeling of selection harvest were 1) minimum volume of 2,000 board feet (350-385 cu ft.) per entry, and 2) 20 percent reduction in the basal area and volumes projected from managed yield tables to account for a competition with adjacent trees

The resulting selection harvest yield tables maintain a relatively constant level of harvest per entry though entry frequency increases, allowing average production to increase from 13-26 cu ft/ac/yr in the first few decades to 36-40 cu. ft/ac/yr for CD and CW, respectively These volumes closely approximate estimates from PROGNOSIS for fully managed stands.

Timber Yield Coefficients for Regenerated Stands

Yield tables for regenerated stands fall into three general categories: 1) those with precommercial thinning, 2) those without precommercial thinning, and 3) selection harvest Yield tables were developed using the PROGNOSIS yield simulator.

All yield tables were adjusted to reflect "operational falldown" including nonstockable and nonstocked holes, defect, and breakage. A lag associated with natural regeneration is provided in FORPLAN. LPP tables assume natural regeneration and no regeneration lag.

Yield tables including multiple commercial thinnings following precommercial thinning were not included in FORPLAN PROGNOSIS showed that maximum production at culmination of mean annual increment occurs following one commercial thinning

All volumes are rounded off to the nearest ten cubic feet to simplify data entry and increase the accuracy of data proofing Attempting to carry the third decimal place in FORPLAN data entry results in values being run together into nearly unrecognizable character strings.

FORPLAN yield tables assume a two-decade cycle for thinning, with regeneration harvest following the last commercial thinning by two or more decades.

All in all, 23 different timber yield tables were developed for analysis areas in the model.

Determining Silvicultural Systems

One of the Forest management goals is a regulated forest, producing annual harvests at the long-term sustained-yield timber capacity The essential requirements of a fully regulated Forest are that age and size classes be represented in such proportions and consistently growing at such rates that an approximately equal annual or periodic yield of products of desired size and quality may be obtained There must be a progression of size and age classes so that harvestable trees in approximately equal volumes are regularly available

While such a goal may never be achieved because of unforeseeable events, timber harvest schedules are directed at this objective. Determining the long-term sustained-yield timber capacity and base harvest schedules require adoption of a Forest management method.

Two methods must be considered when selecting a silvicultural method even-age and uneven-age management A regulated even-aged forest would be composed of stands of different ages in such proportions and growing at such rates as to assure equal annual or periodic harvest from stands of rotation age

Even-age management has been the primary method used for sustained yield forestry in the western United States. The concept of even-age management is regeneration, either through clearcut or shelterwood harvest, followed by site preparation and planting or seeding (natural or artificial) Vegetation competing with replacement crop trees is controlled and one or more intermediate harvests may occur before the next cycle begins. These practices have been the subject of intensive research which provides the scientific basis for predicting their results

Stands not meeting the precisely defined even-age condition are often referred to as uneven-aged stands A multitude of stand conditions on the Forest fall under this broad definition Smith (1962) asserts there is need for a restricted definition, arising from the fact that there is not, in the strictest sense of the term, any such thing as an uneven-aged stand Even when a single large tree dies it is replaced not by one new tree, but by many which appear nearly simultaneously. This is true even if the new trees are from advance regeneration.

Smith (1962) also suggests restricting the definition of uneven-aged stands to those containing at least three well-defined age classes. This suggestion is reasonable for the Wallowa-Whitman as stand age classes generally span 20 years and three 20-year age classes would span the shortest expected rotation period

There is also a need to define when an even-aged group becomes an individual stand and would be managed under the even-age system Again, Smith (1962) suggests that the largest uneven-age opening be taken as that area entirely under the influence of adjacent mature timber This suggests that environmental factors in the middle of such an area would be the same as for a larger opening A five-acre minimum even-aged stand size is preferred, primarily as a realistic area for keeping records, and that size would reasonably meet Smith's criteria for conditions on the Wallowa-Whitman.

A regulated uneven-aged forest would comprise stands with different aged trees in such proportions and growing at such rates as to assure equal annual or periodic harvest of merchantable trees of all ages Theoretically, each uneven-aged stand would contain this idealized distribution and thereby constitute an individual sustained yield area

It would not be reasonable to expect to achieve such a complex arrangement of trees over hundreds of thousands of acres However, it would be reasonable to assume that a broad enough range of uneven-aged stand conditions could be organized and maintained to produce approximately equal annual yields from one portion of the Forest and then another.

Uneven-age management has not been feasibly demonstrated on a significant amount of area in the western United States. Perhaps more importantly, there is little scientific research to predict the response of western species when grown in competition with dominant neighbors over extended time periods.

The obvious difference between group selection and even-age management is the size of the opening created for regeneration Openings in group selection may be measured in tenths of acres up to several acres in size Even-aged openings on the Forest would generally be above 20 acres with occasional openings 40 acres or larger in size.

01336

The principal difference resulting from these opening sizes is the amount of edge effect per area harvest. (Edge effect is the portion of an opening where the physical environment is influenced by the adjacent trees) For example, soil temperature in a harvested area is influenced by shade from adjacent trees; and adjacent trees encroaching into those openings deplete available soil moisture. In small areas the edge effect is 100 percent of the openings, whereas, in large clearcut areas the edge effect may be less than 5 percent of the openings The survival and growth of tree species in such areas is affected by the size of the openings

There is a need to distinguish between management and silviculture. Management may be described as the administrative and regulatory process whereby the policies and objectives established for a forest property are attained. Silviculture is generally the science and art of cultivating (i e , growing and tending) forest crops based upon a knowledge of silvics (Ford-Robertson, 1971). Silviculture is applied to achieve management objectives for each forest property.

Thus the choice of a silvicultural system is made to achieve management objectives. There does, however, need to be a process through which either the management objective or silvicultural method is modified when the biological realities of a site make one or the other infeasible.

The Forest Plan has identified goals and objectives for various parts of the Forest which will require various silvicultural methods. These include such areas as riparian zones, critical habitat for threatened wildlife species, and recreation sites as well as lands where timber production is the primary goal. Silvicultural systems must be selected for each of these concerns The various forms of uneven-aged silvicultural methods may be appropriate where the management goal is continuous forest cover.

Sidel (in USDA 1973) states that silvicultural systems which result in even-aged stands should be used in the grand fir, Douglas-fir, and associated species types if timber production is an important objective. The ecological requirements of the pines and larch, the increasing markets for smaller material and the necessity of removing large amounts of diseased timber, all indicate that even-aged management should be applied.

Sidel also suggests the selection system could be used in disease-free stands if stand structure and composition are suitable and the conversion to more shade-tolerant species is not objectionable

In the northwestern ponderosa pine and associated type, Barrett (1979) states that both methods (even and uneven-aged) can be used successfully but that mature trees have been shown to exert a significant effect on smaller understory trees in both height and diameter growth.

Barrett (in USDA 1973) also recommends that clearcutting or shelterwood methods be used on stands infested with dwarfmistletoe In the lodgepole type, Alexander, et al, (USDA, 1983) recommended clearcutting as the most practical method of harvesting because of windthrow and disease problems associated with other cutting methods

Based on Regional direction (USDA, 1984) the following criteria will be used in selecting the appropriate silvicultural system

- The selected harvest cutting method must permit the production of a volume of marketable trees sufficient to utilize all trees that meet utilization standards and are designated for harvest.

- The selected silvicultural system must permit the use of an available and acceptable logging method that has the capability to remove logs and other products without excessive damage to the identified desirable residual vegetation.

- The selected silvicultural system must be capable of providing special conditions such as a continuous canopy or continuous high density live root mats when required by critical soil conditions or needed to achieve management objectives such as streamside protection, wildlife needs, and visual enhancement.

- The selected harvest cutting method must permit control of vegetation to establish desired numbers and rates of growth of trees, as well as vegetation needed to achieve other management objectives identified in site-specific silvicultural prescriptions.

- The harvest cutting method selected will promote a stand structure and species composition that minimizes serious risk of damage caused by mammals, insects, disease, or wildfire, and will allow treatment of existing adverse insect, disease, or fuel conditions

- The harvest cutting method selected must meet resource and vegetation management objectives identified in the Regional Guide and Forest Plans Harvest cutting methods to be used on specific areas may be identified in Forest Plans, in environmental assessments, or in silvicultural prescriptions that are written or reviewed by a certified silviculturist

- Economics must be considered when selecting a silvicultural system. There may be instances in which uneven-aged methods are prohibitively expensive because of the costs associated with timber harvest and slash disposal on steep ground while protecting residual trees Conversely, it may be prohibitively expensive to achieve regeneration success on harsh sites after clearcutting

Additional supporting rationale for these criteria are found in the Regional Guide

When the foregoing factors are considered, the area likely to be judged suitable for intensive uneven-age management is believed to be relatively small. Conversion of uneven-aged stands to an even-aged structure may be expected where the resource management goal is sustained timber yields at high levels Uneven-age management may be applicable where continued sustained yield at high levels is not critical to overall resource goals.

With the exception of the Hells Canyon National Recreation Area wherein selection harvest (an unevenaged method) is required, the harvest cutting method will be determined through project level planning.

Based on the foregoing criteria, it appears that evenaged methods will normally be selected where timber production is the primary objective In areas where other resource objectives predominate, uneven-aged methods will frequently be used (Also see Chapter IV of this EIS for effects of each of the harvest methods on other resources) Clearcutting will be used only when it can clearly be shown that other methods will be environmentally or economically inferior.

Standards for Dispersing Even-Aged Harvest Units

Within Management Area 1, regeneration harvest units will be separated by uncut stands containing one or more logical logging units Regeneration harvest of units adjacent to an existing regenerated unit will not be initiated until 80 percent of the desired crop tree stocking of the existing unit reaches 4 1/2 feet in height.

At this height a stand is established silviculturally, visually, and as cover for some wildlife species, but does not provide sufficient age or height differentials over time to enhance either wildlife or aesthetic diversity in terms of edge contrast. Small trees would not be expected to provide sufficient edge contrast to allow for shaping and blending of harvest units to the extent practicable. Further delay in the harvest of adjacent mature stands, however, increases the chance of dwarfmistletoe infestation or of other diseases or insects invading the regenerated stands.

Within Management Areas 2 and 3, regeneration harvest units will be separated by uncut stands containing one or more logical logging units. Regeneration harvest of units adjacent to an existing unit will not be initiated until 80 percent of the desired crop tree stocking of the existing unit reaches 10 feet in height.

This exceeds silvicultural standards for stand establishment, provides sufficient age and height differentials over time to maintain edge contrast (enhancing wildlife and aesthetic diversity), and maintains the unique identities of adjacent stands. This height provides a well-defined edge so that units can be shaped and blended to the extent practicable, *and hiding cover that is usually sufficient to meet definitions found in Wildlife Habitat in* Managed Forests (Thomas et al, 1979)

Predicting Timber Yields

Managed yield tables for Forest planning are based on the need for yield projections *for a variety of management intensities within the Forest model.*

a The Forest model developed in 1980 identified the following three working groups:

- CD - Lower elevation timber types of primarily ponderosa pine and Douglas-fir associated with climax pine and Douglas-fir plant communities (Hall, 1973).

- CW - Mid to higher elevation timber types of Douglas-fir, ponderosa pine, true firs, western larch and Engelmann spruce associated with mixed conifer and true fir plant communities

- LP - Lodgepole pine timber types and plant communities.

The working groups were developed to represent a ranking of relative biological yield with the CD group producing the lower yield and the CW group the higher yield

b The Growth Prognosis System (Stage, 1973) was selected to produce yield projections based on work done by Collard (1981) and Wood (1979) This system was also the only readily available program to Forest planners that could produce alternatives The Inland Empire Version was selected for use since this was the most up-to-date (Wykoff and others, 1981).

c. The Forest planning team identified the need for the following investment levels for each working group for even-aged stands An investment level is based on specified combinations of silvicultural activities·

- Harvest and reforest (artificial or natural) only No intermediate cultural activities
- Harvest, reforest (artificial or natural), and precommercially thin
- Harvest, reforest (artificial or natural), precommercially thin with one or more commercial thinnings
- Harvest, artificially reforest, commercial thin without precommercial thinning.

d. A data set was developed for each working group for use in PROGNOSIS starting with bare ground for even-aged stands and a specified diameter distribution for uneven-aged stands Stand attributes were developed from local Forest data and recent research publications on growth and yield

CD working group sample plot was developed using Forest stand examination data from Baker and Wallowa Valley Ranger Districts and Barrett (1978 and 1979)

Sample plot data of the CW group was developed from Wallowa Valley, Pine, and Union Ranger Districts' stand examinations and Cochran (1979 A)

LP group plot data came from stand examinations on Baker Ranger District and Dahms (1964)

Uneven-aged data was developed from Forest inventory data for the multi-treatment model and Collard (1981).

e. PROGNOSIS was used to project yields for each working group and silvicultural activity

Elevation (mean) and aspect (mode) were calculated from Forest inventory data by working group (Table B-2). Slope, as determined by the planning team, averaged 15 percent for tractor yarding ground and 50 percent for nontractor ground PROGNOSIS timber yield projections at 15 percent and 50 percent slope showed little difference. Therefore, 15 percent slope was used for both tractor and aerial yarding timber yield projections. Forest 17 (Nez Perce) was used since it is the nearest to the Wallowa-Whitman (Wykoff and others, 1981)

A list of possible habitat types for each working group was developed and a test run made with each type for one growth cycle The initial scale factors were compared and the habitat type with a scale factor closest to 1 was selected for production runs

Table B-2
NFI DATA SUMMARY BY WORKING GROUPS FOR PROGNOSIS MODELING

No. Plots	Model	Component	Aspect3/	Slope 1/ Class	Elev1/	Site Index PP 2/	DF 2/	GF 2/	WL	LP 2/	ES	AF
23	CD-REG1	0101	4 1=SE	3 1=27%	4600	76	72					
81	CW-REG1	0102	3 8=SE	2 8=24%	5200	78	75	43	58		61	75
45	LP-REG1	0103	3 8=SE	1.7=13%	5500			38	50	40		63
33	CD-REG2	0201	4.8=S	3 1=27%	4600	59	62		50			
31	CW-REG2	0202	3 9=SE	2 7=23%	5100	64	63	35	50	43		73
37	CD-CT	0301	3 5=SE	2.9=25%	4400	69	70					
31	CW-CT	0302	3 8=SE	2 9=25%	5000	63	71	40	55	20	40	60
20	CD-FO	0401	3.4=E	4.1=37%	4500	80	74					
34	CW-FO	0402	3 1=E	3 2=28%	5000	65	72	45	50		55	75
15	LP-FO	0403	3 2=E	1.4=10%	5000				60	36		
29	CD-OWR	0701	3 8=SE	2 3=19%	4800	68	66	50				
50	CW-OWR	0702	3.8=SE	2.5=21%	5100	74	68	35	50	43	45	80
40	CD-MT	0801	3.2=SE	2.5=21%	4500	70	67	40				
24	CW-MT	0802	4 4=SE	2 9=25%	5100	78	69	46			60	55
10	LP-MT	0803	3 4=E	1 5=11%	5100	80		35	55	40		
				Average by working groups weighted by number of NFI plots								
182	CD		3 8=SE	3.0=26%	4600	70(75)	69(54)	45	50	-	-	-
251	CW		3.8=SE	2.8=24%	5100	70(80)	70(56)	41(48)	53	35	52	70
70	LP		3 5=SE	1 5=11%	5200	80	-	37	55	39(40)	-	63
All types			SE	20%	4970	73	70	41	53	37	52	67

1/ Mean values
2/ Site indices in parentheses calculated to the nearest foot for PP from Barrett, 1978; for DF from Cochran, 1979B; for WF from Cochran, 1979C, and for LP from Dahms, 1964.
3/ The mode, or most frequently occurring value, was used for the aspect These values are:
CD = 8 (west)
CW = 1 (north)
LP = 0 (flat)

f Diameter growth increment was calibrated to the sample plot data and height growth increment was calibrated to duplicate height growth for ponderosa pine per Barrett (1978), and Douglas-fir and white fir per Cochran (1979 B and C) Average height and increment for uneven-aged areas were reduced to reflect small tree suppression per Myers (1934) and Knapp (1974). A maximum basal area was set for each working group based on the mean of 30 percent of the highest basal areas from uncut plots Recent mortality was added back into the lodgepole pine working group plot data to account for mountain pine beetle epidemic

g. Test runs for even-aged projections were made for each working group using a variety of treatments consisting of no commercial thinning and one, two and three commercial thinnings both from above and from below

h. Test runs were compared and those projections that produced the highest cubic foot mean annual increment were selected as the managed yield for the designated working group and investment level Table B-3 summarizes these yields

i. A test of the even-aged PROGNOSIS timber yields was made by comparing them to standard yield tables. The precommercial thinning only tables were used in this comparison. Table B-4 displays the results of the comparisons

j The rationale for uneven-aged projections is essentially the same as developed by Collard (1981) except the Inland Empire Version was used instead of the Eastern Oregon Version.

The Eastern Oregon model was not used because it is essentially an older version of a north Idaho model with some modifications by the Boise Cascade Corporation and does not have height increment calibration or a revised diameter limit thinning option that allows a percentage cut within a diameter class

k. Previous decade mortality was added to merchantable cubic foot volume at each harvest entry to compensate for higher-than-experienced mortality (1 percent prognosis vs 0 5 percent inventory data) and to use recent mortality at harvest

l Final yield tables reflect 100 percent stocking Gross cubic foot volumes reflect a minimum merchantability standard of 7 inches DBH and a 4 inch top DIB Gross board-foot volumes have a minimum standard of 9 inches DBH and a 6-inch top DIB

m Net volumes were developed using the adjustment factors shown in Table B-5

n Ten percent genetic gain used at all harvest entries on even-aged CD and CW working groups scheduled for planting.

o Final removal and regeneration lag assumptions are shown below.

Table B-3
SUMMARY OF CUBIC FOOT PRODUCTION AND SIZE
FROM WALLOWA-WHITMAN NF YIELD TABLES

Yield Table	CMAI Age	CMAI DBH Inch	CMAI Vol. Cu Ft	95% CMAI Age	95% CMAI DBH Inch	95% CMAI Vol. Cu Ft	17" Mean DBH Age	17" Mean DBH DBH Inch	17" Mean DBH Vol. Cu Ft
CD-PCT	80	15 6	41.11	70	14 2	40.04	90	17 0	40 97
CD-PCT, CT at 60	90	18 9	42.74	80	17 4	42.18	80	17 4	42 18
CD-PCT, CT at 70	90	19 0	42.34	70	15 7	40 04	80	17.3	41.68
CW-PCT	90	13 8	53 37	70	11 5	51 30	120	17.2	49.46
CW-PCT, CT at 60	100	16.7	55 32	80	14 0	53 56	110	18 7	54 24
CW-PCT, CT at 70	100	16 8	56 22	90	15 5	55 84	110	18.1	55 25
LPP-PCT	60	11.7	47 05	50	10 2	43 88	-	-	-
LPP-PCT, CT at 50	70	15.1	49 17	60	13 4	47 93	-	-	-
LPP-PCT, CT at 60	70	15.0	48 14	60	13.4	47 05	-	-	-
CD-No PCT or CT	110	11.9	23 6	100	11.9	22 9	-	-	-
CD-No PCT, CT at 80	100	6 5	24.5	100	6.4	23.9	-	-	-
CW-No PCT or CT	120	13 8	34.1	100	13.3	33.3	-	-	-
CW-No PCT, CT at 80	120	7 5	34.3	110	7.3	32.8	-	-	-
CL-No PCT or CT	100	6 6	23 2	80	6 2	22.0	-	-	-

	Growth (CF/Yr)	Harvest (CF/Yr)
CD Selection, 16" tree	36.00	35 65
CD Selection, 20" tree	32.95	32 55
CD Selection, 30" tree	27 75	27 30
CW Selection, 16" tree	47 25	47.00
CW Selection, 20" tree	45 15	44.90
CW Selection, 30" tree	39 85	39.40

Time span between seed cut of a shelterwood and the final harvest are expected to be as follows

	CD	CW	Lodgepole Pine
Plant *	10 yr	10 yr	Not Applicable
Natural	20 yr	20 yr	Not Applicable

The following average regeneration lag times (years between regeneration harvest and adequate reforestation) were assumed All acreage designated as suitable in the EIS is capable of being adequately restocked within five years of final removal and will be managed to achieve regeneration within that timeframe

Regeneration Method	CD	CW	Lodgepole Pine
Plant *	5 yr.	5 yr	Not Applicable
Natural	10 yr.	20 yr	5 yr.

Predicting Sawtimber Mortality Salvage

All Forest Plan alternatives project salvaging a volume of sawtimber from dead trees This is material which has died as the result of naturally occurring (endemic) levels of forest disease and pests, and which meets sawtimber standards at the time of harvest

There is an estimated net annual mortality on the Forest of 74 MMBF Much of this timber is inaccessible due to its location or is otherwise uneconomical to salvage. Those trees not salvaged serve as replacement wildlife trees. Attempts will be made to capture as much of this annual mortality as is possible consistent with the objectives of the Final Forest Plan.

Two types of sawtimber mortality salvage occur on the Forest. The first type is salvage of sound, dead trees which occurs simultaneously with harvest of live trees on the same acres. The second type is harvest of mortality in separate sales which are designed specifically to capture dead material. The projected volume for the latter type of salvage is calculated separately and portrayed as roundwood volume.

* "Plant" refers to reforestation expected within five years of the regeneration harvest

Table B-4
COMPARISON OF PROGNOSIS YIELDS WITH PUBLISHED YIELD TABLES 1/

CP - Age 80 - PROGNOSIS CMAI

Item	PROGNOSIS	2/ Myers (1961) & Cochran (1979 A)
Basal Area	140	125
Height	66	65
Volume (cu ft.)	3289	2739
Mean Annual Increment	41.11	34.24

LP - Age 60 - PROGNOSIS CMAI

Item	PROGNOSIS	Dahms (1964)
Basal Area	153	121
Height	47	47
Volume (cu.ft)	2823	2112
Mean Annual Increment	47.05	35 20

CW - Age 90 - PROGNOSIS CMAI

Item	PROGNOSIS	3/ Myers (1961) & Cochran (1979 A)
Basal Area	175	201
Height	75	73
Volume (cu.ft.)	4803	4593
Mean Annual Increment	53.37	51 03

1/ Species distribution by working group based on 1979 National Forest Inventory (NFI) data. Proportion of PP volume from published yield tables based on Stand Density Index adjustment.
2/ 44% PP and 56% DF
3/ 20% PP, 30% DF and 50% WF

Calculation of mortality harvested during live tree sales is based on the timber inventory estimates of salvable dead material as a percent of total standing volume At the time of the 1979 timber inventory there were 267 MMBF of salvable dead volume on the Forest and 10,246 MMBF of live standing volume (net). On this basis it is estimated that for each million board feet of live timber harvested, 26,100 board feet of dead material will also be harvested (on average, across the Forest). This ratio was applied to each alternative in estimating this component of mortality salvage

01345

Table B-5
TIMBER YIELD REDUCTIONS DUE TO OPERATIONAL FALLDOWN
(Percent)

Working Group	Misc 1/	Nonstockable Area 2/	Defect & Breakage 3/	Final Harvest Total	NR-CT NR-CT Total 4/
CP	3.0	3.0	1.0	7.0	12.0
CW	3.0	2.0	2.0	7.0	12.0
LP	-	1.0	-	1.0	1.0

1/ Nonstocked holes and replant lag
2/ 1979 National Forest Inventory (NFI) data extract
3/ Assumption
4/ Additional 5 percent reduction for nonstocked areas (nonlodgepole stands only) at first commercial thinning in naturally regenerated harvest units

The volume of mortality from salvage sales was estimated using the average volume per acre of salvable material (from the timber inventory statistics) multiplied by the number of acres projected to be accessed under the salvage sale program (10,700 acres per year) The timber inventory showed 267 MMBF of salvable volume on 1 159 million acres for an average volume of 230.8 board feet per acre. Based on this process, an estimated 2 5 MMBF of sawtimber is likely to be harvested. Since the numbers of acres accessed by salvage sales is primarily dependent upon funding available for this type of activity, the estimated volume was held constant for all alternatives

Resource Yield Tables

The resource yield tables are rough estimates of output. The yields generated are only useful as indicators of comparison among FORPLAN runs Only the Old Growth and Sediment yield tables were used to generate numbers for the EIS.

The HERBGE (total annual herbage production) FORGTL and FORSTP (forage available on gentle and steep ground respectively) yield tables are derived using Hall's Community Types to provide estimated baseline outputs for the working groups. Data from Miller, McConnel and Smith, Wood, and Young (on file at Forest Headquarters) provided estimates of herbage production after regeneration harvest or under a stand of given crown canopy closure. Safe use factors developed by the Umatilla National Forest allowed conversion of these herbage yields to AUM's on steep and gentle ground, using a value of 800 pounds per AUM

HIDING cover yield tables project only future cover development. An unthinned stand is assumed to provide 100 percent hiding cover for one decade; a thinned stand 70 percent hiding cover for two decades. Both thinned and unthinned stands show complete loss of hiding cover over time.

THERML cover yield tables show approximately 90 percent thermal cover for existing mature stands Future mature stands eventually provide 100 percent thermal cover on a schedule which relates basal area growth to crown canopy closure

01346

OLD GR yield tables are based on the proportion of existing stands that would qualify as old-growth, extrapolating on a gross schematic basis for proportions that may qualify as old-growth in the future Several tables show old-growth values eventually going to zero. This was done solely to force selection of old-growth replacement, and was changed in several alternatives to allow permanent maintenance of old-growth stands.

SALVGE yield tables estimate the amount of salvable dead volume which might be available based on the following assumptions·

a Mortality largely returned to 1968 inventory levels - tussock moth and mountain pine beetle no longer at the epidemic levels of 1978 inventory.

b Relationship of salvable dead to mortality in various model components is the same as in the 1978 inventory.

ROADS yield tables were developed to estimate the amount of roads that would be necessary Sediment resulting from roads is included in the discussion of sediment coefficients contained in Appendix F

ECONOMIC EFFICIENCY ANALYSIS

This section describes the costs and benefits (as well as some concepts involved in economic efficiency analysis), how they were derived, and how they were used in the Forest Planning process. It deals with concerns about the efficiency of operations on the Forest--with the dollar value of outputs and the dollar value of costs. Concerns about the effects on the local social and economical environments are covered in the Social and Economic Impact Analysis section.

Economic efficiency analysis is required by the National Forest Management Act Regulations (36 CFR 219) and played an important role in the development and evaluation of Forest planning benchmarks and alternatives Specifically, 36 CFR 219 12(f) states

> "The primary goal in formulating alternatives, besides complying with NEPA procedures, is to provide an adequate basis for identifying the alternative that comes nearest to maximizing net public benefits."

Direction continues in 36 CFR 219 12(f)(8):

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

Description of Economic Efficiency Analysis Concepts

Priced Outputs

Priced outputs are those that can be exchanged in the market place Their quantitative values are determined by actual market transactions or by estimation methods that produce prices approximately those determined by market transactions.

Timber and forage are examples of commodities which are bought and sold in the market. Their values are determined through the interaction of buyers and sellers based on the supply and demand conditions in the market at the time of the transaction. Dispersed recreation visitor days (RVD's), on the other hand, are not normally purchased in the marketplace Their assigned values are estimated by using available market transaction data in combination with various theoretical techniques.

Conceptually, these assigned values are consistent and comparable to those values which were actually derived via market transactions (Rosenthal and others, 1985) Therefore, both assigned and market values are appropriate for calculating quantitative measures of efficiency such as Present Net Value (PNV) All benefits and costs are tracked in real terms, i.e , exclusive of inflationary effects

Recreation, timber, livestock grazing, water, commercial anadromous fish, and miscellaneous collections were the dollar-quantified benefits included in the economic analysis

Nonpriced Outputs

Nonpriced outputs are those for which there is no available market transaction evidence and no reasonable basis for estimating a dollar value comparable to the market values associated with the priced outputs.

In such cases, subjective non-dollar values must be attributed These values are described qualitatively rather than quantitatively. They may be either positive or negative In fact, what may be considered to be a benefit to one individual may be considered a cost by another

Examples of nonpriced outputs include threatened and endangered species habitat; preservation of natural and scientific areas, historical and anthropological site protection, providing for visual quality, air quality, and employment Some of these nonpriced outputs are reflected in priced outputs--recreation levels are certainly influenced by visual and air quality, e g Also, employment derives from the Forest's offerings of goods and services which are dollar-quantified

Discounting

Analyses of alternative investment options usually involve cash flows over different periods of time Due to a number of factors, including the uses to which money can be applied, a dollar received today is worth more than a dollar received ten years from now. Discounting is a process whereby the dollar values of costs and benefits which occur at different time periods are adjusted to a common time period so that they can be compared.

In this analysis the common time period is the present, in which case the discounted value is referred to as a present value. The real discount rate used in the analysis is 4 percent As a real discount rate, it is exclusive of the effects of inflation.

Present Net Value (PNV)

Present net value is the difference between the discounted value of dollar-quantified benefits and dollar quantified costs of managing the Forest As FSM 1971 2 puts it, PNV is " the primary measure of economic efficiency for use in comparing alternatives "

The period of analysis is 150 years. The analysis therefore reflects the changes that occur over time. Costs and benefits beyond that point are reduced to insignificance through discounting Present net value calculations consider only the benefits and costs which have been dollar-quantified.

Maximization of present net value was the criterion used to help assure that each alternative was the most economically efficient combination of outputs and activities to meet the objectives established for that alternative. Present net value calculations consider only the benefits and costs for which dollar values were assigned

On the Wallowa-Whitman, the priced benefits included timber, recreation, range, water, anadromous fish, and miscellaneous receipts These were compared with all Forest Service fixed and variable costs associated with managing the planning area. Therefore, PNV is an estimate of the respective benchmark's or alternative's excess of benefits over its related costs.

Present net value is equivalent to a one-time, up-front lump sum payment If PNV is positive, then the payment is to the people of the United States If PNV is negative, then the payment is from the people of the United States

A PNV of $1 million is equivalent to an annual payment of $40,808 for a hundred years at a discount rate of four percent. Because so many other costs and benefits are identified for the Forest on an annual basis, the annual equivalent of the present net value may be more meaningful to the decisionmaker

Opportunity Costs

Opportunity costs are defined as the value of a resource's foregone net benefit in its most economically efficient alternative use (FSM 1970.5).

In relation to the economic analysis performed for this analysis, it represents the decrease in PNV which occurs when an alternative other than the one with the highest level of PNV is selected Therefore, opportunity costs measure the net change in PNV for priced resource outputs and associated costs, and can be used to measure the net value sacrificed in order to produce the nonpriced benefits included in net public benefits

Consider an example Alternative 1 has a PNV of $1,000,000 and provides an acceptable degree of visual quality Alternative 2 has a PNV of $750,000 and provides an exceptional degree of visual quality In all other respects the alternatives are identical. In selecting Alternative 2, a decisionmaker would be saying that the visual quality would be worth at least $250,000. The annual equivalent of that $250,000 one-time, up-front lump sum payment would be a $10,202 annual payment for a hundred years

Net Public Benefits (NPB)

The maximization of net public benefits is the primary objective of the analysis Net public benefits is the overall value to the Nation of all outputs and positive effects (benefits) less all the associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits cannot be expressed numerically because it includes qualitatively-valued nonpriced outputs.

Conceptually, net public benefits is the sum of the present net value of priced outputs plus the net value of all nonpriced outputs

Welfare Distribution Effects and Impacts

This is another level of effects which are also of concern to management. These are the welfare distribution effects influenced by the mix and level of outputs produced by the Forest. They can be either positive or negative

They include jobs and personal income and payments to local governments These concerns are more related to questions of equity (i e , who pays and who benefits) rather than questions of efficiency They are not assessed in the context of the efficiency criteria associated with PNV. However, these positive and negative distributive effects need to be assessed as part of the net public benefits measure since equity objectives and efficiency objectives interact.

These concerns are discussed in Part V of this Appendix.

Parameters and Assumptions Used In Economic Efficiency Analysis

In order to calculate the present net value (PNV) for each alternative, assumptions had to be made regarding discount rates, demand functions, a common reference point in time for dollar values, and real price and cost trends. This section summarizes these decisions and their resulting parameters

This appendix is not intended to provide a blow-by-blow account as to how the analysis was performed Rather it seeks to outline the process which is contained in the working papers in the Forest Supervisor's office in Baker City, Oregon.

Discount Rates

Discounting involves the application of a discount rate that represents the time value of money to the American people to determine the present value of future costs and benefits A 4 percent real discount rate was used to calculate the present net value for each benchmark and each alternative

As a real discount rate, it excludes the effects of inflation This is not an assumption that there will be no inflation It is rather an assumption that the costs and benefits presented in the analysis will generally increase or decrease at the same rate as the rate of inflation According to FSM 1971 21·

> "Use a 4 percent real discount rate for evaluations of long-term investments and operations in land and resource management Also, determine the sensitivity of alternatives to variations in the discount rate At a minimum, use the rate used in the most recent Resources Program and Assessment to test sensitivity "

The 4 percent rate approximates the "real" return on corporate long-range investments (Row and others, 1981) The 4 percent rate was used to solve FORPLAN and calculate the PNV for each benchmark and alternative. The 7 1/8 percent rate was also used to run FORPLAN and calculate the PNV for Alternative C (Preferred) The 1985 RPA Program used a real discount rate of 7 1/8 percent. For all benchmarks and alternatives (except Alternative C), the present net values were merely recalculated using this second discount rate (FSM 1971.71) All costs and benefits were discounted from the midpoint of the decade in which they occur and are representative of average annual conditions in each respective decade

The discount rate is not equivalent to the federal government's cost of borrowing money (the interest rate paid for federal securities). It reflects rather the political, social, and economic needs and aspirations of the nation's citizens today and in the future. How much should those living today be willing to sacrifice for those living in the future? How much should those living today be willing to sacrifice the earnings of future generations to achieve a desired end today?

In brief, the discount rate used in the analysis is not the same as the cost of borrowing money because·

> --The cost of borrowing money includes a payment for inflation. The higher the rate of inflation envisioned by the lender, the higher the cost of borrowing The economic analysis assumes that costs and benefits will generally change at the same rate as inflation, thus the use of a real discount rate, net of inflation

--They're two different things The cost of borrowing money reflects the market conditions in effect at the time the money is borrowed. The discount rate reflects our society's judgement as to whether the nation's commonwealth will be enhanced or reduced by the decision.

Demand Functions and Real Price Trends

As specified by the Washington Office, USDA Forest Service (1920 letter to Regional Forester, "Downward Sloping Demand Curves", 2/3/81) and in keeping with FSM 1971.65, *horizontal demand functions for timber and nontimber resources were used* to analyze the benchmarks and alternatives for the DEIS. Many factors can influence the demand for stumpage from any one Forest (Row and others, 1981) Some of these factors include trends in interest rates, the species and product mix, the use of wood for energy, forest products exports, the cost of Canadian lumber, the rate of technical improvement in wood processing, and the levels of harvests on other National Forests. Also to be considered are the full range of wood product substitutes and the full range of considerations dealing with their respective, complementary goods and practices. All these contain some degree of uncertainty.

Neither the empirical nor the theoretical bases have been well enough developed to derive reasonable estimates of the demand functions for the resources offered at the Forest level Evidence suggests that the elasticity in the portion of the timber demand curve for which the Forest can influence output levels is such that prices would be relatively insensitive to some "reasonable" range of Forest timber offerings In other words, it appears that the timber demand curve for the range of output levels analyzed during the development of alternatives is best depicted as a horizontal demand function. We assume that prices are insensitive to volumes offered.

Real price trends were developed and used to represent the rate at which resource values will change over time as a result of anticipated supply and demand interactions in the market place As specified by the Regional Office (1920 letter to Forest Supervisors, "Timber Price Trends, Values, and Costs", 9/25/84), a 1 percent per year increasing real price trend for stumpage was used for FORPLAN harvest scheduling analyses. This was applied for the first 50 years. No further change in the price trend was assumed for the remaining 100 years of the planning horizon. Nominal stumpage prices (i.e., those which include the effects of inflation) are therefore increased during the next 50 years at a rate of 1 percent greater than the rate of inflation. Thereafter they are assumed to change at a rate equal to the rate of inflation.

Since price trends are reflections of conditions expected in the future, there is an *inherent uncertainty involved in making any such projections In recognition of this* uncertainty, sensitivity analysis was conducted using alternative stumpage price changes of 0, 2, and 3 percent, compounded annually The results of these runs are quite complex and are discussed in detail in the Forest working papers. Generally, the model showed itself to be insensitive to the 0, 1, or 2 percent real price increase in terms of acreage dedicated to timber management. In each of those cases, 997,000 acres were so dedicated. At a real price change of 3 percent, the figure increased to 1,033,000 acres.

Based on Washington Office direction, constant real prices were assumed for all other resources

Real Cost Trends

Based on Washington Office direction, constant real costs were assumed That is, the costs of labor, fuels, materials, and all other factors of production involved with managing the Forest are assumed to change at a rate equal to the rate of inflation Sensitivity tests were conducted to see how the model reacted to a 50 percent reduction in reforestation costs and a 20 percent reduction in timber sale related costs. In both cases, the model maintained its original selection of 997,000 acres for timber management

Real Dollar Adjustments

All costs and values used in the Forest planning process are expressed in 1982 dollars, consistent with the 1985 RPA program The Gross National Product (GNP) Implicit Price Deflator was used to convert both historical and future nominal prices and costs to this common base (FSM 1971 32b).

Benefits and Costs Used in the Economic Efficiency Analysis

This section describes the costs used to perform economic efficiency analysis for each of the benchmarks and alternatives considered during the development of the EIS.

All Forest Service costs were included for purposes of estimating budgets and calculating the present net value for each alternative These costs were identified by their Management Information Handbook (MIH) codes as described in FSH 1309 11. The MIH activity descriptions and their associated codes were useful for identifying how different costs would be treated during the planning process At the outset, each cost was categorized as either a fixed or a variable cost If it was identified as a variable cost, decisions were made as to whether it would be analyzed in FORPLAN or INTEGER, an electronic spreadsheet.

Costs were determined by examining the Forest Unit Summary Reports and other historical records, and by constructing cost estimates. Professional judgement was also an important factor when it came to making assumptions regarding what bearing historical costs had on anticipated future costs All costs were developed and reviewed by the Forest Economist and the appropriate staff and substaff personnel. This included the question of cost allocation, that is, the charging of costs to the benefiting output

The following discussion summarizes the costs and how they were incorporated into the efficiency analysis for each alternative A more detailed presentation of the specific costs and their functions in the analytical tools can be found in the process records at the Forest Supervisor's Office, Baker City, Oregon.

Fixed Costs

A cost was classified as being "fixed" if it was not expected to vary significantly over the range of alternatives considered Fixed costs were a component of the budget estimates and present net value calculations for each alternative.

Table B-6 lists the MIH codes and their associated activities that were considered to be "fixed" across all alternatives developed for the EIS These costs also do not vary over time

Table B-6
FIXED COSTS

MIH Code	MIH Activity Description	Average Annual Expenditure 1982 M$ 1980-1983
C01	Fish and Wildlife Planning	126
C02	Habitat Improvement T&E Animals	3
C03	Habitat Improvement T&E Plants	9
C06	Habitat Maintenance	21
C07	Structural Fish Habitat Improvement	10
C09	Wildlife Habitat Maintenance	3
C12	T&E Species Act Coordination (S&P)	1
C15	Habitat Access Controlled by Closures	-0-
F04	Water Uses Management	22
F06	Water Resource Improvement Maintenance	1
F10	Cooperative Technical Assistance, Water (S&P)	-0-
G02	Minerals Management - Oil and Gas	1
G09	Mined Area Reclamation	1
J03	Federal Energy Regulatory Commission License and Permits	2
J11	Land Adjustment Planning	2
J13	Land Exchange	58
J14	Land Exchange - Cash Equalization	3
J15	Land Acquisition	58
J20	Geometronics	4
J22	Forest Land and Resource Planning	216
K06	Soil Resource Improvement Maintenance	-0-
P15	Vegetation Treated by Burning	7
P24	Law Enforcement	51
P25	Cooperative Law Enforcement	7
P26	Search and Rescue	-0-
P32	Forest Fire Presuppression (S&P)	11
P34	Insect & Disease Management - Surveys and Technical Assistance (S&P)	6
P35	Insect & Disease Management - Suppression (S&P)	9
P40	Insect and Disease Management - Special Projects (S&PF)	14
T01	Line Management (FSH 1309.11a)	625
	Total Fixed Costs	1,271
	Percentage of Recent Average Total Budget.	5 5

Variable Costs

All other costs are classified as being "variable" For instance, the Forest has the ability to invest more or less money in precommercial thinning, depending on the desired level of timber production (This includes those costs which are more properly identified as being semivariable in recognition that a certain portion of their total is fixed.) These costs were tied to the implementation of activities and are expressed as costs per acre or costs per unit of output (e g , dollars per MCF, dollars per RVD) Variable costs are analyzed, insofar as they relate to the timber program, in FORPLAN.

INTEGER, an electronic spreadsheet representing all quantified Forest costs and benefits, was run on a personal computer to generate final figures for presentation

In general, FORPLAN contained all of the costs and benefits associated with the timber program, including the costs of accessing previously unroaded areas The model reflected differences in logging costs between tractor logging, shortspan cable logging (less than 2000'), and helicopter-longspan cable logging. The Tables B-7 and B-8 depict the Forest Service costs that were included in FORPLAN and which contributed to its calculation of PNV for alternative multiple use timber harvest scheduling solutions

Table B-7
COSTS TRACKED IN FORPLAN IN THEIR ENTIRETY*

MIH Code	MIH Activity Description	1982-M$ 1980-1983 Average Annual
E00	Timber Resource Management Planning and Inventories	74
E03	Silvicultural Examination and Prescription	540
E04	Reforestation	1,645
E05	Timber Stand Improvement	627
E06	Timber Sale Preparation	1,484
E07	Timber Harvest Administration	792
E08	Nursery Management	6
E09	Genetic Forest Tree Improvement Program	50
L14	Timber Purchaser Road Construction	1,473
L29	Timber Purchaser Road Reconstruction	2,091
P11	Treatment of Activity Fuels	326
	Total Average Annual	9,108
	Percentage of Recent Average Total Budget	39 4

MIH· Management Information Handbook

*FORPLAN was also afforded the opportunity to access the Forest's remaining roadless areas for the cost of their access road construction

Table B-8
COSTS ATTRIBUTED IN PART TO THE TIMBER PROGRAM
AND TRACKED IN FORPLAN

MIH Code	MIH Activity Description	Percentage Charged Timber	Average Annual Expenditures 1980-1983 1982 M$
A02-306	Cultural Resource Inventories	90	140
F01	Water Resource Planning	80	71
F02	Water Resource Inventory	80	15
F03	Water Resource Monitoring	80	14
G01	Mining Law Compliance and Administration	20	20
G07	Minerals Management-Mineral Materials	20	2
G11	Geological Planning and Inventory	100	11
J01	Special Use Management (Non-Recreation)	10	8
J06	Property Boundary Location	90	269
J07	Property Boundary and Corner Maintenance	90	1
J18	Rights-of-Way Acquisition	70	6
K01	Soil Resource Inventory	80	6
K03	Soil Resource Planning	80	14
K04	Soil Monitoring	80	8
---	Engineering Services	91	1,469
---	Road Maintenance (Other than Co-op)	53	466
---	Capital Improvements	95	760
---	Facility Maintenance	24	58
---	Facility Construction/Reconstruction	24	19
P01	Fire Management Planning and Analysis	50	76
P02	Fire Prevention	50	63
P03	Fire Detection	20	17
P04	Primary-Initial Attack Forces	50	409
P06	Fire Reinforcements	20	10
P07	Forest Fire Support and Facilitating Services	50	32
P08	Initial Attack Fire Suppression Action	50	380
P14	Fuel Treatment Area Maintenance	50	1
P19	Aerial Transportation of Personnel	20	101
P21	Aerial Application of Materials	20	24
	Total		4,470
	Percentage of Recent Average Total Budget		19 4

The above tables list the MIH activity codes for which costs were developed and entered into FORPLAN. Since Version 1 of FORPLAN does not easily track its activities by individual MIH codes, many of these elements were combined into broader FORPLAN cost categories These costs were expressed in terms of dollars per acre or dollars per MCF. For each FORPLAN cost category, a range of costs was entered into the model based on the Management Prescriptions, and the characteristics of the analysis areas to which they applied. All in all, 239 different FORPLAN economic tables were developed

to cover the different cost and value combinations to which prescriptions could be assigned in the model Table B-9 presents some broad FORPLAN cost categories, and the range of costs included in the Model

Table B-9 1/
FORPLAN GENERAL INPUT COST DATA

FORPLAN Cost Category	Cost Range Per Acre
Reforestation 2/	0 - $409
Precommercial Thinning	$52 - $209
First Entry Road Construction	$56 - $268
Latter Entry Road Reconstruction 3/	0 - $134

1/ All costs vary depending on site-specific considerations such as steepness, species grouping, accessibility, stand characteristics, and the like
2/ The lower figure represents situations where natural regeneration can be achieved without additional preparation costs The higher figure and other figures within the range reflect a mix of reforestation practices The figures shown are exclusive of the extra costs associated with high elevation regeneration difficulty and shrubfield competition which range from $30 to $79 per acre
3/ Overwood removals following regeneration harvests assume no additional road work

All costs and benefits, whether identified in FORPLAN or not, are tracked outside the FORPLAN model This provided a capsulized view of the Forest under different alternatives and enabled the analysts to fine-tune budget estimates

In the case of recreation, including wilderness recreation, forecasts were made of future recreational activity on the Forest These forecasts relied on the population projection contained in the 1980 OBERS BEA Regional Projections, Vol 1, U S. Government Printing Office, p. 117 OBERS is an acronym for the joint effort of the Office of Business Economics (OBE), now the Bureau of Economic Analysis (BEA), U S. Department of Commerce; and the Economic Research Service (ERS) of the U S Department of Agriculture. These projections of use were in turn used to project associated costs

Range program costs are a function of the number of AUM's respective to individual alternatives. Each grazing allotment on the Forest was reviewed by cognizant field personnel to determine what levels of investment were needed to accommodate different levels of AUM's. These alternative investment levels were then incorporated in the different alternatives based on the issues identified in them

Costs associated with improving habitat for anadromous fish and wildlife were varied among the alternatives pursuant to the respective alternative's responses to issues, concerns, and opportunities (ICOs) As with range investments, these were constructed cost estimates The same procedure was followed for watershed improvement work

Costs for the minerals program and the human resources program were based on RPA projections of activities over the planning horizons Facilities program costs not classified elsewhere, may be fixed or variable. Some reflect a fixed cost component of a semivariable cost.* Some are reflected indirectly in the FORPLAN model as in the case of co-op road maintenance which manifests itself in the form of lower stumpage values

Program support and common services are recognized as being largely fixed but with a significant portion which will vary based on overall Forest activity, such as utility expenses

Costs Not Included in the Economic Efficiency Analysis

The costs which were not figured to vary significantly by alternative were generally excluded from the analysis. Likewise excluded were those costs which could not be reliably predicted--such as the costs associated with the spread of wildfire beyond Forest boundaries or the costs (and benefits) associated with development of lignite deposits Both occurrences are real possibilities. The former was not dollar-quantified because greater care is taken in treating forest slash where it might endanger private property The likelihood of such a possibility is estimated to be extremely small In the latter case, there are so many site-specific questions that mineral development would require a separate environmental document.

The guiding principle for identifying costs is contained in FSM 1971 4

> "Limit identification of economic costs to only those costs in the production process up to the point of evaluation or to those costs that influence the values of outputs "

Benefits Considered in Economic Efficiency Analysis

This section describes the benefits which were incorporated in the economic efficiency analyses for each benchmark and alternative considered during the development of the EIS

The resources for which dollar values were estimated in this analysis are timber, wildlife/ recreation, and domestic livestock grazing, water, anadromous fish, and miscellaneous receipts. As FSM 1971.52 puts it

> "Determine values only for outputs that the Forest Service sells or potentially could sell, if the law or Forest Service policy permitted "

There are other benefits (such as mineral production) which are frequently dollar-quantified in an economic analysis; but were not in this analysis because they were not expected to vary significantly among the alternatives.

Resource outputs to which dollar values were assigned constitute the benefits included in the present net value calculations Like the costs included in the analyses, only those benefits incurred during the 150-year planning horizon were incorporated in the PNV calculations. This period of analysis is more than adequate to capture all significant residual costs and benefits

*A semivariable cost is a cost which contains both a fixed component and a variable component.

01358

Benefits fall into one of two categories, market or nonmarket (assigned). Market values constitute the unit price of an output normally exchanged in a market after at least one stage of production, and are expressed in terms of what people are willing to pay--as evidenced by market transactions Nonmarket values constitute the unit price of an output not normally exchanged in a market at any stage before consumption, and thus one whose value must be assigned from other information (FSM 1970 5) They are valued in terms of what a reasonable and prudent individual would be willing to pay (above participation costs) rather than to go without

In either case, their values are theoretically commensurate and appropriate for inclusion in PNV calculations The resources for which dollar values were estimated on the Wallowa-Whitman were timber, range, recreation, water, anadromous fish, and miscellaneous collections

Benefits Whose Values Are Determined in the Marketplace

Timber was the only resource whose benefits and costs were tracked in FORPLAN. These values were expressed in terms of dollars per MCF paid at time of harvest. The stumpage values were developed for both existing stands and future managed stands, and were stand-respective to the extent shown in Table B-10

Table B-10
CHARACTERISTICS AFFECTING STUMPAGE VALUE DIFFERENTIALS ON EXISTING STANDS

CD:	*Ponderosa pine, Douglas-fir dominant*
	Regeneration Harvest Opportunity
	Commercial Thin Opportunity
	Fiber Opportunity
	Overwood Removal Opportunity
CW·	*Mixed conifer*
	Regeneration Harvest Opportunity
	Commercial Thin Opportunity
	Overwood Removal Opportunity
	Multitreatment Opportunity
High Elevation CW	
	Regeneration Harvest Opportunity
	Commercial Thin Opportunity
	Overwood Removal Opportunity
	Multitreatment Opportunity
CL	*Lodgepole*
	Regeneration Harvest
	Fiber Opportunity

01359

Further differentiation of these values was based on the degree of accessibility (whether the stand was in the HCNRA or not), how the material was harvested (commercial thin, clearcut, shelterwood, e g), and the logging system

Characteristics affecting stumpage value differentials for regenerated stands, besides species grouping, included the regeneration mode (which itself affected species mix); whether the stand was precommercially thinned or not (which affected board-foot volume production), whether the stand was commercially thinned, clearcut, shelterwood harvested, and so on. Harvest characteristics such as trees per acre, volume per tree, volume per log, tree height, slash treatment were also considered

Since the source data was expressed in terms of dollars per MBF, it was necessary to convert these to dollars per MCF, the unit of measure used in FORPLAN Stumpage values used in the planning process came from the Regional Office direction package of April 27, 1984 which contains estimates of high bid stumpage values at harvest.

The stumpage value for each individual species was converted to working group stumpage values based on the species composition of each working group modeled in FORPLAN These values represented the values of the empiric or existing stands.

For regenerated or successor stands, estimates were made of stumpage values based on stand characteristics such as tree volume, tree height, trees per acre, species mix, and so on. These calculations were made for the yield table options put into FORPLAN and showed considerable change as the stands developed over time. These stand characteristics, along with those engendered by the anticipated logging system, were reflected in FORPLAN.

The range outputs represent the amounts of forage to be grazed by domestic livestock and is measured in animal unit months (AUM's) AUM values represent permittee willingness-to-pay for grazing on the Wallowa-Whitman. The Forest Service entered into a cooperative agreement with the USDA Economic Research Service to develop livestock enterprise budgets for each National Forest The Range Budget Approach was used for this analysis. Because Forest AUM's are not actually priced in a free competitive market, the calculated price is an estimate of market value. The Regional Office Direction Package of April 27, 1984 stipulates a value of $7.47 per AUM.

Values used for maintained water quality ($200 per thousand acre feet), improved water quality ($1,400 per thousand acre feet), and anadromous fish ($1,050 per thousand pounds) were among those stipulated in the Regional Office direction package April 27, 1984.

Miscellaneous receipts were also included as benefits for the calculation of PNV The receipts for these activities were based on the actual receipts for fiscal years 1980 through 1983 These receipts are a very small percentage of total Forest revenues They include monies received for the use of admission and user fees, and land use.

Benefits Whose Values Are Not Determined In the Marketplace

The non-wildlife related recreation and wilderness outputs represent the amounts of their use on the Forest and are measured in terms of Recreation Visitor Days (RVD's) The wildlife related recreation use is measured in terms of Wildlife and Fish User Days (WFUD's). The values used for these priced outputs are shown in Table B-11 and were taken directly from the 1985 RPA Program assessment. This discussion is a summary of the description found in Appendix F of the 1985 RPA DEIS.

The development of recreation, wilderness, and wildlife values for the 1985 RPA Program analysis was by activity per RVD or WFUD with adjustment of values to reflect standard and less-than-standard levels of management.

The Resource Evaluation Group at the Rocky Mountain Forest and Range Experiment Station conducted an extensive literature search to develop the 1985 activity values for recreation (Loomis and others, 1982). Benefit values for recreation, wilderness, and wildlife activities were developed from recent travel cost models and contingent valuation research (Loomis and others, 1982) In-service and academic specialists reviewed the research and the activity values and adjusted them to achieve the methodological consistency necessary to apply them to regional conditions The values represent average willingness to pay. The RVD values by recreation activity that were generated by this study can be found in Table F.4 of the 1985 RPA DEIS

In response to the question of quality, the concept of standard and less-than-standard service was introduced, and the resulting impact on the value of the experience to the recreationist was estimated If recreation facilities are not fully maintained, the quality of the experience will be lowered Two different sets of values were developed to account for standard and less-than-standard conditions A special study showed that, on the average, the less-than-standard RVDs are valued at about 53 percent of the value of standard RVDs.

Finally, these values were expressed in terms of the Recreation Opportunity Spectrum (ROS) activity categories The values are depicted in Table B-11

Consideration of Nondollar-Quantified Costs and Benefits

The calculation of PNV provides efficiency data to use when comparing alternatives' output levels. However, other factors also influence the decisionmaking process In some cases the importance of nonpriced benefits outweighs the advantages of producing higher levels of priced outputs The importance of considering these subjectively-valued benefits in Forest management decisionmaking is addressed in the NFMA Regulations which charge the Forest Service with identifying the alternative which comes nearest to maximizing net public benefits (36 CFR 219 12(F)).

01361

Table B-11
1985 RPA RECREATION BENEFIT VALUES (1982 $)
(Average Willingness To Pay)

Recreation	Value ($/RVD)
Primitive (STD) 1/	11 25
Primitive (LSTD) 2/	5 96
Semiprimitive Nonmotorized (STD)	13 25
Semiprimitive Nonmotorized (LSTD)	7.02
Semiprimitive Motorized (STD)	12.13
Semiprimitive Motorized (LSTD)	6.43
Roaded Natural (STD)	9.38
Roaded Natural (LSTD)	4.97
Rural (STD)	8.47
Rural (LSTD)	4.49
Urban (STD)	11 38
Urban (LSTD)	6 03
Wilderness	**Value ($/RVD)**
Primitive (STD)	17.50
Primitive (LSTD)	9.28
Semiprimitive Nonmotorized (LSTD)	9.28
Wildlife & Fish	**Value ($/WFUD)**
Big Game	30.00
Nongame	25.00
Resident Fish	15 00
Anadromous Fish	33.00
Other Game	19 00
Wildlife and Fish Recreation (STD)	21 00
Wildlife and Fish Recreation (LSTD)	14.00

1/ STD Standard
2/ LSTD Less Than Standard

Net public benefits (NPB) represent the overall value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs), whether they can be quantitatively valued or not (36 CFR 219.3). Net public benefits include both priced and nonpriced resource outputs, less all costs associated with managing the area. As stated earlier, all priced outputs and costs associated with managing the Forest are included in the calculation of PNV. To this, the net subjective values of the nonpriced outputs are included in order to arrive at the overall NPB of an alternative Some of the more important nonpriced benefits addressed during the planning process included the following:

- Local Community Stability
- Diversity and Quality of Recreation Opportunities
- Habitat for Threatened, Endangered, and Sensitive Species
- Management Requirements
- Ecosystem Diversity
- Old-Growth Timber
- Visual Quality
- Accessibility by Roads

These are outputs and effects which are influenced by Forest management They are all related to one or more issues and concerns which were identified at the outset of the planning process. Important as they are, it is not practicable to measure their importance in dollar terms comparable to market values. The values are determined subjectively.

Many of the nonpriced benefits are accommodated by applying constraints to the *production of priced outputs (i e , limiting the timber harvest in FORPLAN so that* massive blocks of contiguous lands are not all harvested at the same time). These constraints usually result in a decrease in the PNV of the priced outputs to which the constraints are applied. Subjective judgements are then necessary to assess whether the benefits of producing the nonpriced outputs exceed the opportunity costs associated with producing fewer priced outputs If a PNV tradeoff induced by the provision of a nonpriced output is judged acceptable, then a positive contribution to NPB has resulted, and the alternative is determined to be more desirable overall

The nonpriced outputs considered during the development and evaluation of alternatives are discussed below While the quantitative dollar values of each are not determined, they can generally be evaluated by examining such quantitative indicators as acres of appropriate allocations, resource inventories, or timber production-related activities and outputs

a. *Local Community Stability* The residents of Baker, Union, and Wallowa Counties are especially dependent on the Wallowa-Whitman National Forest The Forest *is responsible directly and indirectly for thousands of area jobs, tens of millions* of dollars of personal income, and sizeable contributions through the "25% Fund" to local road and school programs

   The Forest's importance to the local communities in this regard is based primarily on its timber program which provides about half of the timber processed locally The range program, while vitally important to some permittees, is much less important in terms of overall forage consumed locally by livestock (less than 8 percent) Recreation opportunities on the Forest abound and support an industry which is still developing.

b *Diversity and Quality of Recreation Opportunities* The number of recreation visitor days (RVD's) and their associated priced values are included in the PNV calculations for each alternative. However, the assigned dollar values per RVD by ROS category reflect only indirectly the value of providing a diversity of recreation opportunities and settings

   The Forest currently provides adequate recreation diversity as reflected in RVD capacity by ROS category However, some components of the recreation opportunity spectrum are becoming more difficult to retain. For example, as remaining roadless areas are either designated as wilderness, or are roaded and devel-

oped for other uses, there are fewer opportunities for nonwilderness semiprimitive and primitive recreation experiences.

As more and more roadless areas are either developed or designated as wilderness, future generations will have fewer options regarding their management to meet changing needs. To the extent that retaining roadless areas in undeveloped condition does not restrict the efficient production of priced outputs, both recreation diversity and the future options they offer are considered a nonpriced benefit.

For each alternative, the recreation allocations and projected carrying capacities are categorized according to the recreation opportunity spectrum This is used to assess the recreation diversity which an alternative provides.

c *Habitat for Threatened, Endangered, and Sensitive Species.* The Endangered Species Act of 1973 (P. L 93-205), as amended, declared that Federal agencies shall seek to conserve endangered and threatened species of plants and animals. In order to meet the intent of this direction the Forest Service has established objectives and policies for inventorying the species, determining habitat or environmental needs, and protecting critical habitat and/or conditions necessary to preserve the plants or animals (FSM 2670) Included is direction to protect certain sensitive species to ensure that they do not become threatened or endangered

The U. S Fish and Wildlife Service, USDI, has primary responsibility for administering the Endangered Species Act. When the Forest Service proposes an activity that may affect a species listed, or proposed for listing as threatened or endangered, the Fish and Wildlife Service is consulted. The threatened, endangered, and sensitive species on the Wallowa-Whitman are listed in Table B-12.

Management Requirements. Each alternative provides for at least enough habitat to "maintain viable populations of existing native vertebrate wildlife species" (36 CFR 219.27 (a)(6)). However, some alternatives provide habitat for these species in excess of the MR's. Any provision of suitable habitat in excess of that specified in the MR's is considered to be a nonpriced benefit

Ecosystem Diversity Maintaining plant and animal ecosystem diversity over time is also considered to be a nonpriced component of net public benefits Benefits generally associated with ecosystem diversity are gene pool maintenance, scientific research opportunities, and the reduction of insect and disease risks

Since animal diversity is to a large extent dependent upon plant diversity, attention is focused particularly on the number of acres of each working group in each successional stage. The amount of old-growth provided is especially important since this component is the most difficult to replace once it disappears It serves as the focus for evaluating each alternative's impact on ecosystem diversity. Timber harvesting and fire are the chief means of manipulating vegetation diversity. The more old growth in a particular alternative, the more responsive it is to these concerns.

Old-Growth Timber During the recent decades, there has been a growing interest in old-growth timber, apparently brought about by an awareness that unaltered old-growth stands are diminishing both in size and in number. One reason frequently given for retaining old-growth timber is to meet wildlife needs but the

01364

desire apparently goes beyond this On the Wallowa-Whitman National Forest, there is no wildlife species that has been identified as requiring solely old-growth timber conditions, although some species require conditions that are best represented in old-growth stands.

People also want old growth for the recreational enjoyment it provides, for aesthetic and other qualities such as the size and age of its trees. Those opposed to the retention of old-growth conditions cite their concern for the loss of wood production and often prefer that land be converted to rapidly growing timber stands These conflicting desires are the basis of the old-growth issue. (For further discussion of the issue, see the Regional Guide.)

01365

Table B-12
THREATENED, ENDANGERED, AND SENSITIVE ANIMALS AND PLANTS

List	Species	Status
Threatened	Northern bald eagle	One nesting pair and significant wintering populations along several rivers on Forest.
Endangered	American peregrine falcon	Several areas on the Forest exist where sightings have occurred
Sensitive	Ferruginous hawk	Feeding, nesting, and rearing occur on Forest in several areas. USFWS needs additional information before proposing as Endangered or Threatened
	California wolverine	Abundant habitat exists on Forest but sightings are uncommon. USFWS needs additional information before proposing as Endangered or Threatened
	Long-billed curlew	Habitat exists on Forest and scattered sightings have occurred. USFWS needs additional information before proposing as Endangered or Threatened
	Pacific western big-eared bat	Known to occur within the Forest but the range and population size are unknown
	Redband trout	Habitat exists on Forest, but populations not identified at present USFWS needs additional information before proposing as Endangered or Threatened.
	Bull trout	Habitat exists on Forest and sightings have occurred. USFWS needs additional information before proposing as Endangered or Threatened
	Western sage grouse	Habitat exists on Forest, but populations not identified at present USFWS needs additional information before proposing as Endangered or Threatened.

Source: FSH 2600 - Wildlife, Fish and Sensitive Plant Habitat Management Interim Directive No. 6, August 15, 1989.

Table B-12 (cont.)
THREATENED, ENDANGERED, AND SENSITIVE ANIMALS AND PLANTS

List	Species	Status
Sensitive (cont)	Greater sandhill crane	Habitat exists on Forest and sightings have occurred.
	Upland sandpiper	Habitat exists on Forest and sightings have occurred.
	Tricolored blackbird	Habitat exists on Forest and sightings have occurred. USFWS needs additional information before proposing as Endangered or Threatened.
	Harlequin duck	Habitat exists on Forest and sightings have occurred
	Black rosy finch	Habitat exists on Forest, but populations not identified at present.
	Preble's shrew	Habitat exists on Forest and sightings have occurred USFWS needs additional information before proposing as Endangered or Threatened.
	North American lynx	Habitat exists on Forest and sightings have occurred USFWS needs additional information before proposing as Endangered or Threatened
	California bighorn	Habitat exists on Forest and sightings have occurred. USFWS needs additional information before proposing as Endangered or Threatened.
	Blue Mountain Cryptochian	Habitat exists on Forest and sightings have occurred. USFWS needs additional information before proposing as Endangered or Threatened

Source· FSH 2600 - Wildlife, Fish and Sensitive Plant Habitat Management Interim Directive No 6, August 15, 1989.

TABLE B-12 (cont)
THREATENED, ENDANGERED, AND SENSITIVE PLANT SPECIES WITH DOCUMENTED SIGHTINGS ON THE WALLOWA-WHITMAN NATIONAL FOREST
(Excludes Status 3c, Inventory and Watch List Species)

Scientific Name (Common Name)	Status	Threats	Habitat	Known Locations	No of Sightings	Plant Association
SENSITIVE PLANTS (OREGON)						
Allium brandegei (Brandegee's onion)	S	?	?	Pine Creek (PRD), Summit Creek (WVRD)	2	Unknown
Allium campanulatum (Sierra onion)	S	?	Subalpine meadows to lithic grassland	Experiment Creek (HCNRA) W FK Pine Cr (PRD)	2	AGSP-P0SA3/ OPPO
Allium geyeri var *geyeri* (Geyer's onion)	S	?	Rocky outcrops	Lower Imnaha R (HCNRA)	1	GLNE/AGSP
Allium madidum	S	none	Vernally wet meadows, flats, draws, gentle slopes	Target Spring, Sparta Butte, Anthony Lakes, Balm Cr Res , Cornucopia, Lehman Spring	6	Unknown
Asplenium viride (green spleenwort)	S	?	cliffs (granite, limestone)	Head of Imnaha R (ECWA)	2	Unknown
Botrychium ascendens (upward-lobed moonwort)	S	logging, road construction	grassy mdws w/spruce	Hurricane Cr (ECWA)	1	Unknown
Botrychium crenulatum (crenulate grape-fern)	S	logging, road construction	grassy fields w/spruce	Hurricane Cr , Lostine R (ECWA)	2	Unknown
Botrychium lanceolatum (lance-leaved grape-fern)	S	logging, road construction	grassy fields , lodgepole with spruce	E FK Wallowa R , Lostine R (ECWA)	3	Unknown
Botrychium lunaria (moonwart)	S	logging, road construction	grassy fields, lodgepole with spruce	Lostine R , Hurricane Cr (ECWA)	3	Unknown

LEGEND

Status Codes — T - Threatened, E - Endangered, S - Sensitive
Location Codes — (BRD - Baker Ranger District)
(ECWA - Eagle Cap Wilderness Area)
(HCNRA - Hells Canyon National Recreation Area)
(LGRD) - La Grande Ranger District)
(WVRD) - Wallowa Valley Ranger District)
Plant Association — (See "Plant Associations of the Wallowa-Snake Province, 1987, Johnson and Simon)

TABLE B-12 (Cont)
THREATENED, ENDANGERED, AND SENSITIVE PLANT SPECIES WITH DOCUMENTED SIGHTINGS ON THE WALLOWA-WHITMAN NATIONAL FOREST
(Excludes Status 3c, Inventory and Watch List Species)

Scientific Name (Common Name)	Status	Threats	Habitat	Known Locations	No of Sightings	Plant Association
Botrychium minganense	S	None	small grassy openings with pics	Lostine River, Hurricane Creek	2	Unknown
Botrychium pedunculosum (stalked moonwort)	S	logging, road construction	grassy fields w/lodgepole	Lostine R (ECWA)	1	Unknown
Botrychium pinnatum (grape-fern)	S	logging, road construction	grassy fields w/lodgepole	Lostine R , E FK Wallowa R (ECWA)	3	Unknown
Bupleurum americanum (bupleurum)	S	grazing	subalpine grasslands, savanna	Maxwell PK (BRD), Wallowa Mtns (ECWA)	4	FEVI/LULA2
Carex concinna (low northern sedge)	S	logging, road construction	Spruce forest	Hurricane Cr (ECWA)	4	Unknown
Carex limnophila (pond sedge)	S	logging, grazing	forest openings, meadows	Cayuse Flat (HCNRA) Flagstaff Butte (LGRD)	2	Meadows
Castilleja fraterna fraternal paintbrush	S	grazing, recreational use	talus slopes and in alpine meadows	(ECWA) E Fk Wallowa and W Fk Wallowa River Canyons, Razz Lake vicinity, head of Imnaha R Canyons	7	Unknown
Cheilanthes feei (Fee's lipfern)	S	grazing	seepy rims, outcrops	Lightning Cr (HCNRA)	1	AGSP-POSA2/ OPPO, GLNE/AGSP
Cryptogramma stelleri slender rock-brake	S	Unknown	limestone outcroppings	(ECWA) Cornucopia vicinity	1	Unknown

LEGEND

Status Codes — T - Threatened, E - Endangered, S - Sensitive

Location Codes — (BRD - Baker Ranger District)
(ECWA - Eagle Cap Wilderness Area)
(HCNRA - Hells Canyon National Recreation Area)
(LGRD) - La Grande Ranger District)
(WVRD) - Wallowa Valley Ranger District)

Plant Association — (See "Plant Associations of the Wallowa-Snake Province, 1987, Johnson and Simon)

01369

TABLE B-12 (Cont)
THREATENED, ENDANGERED, AND SENSITIVE PLANT SPECIES WITH DOCUMENTED SIGHTINGS ON THE WALLOWA-WHITMAN NATIONAL FOREST
(Excludes Status 3c, Inventory and Watch List Species)

Scientific Name (Common Name)	Status	Threats	Habitat	Known Locations	No of Sightings	Plant Association
Erigerom engelmannii var *davisii* (Engelmann's daisy)	S	grazing	?	Cache Cr (HCNRA)	1	Unknown
Geum *rossii* var *turbinatum* (slender-stemmed avens)	S	grazing	talus, alpine slopes	Maxwell PK, Van Patton Pk, Anthony Lake (BRD)	5	Unknown
Kobresia simpliciuscula (simple Kobresia)	S	grazing, logging	bogs and meadows	Hurricane Cr (ECWA)	2	Unknown
Leptodactylon pungens ssp *hazeliae* (Hazel's prickly-phlox)	S	?	cliffs, outcrops	Battle Creek, Lower Imnaha R (HCNRA)	2	AGSP-POSA3
Lomatium erythrocarpum red-fruited lomatium	S	grazing	granitic slopes	Elkhorn Peak (BRD)	5	Unknown
Lomatium greenmanii (Greenman's lomatium)	S	recreational users	subalpine savanna (PIAL)	Mt Howard, Ruby Peak, Ice Lake (ECWA)	4	Unknown
Lomatium "pastoralis" meadow lomatium	S	Unknown	overgrazed meadows	Mt. Emily (LGRD)	1	Unknown
Lycopodium annotinum (stiff club-moss)	S	logging	bogs and seeps with spruce	Minam Lake, (ECWA) Anthony Lake (BRD) Broady Cr , Ferguson Cr , L Sheep Cr (WVRD)	8	ABGR/CLUN ABCA2/CLUN
Mimulus clivicola (bank monkey flower)	S	logging, grazing	seepages under PIPO	N Pine Cr , Imnaha-Snake Divide (HCNRA)	3	Unknown

LEGEND

Status Codes — T - Threatened, E - Endangered, S - Sensitive
Location Codes — (BRD - Baker Ranger District) (ECWA - Eagle Cap Wilderness Area) (HCNRA - Hells Canyon National Recreation Area) (LGRD) - La Grande Ranger District) (WVRD) - Wallowa Valley Ranger District)
Plant Association — (See "Plant Associations of the Wallowa-Snake Province, 1987, Johnson and Simon)

TABLE B-12 (cont)
THREATENED, ENDANGERED, AND SENSITIVE PLANT SPECIES WITH DOCUMENTED SIGHTINGS ON THE WALLOWA-WHITMAN NATIONAL FOREST
(Excludes Status 3c, Inventory and Watch List Species)

Scientific Name (Common Name)	Status	Threats	Habitat	Known Locations	No of Sightings	Plant Association
Mimulus hymenophyllus (membrane-leaved monkey flower)	S	grazing	rimrock, cliffs	Horse Creek (HCNRA)	3	Unknown
Mirabilis macfarlanei (Macfarlane's four-o-clock)	E	grazing, rec use	mid seral grasslands, mining tailings	Tryon Cr , Imnaha R Canyon, West Cr (HCNRA)	4	CELE2/AGSP FEID-AGSP
Oryzopsis hendersonii (Henderson's ricegrass)	S	grazing	lithic basaltic soil	E FK. Sumac Cr (WVRD)	2	ARRI/POSA3 ERST2/POSA3
Pellaea bridgesii (Bridge's cliff-brake)	S	?	talus, granitic slopes	Eagle Cr , Pine Lakes (ECWA)	5	Unknown
Phacelia minutissima	S	recreation	moist flat	Buckhorn	1	Unknown
Platanthera obtusata (small northern bog-orchid)	S	logging, road construction	spruce bogs	Hurricane Cr (ECWA)	2	Unknown
Primula cusickiana (Wallowa primrose)	S	road construction	seepy lithic basaltic soils, scablands	Grouse Cr , Carroll Cr ; Ferguson Cr (WVRD) Imnaha-Snake Divide (HCNRA) Target Spg Area (WVRD)	12	AGSP-POSA3 POSA3-DAUN
Ranunculus oresterus (Blue Mtn buttercup)	S	grazing	subalpine meadows	Pine Lakes (ECWA)	1	Unknown
Ribes irriguum	S	?	canyon slopes, wooded open hillsides	Deer Ridge, Bobcat Ridge, Lake Fork, Duck Creek, Hurricane Creek, Minam River	9	Unknown

LEGEND

Status Codes	T - Threatened, E - Endangered, S - Sensitive
Location Codes	(BRD - Baker Ranger District) (ECWA - Eagle Cap Wilderness Area) (HCNRA - Hells Canyon National Recreation Area) (LGRD) - La Grande Ranger District) (WVRD) - Wallowa Valley Ranger District)
Plant Association	(See "Plant Associations of the Wallowa-Snake Province, 1987, Johnson and Simon)

TABLE B-12 (cont)
THREATENED, ENDANGERED, AND SENSITIVE PLANT SPECIES WITH DOCUMENTED SIGHTINGS ON THE WALLOWA-WHITMAN NATIONAL FOREST
(Excludes Status 3c, Inventory and Watch List Species)

Scientific Name (Common Name)	Status	Threats	Habitat	Known Locations	No of Sightings	Plant Association
Rubus bartonianus (Bartonberry)	S	?	talus, ravines	Snake River Canyon near Three Creeks (HCNRA)	1	Unknown
Silene scaposa var *scaposa* scaposa catchfly	S	grazing	grassy slopes	Salmon Cr (BRD)	1	Unknown
Salix Farnae Farr's willow	S	browsing	meadows and stream-banks	Thorp Creek (ECWA)	1	Unknown
Saxifraga adscendens var *oregonensis* (wedge-leaf saxifrage)	S	grazing	talus slopes	Petes Peak (ECWA)	1	Unknown
Senecio dimorphophyllus Payson's groundsel	S	Unknown	subalpine slopes	Cusick Peak (ECWA)	1	Unknown
Senecio porteri (Porter's butterweed)	S	?	?	Douglas Lake, Marble Mtn (ECWA)	2	?
Silene scaposa var *scaposa* scaposa catchfly	S	grazing	grassy slopes	Salmon Cr. (BRD)	1	Unknown
Silene Spaldingii	S	grazing	FEID grass-lands	Off-Forest	12	Unknown
Thalictrum alpinum var *hebetum*	S	Unknown	Seepy, buggy sites	Francis Lake, Hurricane Creek (ECWA)	2	Unknown
Trollius laxus var *albiflorus* (American globeflower)	S	?	?	Hat Point (HCNRA) Aneroid Lake (ECWA)	3	?

LEGEND

Status Codes	T - Threatened, E - Endangered, S - Sensitive
Location Codes	(BRD - Baker Ranger District) (ECWA - Eagle Cap Wilderness Area) (HCNRA - Hells Canyon National Recreation Area) (LGRD) - La Grande Ranger District) (WVRD) - Wallowa Valley Ranger District)
Plant Association	(See "Plant Associations of the Wallowa-Snake Province, 1987, Johnson and Simon)

TABLE B-12 (cont)
THREATENED, ENDANGERED, AND SENSITIVE PLANT SPECIES WITH DOCUMENTED SIGHTINGS ON THE WALLOWA-WHITMAN NATIONAL FOREST
(Excludes Status 3c, Inventory and Watch List Species)

Scientific Name (Common Name)	Status	Threats	Habitat	Known Locations	No of Sightings	Plant Association
SENSITIVE PLANTS (IDAHO)						
Adiantum pedatum var *novum* (northern maidenhair fern)	S	?	cliffs, talus fields	Seven Devils (HCNRA)	3	Unknown
Allium tolmiei var *platyphyllum* (Tolmie's onion)	S	?	stone stripes, thin soils, basaltic	Cow Cr Saddle (HCNRA)	2	Unknown
Calochortus nitidus (broad-fruited mariposa)	S	grazing	early to late seral grass-lands	Cow Cr Saddle, Grave Point, Tablelands (HCNRA)	8	FEID-KOCR *FEID-AGSP*
Campanula scabrella (rough harebell)	S	?	cliffs, savanna (PIAL-ABLA2)	Seven Devils (HCNRA)	2	Unknown
Halimolobus perplexa var *perplexa* (puzzling halimolobos)	S	?	rocky sub-strates	Cold Springs, Little Granite Cr , Sheep Creek (HCNRA)	4	Unknown
Polystichum kruckebergii (Kruckeberg's sword-fern)	S	?	talus and crevices	Seven Devils (HCNRA)	1	Unknown
Ribes wolfii (Rothrock's currant)	S	?	?	Seven Devils (HCNRA)	3	Unknown

LEGEND

Status Codes — T - Threatened; E - Endangered, S - Sensitive

Location Codes — (BRD - Baker Ranger District)
(ECWA - Eagle Cap Wilderness Area)
(HCNRA - Hells Canyon National Recreation Area)
(LGRD) - La Grande Ranger District)
(WVRD) - Wallowa Valley Ranger District)

Plant Association — (See "Plant Associations of the Wallowa-Snake Province, 1987, Johnson and Simon)

Visual Quality. While the value of visual quality is not directly included in the PNV calculations, its value is indirectly represented through the consideration of recreation as a priced benefit. It is reasonable to assume that providing positive visual experiences has a positive relationship to the quantity and quality of recreation on the Forest.

However, a large number of people who benefit from the visually appealing scenery are not tallied as recreation users of the Forest. For example, homes are often sited so as to provide better views of the Forest. This visual appreciation occurs even within the corporate limits of cities well removed from Forest boundaries

Accessibility by Roads. Transportation facilities for the Forest include 9,300 miles of road, over 7,000 miles of which are open for use, 1,750 miles of trail and five landing strips. In addition, the Snake River provides 68 miles of river that are a part of the transportation network.

The transportation system is established and is likely, with certain construction and reconstruction projects, to be satisfactory for serving most future management scenarios Exceptions are the relatively few undeveloped areas (not including wilderness) that will require additional roads if they are to be managed for timber production

The present trail system primarily serves the four wilderness areas, unroaded areas in the Hells Canyon National Recreation Area and the Elkhorn Range. Whereas the trails once served many administrative purposes, there is now management concern that the trail system be brought more in line with recreation needs

Roads are the most important and most impacting of the transportation facilities The total number of miles of road open to public use has been identified as a facet of an issue to be dealt with in the Forest Land and Resource Management Plan. Alternatives vary in the extent to which they build new roads and in the extent to which they access previously unroaded areas.

SOCIAL AND ECONOMIC IMPACT ANALYSIS

Social and Economic Overview

Forest Area of Influence Established for Economic Analysis

To assess the current economic conditions and to estimate potential changes, a Forest Area of Influence was determined This is the geographic area wherein the majority of Forest products are first used and wherein public concern is concentrated This zone comprises Baker, Union and Wallowa counties (hereinafter referred to as the Tri-Counties) in northeastern Oregon For some activities, such as elk hunting, the Forest's area of influence has a much greater geographic spread.

The Tri-Counties is a rural area whose basis for existence lies in the successful development of its natural resource base Development of employment opportunities beyond this base is somewhat lacking A description of why this has happened--or rather, has not happened--explains a great deal about the people who live here and about the area in which they live

It is an area separated by long distances from major metropolitan areas whose influence is nevertheless felt in the form of their radio and television signals, their newspapers, and through business and social dealings Interstate Highway 84 and the Union Pacific Railroad comprise the area's major physical links with the outside world Scheduled air service arrives and departs with the fortunes of the area. Harsh winters severely limit the possibility of establishing the area as a center for retirement Majestic mountain ranges and beautiful canyons succeed in luring tourists to the area, but the mainstays of the economy are agriculture, timber, minerals, and tourism.

Because the area has had only limited success in attracting diversified employment opportunities, its total population has shown very little change for decades as technological improvements have reduced even the existing employment opportunities. Ironically this has occurred right along with increases in timber production from the Wallowa-Whitman.

There is, in fact, a marked ambivalence toward growth in the area (Pekar, 1981) People want gainful employment for themselves, for their families, but are uncertain of the benefits of an increasing population. The two do, however, go together and the entrepreneurial energy necessary to establish an expanding economic base in the face of this dilemma has not been adequate to the task Development has been largely limited to those endeavors which enjoy significant locational advantages.

This general lack of expansion has undoubtedly contributed to the area's generally high degree of social stability as manifested in its exemplary showing in such areas as crime, the social problem indicators in general, and resident perception of the area's quality of life (QOL) It has also resulted in a sizeable outmigration of young adults.

Perhaps the feelings of the local inhabitants toward the area are best summarized by the thought that it is a fine place to live (if one is fortunate enough to find employment) and that nothing should be done which might spoil it

Table B-13 shows area population by county over time and provides a basis for comparison with the population of Oregon As reflected in the table, much of Oregon's development has bypassed the local area

Table B-13
AREA POPULATION OVER TIME

County	1930	1940	1950	1960	1970	1980	1987
Baker	16,754	18,297	16,175	17,295	14,919	16,134	15,300
Union	17,492	17,399	17,962	18,180	19,377	23,921	23,300
Wallowa	7,814	7,623	7,264	7,102	6,247	7,273	7,150
Tri-County	42,060	43,319	41,401	42,577	40,543	47,328	45,750
Oregon	953,786	1,089,684	1,521,341	1,758,687	2,091,385	2,633,149	2,690,000

Sources R. Bruce Mackey and Michael J Blaine, Social/Economic Assessment Hells Canyon NRA USDA Forest Service, 1978, pp. 6, 7 Original Source. U S. Department of Commerce, Bureau of the Census 1980 data from Center for Population Research and Census, Portland State University, 12/31/82, pp c, 2, 7. Original Source. U S Department of Commerce, Bureau of the Census. 1987 estimates from "Oregon Labor Trends" State of Oregon Employment Division, Department of Human Resources, January 1988 issue--original source Portland State University Center for Population Research and Census.

The area of influence is defined as Baker, Union, and Wallowa Counties situated in the northeastern corner of Oregon. The neighboring counties of Grant, Malheur, and Umatilla were excluded due to the limited quantity of the Forest outputs which they receive (see Table B-14) Likewise, the relatively small outputs from portions of the Idaho counties of Adams, Idaho, and Nez Perce included in the Forest as part of the Hells Canyon National Recreation Area (NRA) do not justify increasing the size of the primary area of influence

The lay of the land and the road system have combined to concentrate forest users in their immediate environs

Hunters, woodcutters, picnickers and others tend to use the most convenient opportunities, and for the adjacent counties those opportunities are largely presented by the Malheur, Umatilla, Nez Perce and Payette National Forests.

Table B-14
LOG FLOW TO COUNTY MILLS FROM THE WALLOWA-WHITMAN 1/

	1972		1976		1982		1985	
	MBF	% of Total W-W Logs	MBF	% of Total W-W Logs	MBF	% of Total W-W Logs	MBF	% of Total W-W Logs
Baker	64,645	38	97,647 2/	62 2/	37,521	30	83,325 2/	49 2/
Grant & Harney 3/	0	0	0	0	5,160	4	1,746	1
Umatilla & Morrow 3/	7,064	4	5,400	3	10,652	9	577	0
Union	71,217	42	53,879	34	20,519	17	63,919 5/	38 5/
Baker&Union 4/					11,674	9		
Wallowa	25,303	15	— 2/	— 2/	36,561	29	— 2/	— 2/
Crook	0	0	0	0	2,204	2	0	0
Deschutes & Jefferson 5/	0	0	0	0	0	0	20,054	12
Tri-County Area	161,165	96	151,526	96	106,275 6/	85	147,244	87+ 7/

1/ Sources: 1985 Data: James O Howard and Franklin R. Ward, Oregon's Forest Products Industry: 1985, USDA Forest Service Resource Bulletin PNW-RB-149 (Portland, OR. USDA FS 1988), p 20 1982 Data: James O. Howard, Oregon's Forest Products Industry: 1982, USDA Forest Service Resource Bulletin PNW-118 (Portland, OR USDA FS 1984), p. 16 1976 Data: James O. Howard and Bruce A. Hiserote, Oregon's Forest Products Industry: 1976, USDA Forest Service Resource Bulletin PNW-79 1978 (Portland, OR USDA FS, 1978), p. 28 1972 Data John P. Schuldt and James O. Howard, Oregon Forest Industries 1972, (Corvallis, OR: Oregon State University Extension Service, 1974), p. 38.
2/ Wallowa County figures were joined with the Baker County figures to avoid disclosure of information on any individual mill
3/ Combined to avoid disclosure of information on any individual mill
4/ Includes one veneer and one plywood mill each from Baker and Union counties, combined to avoid disclosure of information on any individual mill
5/ Deschutes and Jefferson Counties include one veneer and plywood mills from Union County combined to avoid disclosure.
6/ Due to efforts to avoid disclosing information about individual mills, the figure shown here is probably high The maximum amount of the error is 11,673 MBF
7/ See footnote 5/ Some Union County volume is recorded under Deschutes and Jefferson Counties.

The Tri-County area comprises a region resplendent in recreational opportunities, scenic vistas, and panoramas Forested mountains give way to foothills and plains where livestock and agriculture hold sway. The region would best be described as holding a rural orientation with an overall population density of only six people per square mile. General comments on the individual counties follow

Baker County

The Baker Valley is a large and fertile alluvial plain roughly 18 miles wide and 50 miles long The county area is 1,964,000 acres (3,100 square miles) and the major land uses are agriculture (49 percent) and forestry (39 percent) (EOCDC 1975, p. 2-2).

The county is dissected by Interstate 84 on a northwesterly to southeasterly axis. It contains portions of the Eagle Cap, North Fork John Day, and Monument Rock Wildernesses, the Elkhorn Mountain Range and the Hells Canyon National Recreation Area. Population is centered in the valleys.

Population Baker County population for 1980 was 16,134 with Baker City, the county seat, representing some 9,471 of that total (CPRC 1984, p.2). In addition there are a number of small population centers scattered throughout the county.

According to the 1970 census 12 percent of the population was over 65 years of age; by 1980 the incidence had increased to 16 percent. This percentage is one of the highest in the State and the highest for the counties in Eastern Oregon. Baker County's tendency toward a retirement-age population was intensified during the 1960's by an emigration of young adults, leaving to seek jobs

The growth potential of Baker County is dimmed by the cyclical nature of the lumber and wood products industry and a lack of economic diversification However, between 1970 and 1977, population increases occurred which reversed the 1960 to 1970 decline As in other parts of the Region, growth occurred in response to an expanding lumber market, increased tourism, and local construction projects such as the cement plant at Durkee and power house expansion at local hydroelectric facilities. Employment has since stabilized and entered into a decline with the recent setbacks to the timber industry and the completion of said projects.

Climate (Valde 1973a, p 3). Baker County's climate is semiarid, characterized by low precipitation and by low winter and high summer temperatures. The topography of the county produces considerable local variation in climate.

The average annual precipitation varies from extremes of 80 inches at mountain tops to eight inches in the Haines area of the Baker Valley Annual precipitation in the cropland areas is generally less than 20 inches. About 50 percent of the precipitation falls during the irrigation season--April through September. During the summer months, much of the basin is subject to violent cloudburst storms of small areal extent and high intensity. These storms are the cause of severe soil erosion and flood damage, and they increase soil moisture very little

Annual snowfall varies from a trace along the Snake River to several feet in the upper reaches of the mountains. Mountain snowpacks are important sources of water for irrigation, fish, wildlife, domestic use, and other uses. The mean annual snowfall from 1950-1960 was 30 inches at Baker and over 250 inches at Cornucopia in the Wallowa Mountains.

The prevailing winds are northwest in the summer and southeast the remainder of the year. The wind velocity usually ranges from 6 to 8 miles an hour, with the highest velocities in December, January and February

The mean annual temperatures in the cropland areas vary from 44 degrees at Baker City to 53 degrees at Huntington Temperature extremes vary from below -30 degrees at Baker City to 110 degrees at Huntington.

The average growing season ranges from 60 days in the mountains to 200 days along the Snake River. The average frost-free season at different locations are as follows: Baker City, 140 days; Richland, 180 days; and Huntington, 180 days

Employment. Baker County relies upon government, trade, agriculture, and the lumber and wood products industry for some 60 percent of employment opportunities (Mason 1979a, Tables 6 and 9) In recent years Baker County has had one of the highest unemployment rates in the State (16 7 percent in 1982 (CPRC 1984, p 21)).

Income Median family income in Baker County for 1978 ranked 35th out of the State's 36 counties ($13,885) (Mason 1979a, Table 3). Per capita personal income rated 32nd (1977 $5,592) (Mason 1979a, Table 4) Thirteen percent of the families existed below the poverty level in 1980 (CPRC 1984, p 21)

Recreation Outdoor recreation plays a large part in the county's leisure time activities. Rodeos, hunting, camping, snowmobiling, skiing, fishing and numerous other activities are all offered locally Most park and recreation facilities are in the National Forest and the State Park systems

Public Attitudes and Values It seems that the people who live in Baker have learned to combine the amenities of the outdoors with an increasingly urban lifestyle The county is still composed of rural communities with economies based on agriculture and forestry Seasonal employment and a fluctuating economy continue to plague the area. There is a wide range of attitudes toward development and recreation.

Union County

The Grande Ronde Valley is a diamond-shaped fertile plain 20 miles long by 12 miles wide. It contains the great bulk of the county's population (EOCDC 1975, p 2-2) The county consists of 1,301,760 acres (2,034 square miles) with the major land uses being forestry and agriculture (EOCDC 1975, p 2-2). This county lies north of Baker County and also has a northwest-southeast diagonal transverse by Interstate 84

Population Since the 1950's Union County has experienced a slow but continuous growth A small but steady net in-migration and more varied job opportunities have contributed to this growth trend Eastern Oregon State College; expanded trade, government, and service sectors, and the establishment of some new industry have stimulated growth in both rural and urban areas throughout the county.

La Grande, with a population of 11,325 (CPRC 1984, p.7) has attracted a younger population than Baker or Wallowa Counties. The county population in 1980 was 23,921 (CPRC 1984, p. 7).

Climate. (Valde 1973b, p. 2) Precipitation in Union County is greater than in most of central and eastern Oregon because the cooling of the winds passing over the Blue Mountains reduces their moisture-holding capacity. Average annual rainfall in the county varies from location to location with the areas just east of the Blue

Mountains receiving an average annual rainfall of just below 20 inches, whereas areas further east have averages varying from 11 to 14 inches. A high proportion of the rain and snowfall occurs in the winter and spring months with little rainfall recorded during the summer growing season Consequently, water flow in the major streams may vary from a high of 50 percent of the annual stream flow occurring during the two months of April and May to a low in August and September when streamflow per month may drop to less than one percent of the annual flow.

Temperatures have a maximum range of close to 140 degrees The absolute maximum temperatures are just above 100 degrees, and the absolute minimum temperatures are about -35 degrees. The average mean temperature in La Grande is about 50 degrees, with mean temperatures for other locations in the county varying from this value depending largely on elevation. The average date for the last killing frost is April 24 and that of the first killing frost is October 2, so that a growing season of up to 160 days can be expected.

Employment Unemployment within the county has followed state trends and increased from 1970 to 1973 averages of 7 percent to an average of 13 percent in 1975 (Mason 1979b), and 13 percent in 1982 (Street 1984). The trend in Union County, like its neighbors Baker and Wallowa, has been towards an expanding labor force and declining employment opportunities.

The principal employers are government, trade, and lumber and wood products manufacturing (Mason 1979b)

Income. Median family income was the best of the three county area in 1978 at $16,957 - enough to rank it 13th among the State's counties. Per capita personal income in 1977 amounted to $6,044 and ranked it 26th out of the state's 36 counties The 1970 census showed 10.8 percent of the families below the poverty level, the 1980 census, 12 4 percent (CPRC 1984, p.21)

Recreation Union County has 11,087 acres in State and local parks. Park and recreation facilities also exist in Umatilla National Forest and the Wallowa-Whitman National Forest. Hunting, biking, camping, fishing, snowmobiling, boating and skiing are among the activities pursued in these areas

Public Attitudes and Values (Beecher 1975, p 57) Forest and agricultural interests generally favor development unless it interferes with production This sentiment is tempered in the case of their employees who have come to recognize the cyclical/seasonal nature of their employment and the need for more employment options The business community supports development, particularly when it is based upon short-term trade promotion and return.

A third group, supported by the Chamber of Commerce, the local Industrial Development Corporation, the County Planning Staff, and the Eastern Oregon Community Development Council, are interested in long-term development planning.

The people of Union County have developed interests in a variety of cultural and social activities La Grande is a cultural and educational center for eastern Oregon.

Wallowa County

The fertile Wallowa Valley is a V-shaped, rolling area with elevations ranging from 4,300 at Wallowa Lake to 2,800 feet at the town of Wallowa The valley extends northward about 20 miles with Enterprise near its northern limit. The county consists of 2,035,840 acres (3,181 square miles) with most of the land devoted to forestry and grazing (EOCDC 1975, p. 2-3)

Population Wallowa County, isolated and sparsely populated, had been losing population since the 1940's. In the early seventies this trend was reversed. Between 1970 and 1977, largely due to prosperity in the forest industry, Wallowa County experienced a 6.1 percent population increase Wallowa County's population for 1980 is 7,273, 2,003 in Enterprise, its largest city (CPRC 1984, p 7).

Climate. (EOCDC 1975, p. 4-3) Sunshine prevails throughout most of the year with less than 100 days in the normal year having measurable precipitation. Summer days tend to be hot on the central plateau but the nights are cool Winters can be severe, particularly in the higher elevations. There is an average frost-free growing season of slightly more than four months, but the average is not an absolute, frost can come in any season, and has, although this is a rare occurrence.

There is a wide range in annual precipitation from a high of 60 inches in the south central mountains to a low of 12 inches on the central plateau Annual average precipitation at Enterprise, the county seat (which is also near an average elevation) is slightly more than 13 inches. Most of this comes in the late winter and early spring and practically all at the higher altitudes is in the form of snow Some snow remains during most summers on the higher peaks, but there is no appreciable glaciation

Employment The principal employers are government, agriculture, trade and the lumber and wood products industry.

Income. The median family income for 1978 in the county was $14,065, second lowest in the State. Per capita personal income in 1977 was $5,998, for a State ranking of 28 In 1970, 15 percent of the families were below the poverty level, in 1980 11 percent (CPRC 1984, p. 21)

Recreational Activities. Although recreation is still a small industry in Wallowa County there are a number of organized events and activities in which the local community participates These include rodeos and fairs. State parks and National Forests provide a number of facilities and attendance is high for the region Park facilities are generally oriented towards trailer camping and hunting, although a wide variety of activities are provided.

Public Attitudes and Values (Beecher 1975, p 57) From Wallowa County's early history, ranchers and cattlemen have opposed immigration for fear that rangelands would be divided and sold into parcels too small for grazing. This desire to retain a sparsely populated land is still strong among ranchers and farmers The county has been isolated from urban pressures and economic development. Recently economic diversification has increased with the expansion of National Forest and State Park facilities The logger and the agricultural worker have learned to cope with the seasonal fluctuations and economic instability by developing multiple job skills.

Determination of Social Effects

Social Effects

Social effects are changes in communities, peoples' beliefs, and their ways of life. Specifically, the social effects of the Forest Plan alternatives are the different social conditions that are caused by Forest management directions that are different from a continuation of current management direction.

Estimation of social effects is a two-step process First, the conditions that are expected under the current management direction (Alternative A) over the next ten years are estimated Then the factors that would change because of different management direction (alternatives) are noted and compared to the current management direction, or "baseline," conditions

The following categories encompass the significant social effects of the Forest Plan alternatives. The social effects of the alternatives were estimated for the counties separately, but the effects are often similar. The social effects for the Tri-Counties are reported together and special note made where the effects on any one county are substantially different

Lifestyle and Job Dependence Effects are indicated by significant changes from baseline conditions (Alternative A) in the patterns of work, leisure, and other activities Dimensions include the availability and characteristics of jobs, recreational activities, aesthetic and amenity ties to the Forest, and the gathering and use of food and fuel from the Forest

Beliefs and Perceptions. Significant effects are indicated by outputs and practices at odds with the understandings and emotional values people have for the Forest. Dimensions include concerns that familiar places will be changed, that full use of Forest commodities will be restricted, and that disliked or unsound practices will occur. People have concerns for visual qualities, for the Forest as a natural or managed ecosystem, for environmental qualities, and for historical and cultural sites and characteristics.

Sense of Control/Sense of Self-Sufficiency. These effects are indicated by changes from the baseline conditions in the degree of control affected groups perceive they have over the Forest compared to outside forces (e g , government, interest groups, industries)

It also reflects the affected groups' sense that they can contribute to their subsistence needs (food, fuel, shelter) by their own direct knowledge and effort Dimen-

01382

sions include concerns about government restrictions on uses and practices, and changes caused by special interest groups

People who gain food or fuel directly from the Forest are concerned about reduced access or supply. Because local area inhabitants rely so heavily on the Forest, their sense of control or self-sufficiency is more profoundly impacted by Forest actions than are others Next in order of significance would be the recreationists from outside the area who have, in many cases, been returning to the area for years. This latter group and other recreationists would suffer a loss in their sense of control or self sufficiency if their existing recreational benefits were reduced.

Categories of Social Effects Considered, but not in Detail for Each Alternative

In addition to the three main categories of social effects, the effects of the alternatives on population change and the effects on land use and ownership were examined

Population Change The Forest Plan alternatives will affect the level of economic activity in the Tri-Counties through anticipated changes in employment. This may ultimately affect migration and population. Many short-term changes can, however, be accommodated without changes in population

In recent years, migration has been responsive both to employment opportunities and to a variety of amenity and lifestyle factors so that a precise population projection tied to the Forest Plan alternatives is not presented However, employment and population are generally recognized as being directly related.

Landownership and Use Changes Land exchanges will be primarily with private parties, corporations, or other government agencies which normally use the land for purposes similar to current National Forest management Land for development is generally located off the Forest, and land use in the Tri-Counties is not significantly affected, either directly or indirectly, by the alternatives in the Forest Plan.

Constants

These factors with potentially significant social effects are treated the same by all the Forest Plan alternatives Thus, they have no social effects with respect to the Forest Plan alternatives.

Hells Canyon National Recreation Area Management of the HCNRA is the same under all Forest Plan alternatives.

Municipal Watersheds Water quality and quantity are protected by all alternatives

Use of the IMPLAN Computer Model To Estimate Effects on Jobs and Personal Income in the Local Area

Input-Output Models (Alward and others, n.d.; Palmer 1976)

Any developed economy, whether national, regional, or local, is characterized by a high degree of interdependence among its producing sectors. Each economic sector not only produces goods or services but is also a consumer itself, purchasing other goods

and services for use in the production process. Interindustry relations have been recognized for a long time. Francois Quesnay's "Tableau Economique" of 1758 developed the circular flow and general equilibrium concepts, while Walras stressed the interdependence between the production sectors of an economy with his general equilibrium model in the 1870's

The first empirical application of the input-output model in the Anglo-American world dates from 1936 when Leontief published an input-output system of the United States' economy What Leontief did was to simplify Walras' generalized model so the model's equation could be estimated empirically. He used two simplifying assumptions. First, the large number of commodities in the Walrasian model was aggregated into relatively few outputs, one for each industrial sector. Second, the supply equation for labor and demand equations for final consumption was abandoned and the remaining production equations were expressed in their simplest, linear form

These simplifying assumptions make a sharp difference between input-output and most other conventional economic models The linearity does not allow factor substitution or economies of scale Time is missing, yet the purchase of inputs by one industry to make goods to sell to other industries implies a period analysis The prevalence of joint products and multi-product plants makes it impossible to aggregate only those plants with similar output and inputs structures together

However, the model is starkly simple Its key variables are the outputs of sectors into which the economy is divided Each sector's output consists of summing its sales to all other sectors and to final demand. The amount of each product which each sector consumes depends only on the level of output in the consuming sector Equilibrium in the economy is attained when the output of each sector equals total purchases from that sector, these purchases being determined by the output of all other sectors.

Because of these simplifying assumptions and the simplicity of the model, it is empirically implementable The implausible assumptions of the production function do not appear to restrict the model too badly. Technology changes are slow enough so the input coefficient matrix of one year seems to be good for several years. Even out-of-date tables can show the maximum input requirement. Perhaps most important of all, input-output models pass the critical test that for many purposes they predict reasonably well

Development of IMPLAN

The USDA Forest Service developed IMPLAN to assist its land and resource management planning efforts in economic impact assessment IMPLAN utilizes input-output analysis procedures to provide forest planners with the capability to develop non-survey based interindustry models and apply them to the evaluation of alternative management programs

The IMPLAN data base consists of two major parts (1) a national-level technology matrix and (2) estimates of sectoral activity for final demand, final payments, gross output and employment for each county. The data represent 1977 county level economic activity for 466 sectors as shown in Table B-15.

Table B-15
CONTENTS OF THE IMPLAN DATA BASE FOR EACH U S COUNTY

A	Final Demand	
	1.	Personal Consumption Expenditures
	2.	Capital Formation
	3.	Inventory Change
	4	State and Local Government Expenditures
	5.	Federal Government Expenditures
	6	Foreign Exports
B	Final Payments	
	1.	Employee Compensation
	2	Indirect Business Taxes
	3	Property-Type Income
C.	Total Gross Output	
D.	Production Employment	

The national technology matrix denotes sectoral production functions and is utilized to estimate local purchases and sales This 466-sector, gross domestic based model was derived from the Commerce Department's 1972 national input-output model (U S Department of Commerce 1979a). The "use" and "make" tables were rectified to an "industry by industry" basis and updated to 1977 using relative price changes and the RAS* procedure (Stone and others 1962) with the 1977 National Income and Products Accounts (U S Department of Commerce 1977a) information used as control totals

Aggregation of some agriculture, construction and manufacturing sectors, and disaggregation of the mining sectors resulted in the reduction in the number of sectors from 496 in the Department of Commerce tables to 466 in IMPLAN. The matrix is a highly disaggregated representation of national average sectoral input and output technology and it is on the basis of these production functions that regional purchase patterns are estimated.

*RAS is a procedure used to update technical coefficients.

Estimates of economic activity and production employment for each of the 466 sectors for all states and every county within each state were made for the components of an input-output table The estimates of economic activity for states and counties were made through a "downward movement" approach beginning with total national activity and disaggregating to states and ultimately to counties with control totals employed at each level As previously noted, the updated 1977 national table was benchmarked with the 1977 National Income and Product Accounts Since comparable accounts are not available for states or counties, the most suitable regional measures of economic activity were used to disaggregate the national production and demand activity, first among states and then among counties within each state.

Gross output and employment estimates utilized several sources, principally censuses. For example, agriculture sector activity used the Census of Agriculture (U. S. Department of Commerce 1977a) and Agriculture Statistics (U.S. Department of Agriculture 1979). Gross output measures for most other sectors* (U. S. Department of Commerce 1979a) utilized proxy measures derived from employment and payroll data, principally the national summaries of the County Business Patterns (U S. Department of Commerce 1977c) and employment data from the Dun and Bradstreet Corporation (Dunn and Bradstreet Corporation 1977). Some sectors could be related to specialized data sources such as the Census of Housing (U.S Department of Commerce 1970) for owner-occupied dwellings and the Census of Governments (U.S. Department of Commerce 1977d) for government related sectors. All data was adjusted to the 1977 base year and unreported data was estimated utilizing the RAS procedure

Final demands were estimated consistent with control totals from the National Income and Product Accounts, by updating the 1963 Multi-Regional Input-Output data (Polenske 1979) using the RAS procedure as suggested by McMenamin and Haring (McMenamin and others 1974). The three components of value added were allocated on the basis of gross outputs. Both final demand and final payment estimates were disaggregated using the "downward movement" approach.

In its entirety, the IMPLAN data base provides a comprehensive, Nationwide set of input-output information which can be used to construct non-survey based regional tables. The national technology matrix is maintained at the highly disaggregated 466-sector level of detail which greatly reduces aggregation errors caused by using 1- or 2-digit SIC (Standard Industrial Classification) industry groupings Consequently, the industry-commodity relationship is much more consistent than in highly aggregated models The hierarchical nature of the data base, achieved by the use of published control totals at each level of disaggregation, results in a data base that permits the construction of models that are consistent both in terms of definition and activity. These principal aspects result in significant improvements over the data used in many previous non-survey input-output studies.

*Bureau of Economic Analysis input-output sectors 3.00 through 77.05, excluding sectors 11 00, 12.00, 65.01, and 71.01.

Data Reduction The IMPLAN software system was designed to serve three functions: (1) data retrieval, (2) data reduction and model development, and (3) impact analysis

The data retrieval system was designed so that the user could have access to input-output data for any U. S state, county, or combination thereof The study area data is referenced via a standard set of state and county codes with the extracted data treated as control totals for the region being analyzed Modification of data, if desired by the user, is permitted

Utilizing the national technology matrix and the regional control totals, a data reduction method is employed to develop a regional input-output table. The method used exploits the property of "Openness" displayed by regional economies compared with the national economy (Richardson 1972) Regional economies exhibit much greater propensities to import and export than is observed at the national level. Based on the assumption that trade balances are the principal difference between national and regional purchase patterns (that is, industry production functions are identical but regional imports and exports make local interindustry transactions different), the supply-demand pool technique (Schaffer and others 1969) for data reduction was adopted.

This method for constructing a regional table begins with the national technology matrix and regional data for gross outputs, final demands and final payments. Regional data for all 466 sectors is sorted with respect to gross outputs If the sectoral gross output is greater than zero (firms producing the commodity exist within the region), the corresponding column of direct coefficients is extracted from the national matrix.

Using regional gross outputs and the abbreviated matrix of national direct coefficients, regional purchase transactions are computed This transactions matrix is then scanned row by row If the industry represented by any row has zero regional gross output (the industry does not occur within the region) the estimated purchases of that commodity are assumed to be noncompetitive domestic imports and are shifted from the regional transactions matrix to final payments If the gross output is positive and the commodity balance shows a surplus*, the domestic import purchases are assumed to be zero, the regional transactions estimated with national direct coefficients are left unchanged, and the surplus is assumed to be domestic exports. If the commodity balance indicates a deficit, the regional final demands and transactions estimated with the national coefficients are proportionately reduced across the row to obtain a balance, and the differences assumed to be competitive domestic imports. The result of this process is a matrix of *local* transactions between regional industries plus estimates of both competitive and noncompetitive imports as well as exports

The data reduction procedure used in IMPLAN produces a complete table of regional input-output accounts.

*Regional gross output is greater than regional final demand plus intermediate demand estimated with national direct coefficients

In addition to this typical table of accounts, detailed reports of sectoral competitive and noncompetitive import purchases are given. Based upon the regional accounts, the predictive input-output model can be derived by computing the standard Leontief-type inverse and calculating various income and employment multipliers If appropriate, the number of sectors in the model can be reduced through aggregation prior to inverting the matrix.

Several limitations to nonsurvey data reduction techniques have been noted (Richardson 1972, Fisch and others 1978) and the supply-demand pool procedure likewise has limitations One principal limitation of the supply-demand pool technique is that cross-haul conditions are ignored while evidence suggests that this may be a common occurrence in regional economies. This arises from the technique's method of allocating local production to meet local requirements before imports or exports are estimated.

Through the use of a highly disaggregated technology matrix and a consistent data base, the IMPLAN system has mitigated though not eliminated many limitations noted by others. For example, Richardson (1972) commented that the use of the national technology matrix may overestimate the interdependence of a regional economy. Similarly, Miernyk (1965) criticizes the supply-demand pool technique assumption of proportionate imports by all purchasing industries Continued improvements are being sought to enhance the system.

Estimating the regional economic impacts of disturbances in the final demand sector caused by resource management actions is the most frequently used form of input-output analysis employed in Forest Service planning studies These demand disturbances arise from such activities as changes in timber harvesting, grazing and recreation, as well as direct budgetary expenditures for goods and services Economic impacts are expressed by the changes in regional income and earnings, employment, gross output and various other parameters

Input-output models are typically used in Forest Service planning studies to estimate the regional economic effects of implementing alternative management plans These plans describe the intended management activities on a National Forest along with the expected outputs, resource uses and budgetary expenditures Economic impacts are characterized as changes (increases or decreases) from current conditions Planning teams frequently employ input-output models in other ways The models provide excellent descriptions of regional economic structure, giving planning teams valuable information for formulating Agency policies regarding economic growth or stabilization

The linkages between Forest Service management actions and corresponding estimates of net changes in regional final demands are critical components in the use of input-output analysis for impact estimation. These disturbances in final demand arise from two principal sources public expenditure effects and private sector output effects (Cartwright 1979).

Public expenditure effects arise from demand disturbances caused by government purchases of goods and services For example, timber stand improvement projects or the construction of recreational facilities involve purchases for labor, materials and so forth which can directly be transformed into a demand disturbance vector.

Private sector output effects are somewhat more complex These effects stem from the use of forest resources and indirectly (from the viewpoint of the Forest Service) result in demand disturbances For example, the Forest Service's provision of various "factors

01388

of production" such as stumpage for wood products, water for municipal and domestic uses, and forage for red meat production must be traced to its final regional economic use, either directly to exports or via "forward linkages" and "stemming-from" effects. See, for example, Roesler and others (1968).

The effects of the use of forest resources for recreation can be directly transformed into demand disturbances by deriving a typical "bill of goods" purchased locally by the recreationist during the pursuit of such activities. In all cases the demand disturbances represent regional market transactions expressed in purchaser's prices with appropriate transportation and trade margins.

Traditional applications of input-output models, utilizing demand disturbances as the source of interindustry effects, contain an implicit assumption of sufficient resource supply to permit attainment of an equilibrium economy As is often the case with forest resources, some of the primary resource supplies may be restricted within a regional economy (for example, the amount of water may be restricted).

If the change in forest output is used, under these circumstances, to derive a disturbance in demand and the model used to estimate the resultant multiplier effects, the backward linkages would usually indicate a total demand for the resource exceeding the original change. The IMPLAN system has been designed to perform analyses under these conditions by permitting the user to link the change in resource output directly to change in sectoral gross output rather than a change in final demand. The input-output model is then used to estimate the maximum level of delivery to regional final demands attainable given the constrained level of gross output. This kind of analysis is often applicable to economies that are highly dependent upon primary resources.

The economic effects estimated with IMPLAN are described by parameters typical of input-output studies. They are structural in nature, permitting multiplier effects to be traced throughout the various regional sectors. Direct, indirect and induced changes in gross outputs and final demands, employment and import requirements, income and earnings are the most representative parameters used to describe impacts.

The availability of a complete table also permits calculation of gross regional product Induced effects are computed using a modified "Type III" multiplier procedure (Miernyk 1965), iteratively solving the open model to capture the effects of induced consumptive spending Detailed employment analysis is possible by tracking employment requirements among various occupations, and accounting for the effects of either inmigration of workers or reemployment of unemployed local labor In combination, this information provides a comprehensive, detailed account of potential regional economic impacts

Use of IMPLAN on the Forest

As discussed earlier in this document, the Wallowa-Whitman National Forest's primary impact area is Baker, Union, and Wallowa counties in northeastern Oregon. Accordingly, the first step in applying the IMPLAN model was to access IMPLAN and generate a single model comprising those three counties Pursuant to discussion with cognizant IMPLAN personnel (Siverts 1985), adjustment was made to the population figures to reflect the relatively high levels of government employment in the Tri-Counties This prevents an overestimation of effects which would otherwise result due to IMPLAN's reliance on correct portrayal of population (less government employees and their dependents) private employment relationship

That done, estimates were made as to the effects changes in final demand would have Because of the political nature of Forest budgets and employment levels, no attempt was made to explicitly identify them in the process These "effect groups" were developed for sawtimber volume, roundwood volume, livestock grazing, and a weighted average composite of the various Forest recreational activities The process involved estimating the dollar values which would be injected into the local economy as a result of the various activities For instance, a Final Demand Value for 1 CCF of Roundwood was estimated at $62 73 as follows.

Values were taken from Report 5--Summary of Appraisal Elements by Product and Measurement Unit--which uses information from Forest Service Forms 2400-17 That source was used for the roundwood valuation shown in Table B-16

Table B-16
DERIVATION OF MANUFACTURED PRODUCT SELLING VALUE PER CCF OF ROUNDWOOD
(1977 Dollars)

Statistical High Bid	$ 0 53
Logging Cost	39 58
Purchaser Credit Road Costs	2 62
Manufacturing Costs	20 00
Manufactured Products Selling Value	$ 62 73

The resulting figures were then converted into the more workable MMBF and MMCF measures. These were then input to IMPLAN for an IMPACT run. The total change to Final Demand was disaggregated with the great bulk of activity attributed to Sector 137--Aggregated Primary Wood Processing--and a relatively small portion of road construction work being assigned to Sector 51--New Construction. This split in Final Demand was coordinated with cognizant personnel (Sivert 1985) A Range Final Demand figure of $17.92 was used per the Regional Office direction package of September 24, 1984, applied to Sector 3, Meat Animals and Miscellaneous Livestock

Subsequent to publication of the Forest Plan DEIS, personnel from Ft. Collins Computer Center worked with Forest personnel on an assessment of the potential impacts of the Tepee Butte Fire Recovery Project on the local economy. Their estimates of sawtimber-related employment and personal income effects are used in the FEIS.

Because of the wide diversity of experiences which are tracked as recreation, and because so many sectors are involved in providing it, considerably greater detail was needed to reflect recreation activities in IMPLAN.

The first step in tracking recreation was to categorize all Forest recreation according to the recreation expenditure categories provided by the Regional Office The following list is a compilation of those expenditure groupings found on the Forest

Fresh Water Fishing
Water Fowl Hunting
Small Game Hunting
Big Game Hunting
Nonconsumptive Wildlife Use
Recreation Residence Use
Visitor Information Service
Water Based Recreation
Gathering Forest Products
Camping
Downhill Skiing
Snow Play
Picnicking
Dispersed Nonmotorized Recreation Not Elsewhere Classified
Dispersed Motorized Recreation Not Elsewhere Classified

That done, recreational expenditures by category identified in said Regional Direction Package were parcelled out to the respective sectors identified in the local economy Because the information generated by IMPLAN was to be used to reflect first decade conditions alone, a single weighted composite recreational expenditure category was produced. The resulting figure was used for all recreation categories for all alternatives because estimated total recreation use varies at the most in decade one only by about 1 percent

The Jobs and Personal Income coefficients shown in Table B-17 which resulted from increments of 1 MMBF of sawtimber, 1 MMCF of roundwood, 1,000 AUM's, and 1,000 RVD's were then applied to alternative output levels to generate estimates of jobs and personal income.*

*Pursuant to personal communications between Dale Pekar and Eric Siverts of the Fort Collins Computer Center, coefficients used for Personal Income reflected only that portion of Personal Income in the form of Employee Compensation As such, the coefficients necessarily defined the lower limit of that range Including portions of Property Income would be speculative, however, inasmuch as sizeable portions of that income are lost to the local area

Table B-17
TOTAL EFFECT COEFFICIENTS (DIRECT, INDIRECT, AND INDUCED)

Category	Jobs 1/	Personal Income 2/ (1977 Thousand $)	Personal Income 3/ (1982 Thousand $)
1 MMBF Sawtimber 4/	6.2	78.4	115 8
1 MMCF Roundwood	22.7	311.1	459 3
1 MAUM Livestock Grazing	0 5	4.0	5 9
1 MRVD Recreation	1.1	9.2	13.6

1/ "Jobs" does not discriminate between full time, part time, permanent, or seasonal forms of employment Per personal communication between Dale Pekar and Max Keetch of FCCC on May 10, 1985, "jobs" excludes proprietors
2/ Pursuant to personal communications between Dale Pekar and Eric Siverts of the Fort Collins Computer Center, coefficients used for Personal Income reflect only that portion of Personal Income in the form of Employee Compensation As such, the coefficients necessarily defined the lower limit of that range Including portions of Property Income would be speculative, however, inasmuch as sizeable portions of that income are lost to the local area Sawtimber personal income coefficients have been converted to 1977 dollar terms using the Gross National Product Implicit Price Deflator (GNP-IPD).
3/ 1977 dollar term were converted to 1982 dollar term using the GNP-IPD
4/Subsequent to publication of the Forest Plan DEIS, personnel from Ft. Collins Computer Center worked with Forest personnel on an assessment of the potential impacts of the Tepee Butte Fire Recovery Project on the local economy. Their estimates of sawtimber related employment and personal income effects are used in the FEIS

In relation to total area Personal Income, Forest-related employee compensation accounts for some 10 percent of the total. Exclusive of proprietors, Forest-related employment accounts for about 15 percent of the area's total. Table B-18 summarizes the findings

Table B-18
FOREST-RELATED JOBS AND PERSONAL INCOME IN RELATION TO AREA TOTALS

Category	Recent Levels	Forest-Related Jobs 1/	Total Jobs	Forest-Related 2/ Employee Compensation 1982 Million $	Total Personal Income 1981 Million $ 4/
Sawtimber	159 MMBF	982		18.4	
Roundwood	9.6 MMCF	218		4 4	
Livestock	186 MAUMs	93		1 1	
Recreation	1511 MRVDs	1662		20 5	
Total		2955	19,860 3/	44 5	424 3/

1/ Full and part-time; direct, indirect and induced, exclusive of proprietors and unpaid family labor Not directly comparable to total jobs which is more a reflection of the number of people employed and which includes proprietors and unpaid labor.
2/ Direct, indirect, and induced Not directly comparable with total personal income which includes property income.
3/ Bill Street, December 1984 Economic Survey Analysis State of Oregon Employment Division, Department of Human Resources, Appendix. Average of 1982 and 1983. Not directly comparable with Forest-related jobs, see footnote 1
4/ Street, 1982 data. See footnote 2/.

The effects are disaggregated into their respective direct, indirect, and induced components in Table B-19.

Table B-19
JOBS AND PERSONAL INCOME COEFFICIENTS

JOBS 1/

Category	Unit	Direct	Indirect	Induced	Total
Sawtimber	MMBF	3.48	1 25	1 44	6.17
Roundwood	MMCF	7.99	5.34	9 41	22.74
Livestock	MAUM	.12	25	.16	.53
Recreation	MRVD	.66	09	33	1.08

PERSONAL INCOME 1977 M $ 2/

Category	Unit	Direct	Indirect	Induced	Total	(Total in 1982 M $)
Sawtimber	MMBF	49.8	18 2	10 5	78.4	115.8
Roundwood	MMCF	146 1	78 5	86.5	311.1	459.3
Livestock	MAUM	0.5	2 0	1 5	4.0	5.9
Recreation	MRVD	5.2	1.0	3 0	9 2	13 6

1/ Temporary, permanent, full-time, and part-time, direct, indirect, induced Excludes proprietors and family labor. All figures generated from IMPLAN Version 1 except Sawtimber which is from Version 2.
2/ Employee compensation.

ANALYSIS PRIOR TO THE DEVELOPMENT OF ALTERNATIVES

Overview of Benchmark Analysis

Since issuance of the DEIS and Supplement, additional direction was provided by the Omnibus Oregon Wild and Scenic Rivers Act of 1988 and allowance was made in the timber yield tables for perpetuation of small diameter snags. Also several data errors were noted and appropriate corrections were made to the data sets The new direction and data error corrections were incorporated in all FEIS alternatives and also the maximum present net value benchmark All other benchmarks were not updated to reflect these changes

Much analysis was done prior to the formulation of alternatives in the Wallowa-Whitman National Forest planning process Numerous FORPLAN "benchmark" runs helped to define the decision space, the range within which a decision can be made More specifically, they helped define the maximum economic and biological resource production opportunities, assisted in evaluating the compatibilities and conflicts between market and nonmarket objectives, and defined the range in which integrated alternatives would be developed. Benchmarks also test the costs associated with *various management requirements of 36 CFR 219 27 They analyze implications of legal and policy* constraints such as nondeclining flow and the culmination of mean annual increment (For further information and analysis pertaining to management requirements (MR's), see Appendix M)

Benchmarks are analyses of data designed to provide answers to questions posed by interested parties, both within and outside the Forest Service The information is presented apart from other planning data to remind the reader that benchmarks are not alternatives All benchmarks share the same tentatively suitable landbase

Benchmarks are approximately implementable, but are not constrained by budget and may require substantial shifts between decades in management activities and in products offered for sale All benchmark analyses presented below include a maximum present net value objective function The maximum timber output levels were rerun with a maximize present net value objective function and a timber harvest floor set at 99% of the level achieved in the "maximize timber" run in order to identify the most economically efficient means of obtaining that maximum timber objective

The reader should also see Table B-21 for a summary of constraints.

Development of Management Requirements (MR's)

The following modeling constraints are necessary to meet the management requirements of 36 CFR 219 27 The specific constraint, purpose, rationale, and apparent trade-offs are summarized below The trade-off analysis is based on the original benchmark analysis conducted for the DEIS Dollar trade-offs are those identified in the FORPLAN model only See also Table B-25 for opportunity cost coefficients for benchmarks and alternative constraint

1 Constraint: A maximum area of 33 percent per decade in age class 0 was applied across all existing analysis areas available for regeneration harvest. This was changed to 16 7 percent per decade in higher elevations

Purpose. These constraints limit the schedule of harvest to allow for the minimum *separation of harvest units necessary to meet requirements of a 40-acre* maximum unit size, shaped and blended to the extent practicable and separated by one or more logical logging units (36 CFR 219 27a). The tighter standard of harvest dispersion in high elevation areas provides for

continuity of cover between old-growth patches which is important to the pine marten, an indicator species

Rationale: Without a harvest dispersion constraint, FORPLAN will frequently schedule all of an analysis area to be harvested in a single decade Since the analysis areas usually represent timber stands much larger than the acceptable 40-acre maximum unit size, this harvest schedule becomes infeasible in implementation. The 33 percent per decade constraint allows scheduling of all areas for harvest within a given analysis area in approximately three decades.

Tradeoff: The first decade allowable sale quantity and present net value of all alternatives and benchmarks are reduced approximately 15 million cubic feet and 53 million dollars respectively by this constraint. While harvest dispersion is generally thought of as a legal or other-resource constraint, these constraints contribute substantially to basic alternative feasibility

For example, species mix and logging systems shift so dramatically between decades without these harvest dispersion constraints that the undiscounted net revenue within Benchmark Run No 3 drops from 272 million dollars in the first decade to only 19 million dollars in the eighth decade. The mix of timber offered in that eighth period is one that would produce many deficit sales. Logging systems mix without this constraint moves from 70 percent tractor, 30 percent skyline, 0 percent helicopter in the fourth decade to 0 percent tractor, 88 percent skyline, and 12 percent helicopter in the fifth decade

2 Constraint: Approximately 20,000 acres of riparian zones were designated for selection harvest in the FORPLAN model

Purpose: This constraint serves to limit the harvest schedule to a level which allows special consideration for riparian zones (36 CFR 219 27(e)) It allows maintenance of stream shading at or near current levels, minimizing increases in water temperatures which would be detrimental to salmonids, a management indicator species.

Rationale: Selection harvest was chosen as a scheduling representation of the riparian zone management for FORPLAN Alternatives considered included a constrained rate of regeneration harvest However, if regeneration harvest is sufficiently constrained to provide for similar stream shading benefits, the opportunity costs in terms of timber foregone is similar to that expressed under a selection harvest-only constraint.

Tradeoff: The first decade allowable sale quantity and present net value of all alternatives and benchmarks is reduced approximately 3 4 million cubic feet and 4.5 million dollars respectively. Benefits to wildlife occur in the vertical diversity expected to develop along riparian zones where management is limited to selection or group selection and small clearcuts. Salmonids will benefit from the maintenance of stream shade, but it is not possible, given the general nature of our management data, to predict the exact level of benefit Therefore, we have not assigned any benefit value to this particular constraint.

3	Constraint	The FORPLAN model was constrained to provide 28,000 acres of old growth to be managed without timber harvest.
	Purpose·	The National Forest Management Act requires maintenance of viable populations of all indigenous wildlife species Old-growth also contributes to maintaining a high level of biotic diversity.
	Rationale	As discussed in Section VIII, dedicated old growth is the most cost-effective means of providing old growth. While the Wallowa-Whitman National Forest has no species of wildlife which is known to require old-growth forest, a number of large snag cavity dwellers and other species are dependent on either old or mature stands Scheduling harvest on short rotations precludes the development of mature stands. Fuelwood cutting also reduces snags. By delineating old-growth areas, and minimizing access to those areas, we can better assure that such snags will be maintained at viable levels.
	Tradeoff	The first decade allowable sale quantity and present net value of all benchmarks and alternatives are reduced approximately 10 3 million cubic feet and 7 1 million dollars respectively. Substantial improvement in diversity is a benefit that has not been dollar-quantified.
4	Constraint	No timber harvest is scheduled within the Starkey Experimental Forest.
	Purpose:	The Starkey Experimental Forest was established by the Chief of the Forest Service and serves to meet research needs of the Service
	Rationale.	Timber harvest may occur as part of the research needs of the Forest Service, but cannot be scheduled because of the potential conflicts with research objectives.
	Tradeoff·	The first decade allowable sale quantity and present net value of all benchmarks is reduced by approximately 5.7 million cubic feet and 4 0 million dollars, respectively.
5	Constraint·	No timber harvest is provided within the Indian Creek Research Natural Area.
	Purpose·	This area was established by the Chief of the Forest Service and its objectives as a research natural area preclude scheduled timber harvest
	Rationale:	Timber harvest cannot be scheduled because of the potential conflicts with research objectives
	Tradeoff.	The first decade allowable sale quantity and present net value of all benchmarks is reduced by approximately 0 3 million cubic feet and 0 2 million dollars.
6.	Constraint:	The analysis areas within Hells Canyon NRA had harvest dispersion constraints applied (maximum area 13.3 percent per decade in age class 0) which would allow for a near optimum habitat for deer and elk Additional inventory constraints provide for maintenance of 10 percent of the commercial forest stands in old-growth and 10 percent as mature forest

	Purpose:	These include the objectives of the Hells Canyon NRA Act of "protection and maintenance of fish and wildlife habitat" and "preservation of outstanding and diverse ecosystems."
	Rationale.	No regional or subregional standards were developed to guide development of these constraints for the Hells Canyon National Recreation Area, but the language of Public Law 94-199 makes it obvious that additional consideration is necessary
	Tradeoff:	The allowable sale quantity and present net value of the benchmarks is reduced by approximately 12 8 million cubic feet and 38.6 million dollars from what would be experienced if the management requirements applied to the rest of the Wallowa-Whitman National Forest were carried into Hells Canyon National Recreation Area as well.
7.	Constraint:	The Hells Canyon NRA Comprehensive Management Plan Allocations (Management Areas 8, 9, 10 and 11) were allocation constraints in the Wallowa-Whitman FORPLAN model.
	Purpose:	To represent implementation of the Hells Canyon NRA Comprehensive Management Plan.
	Rationale	This Comprehensive Management Plan was mandated by Congress The plan followed extensive public involvement and publication of draft and final environmental impact statements
	Tradeoff:	The first decade allowable sale quantity and present net value of all alternatives is reduced approximately 24 million cubic feet and 56 million dollars.

NOTE: The following constraints were added to all alternatives and the maximum present net value benchmark in the FEIS See also Table B-25 opportunity cost coefficients for benchmark and alternative constraints.

8.	Constraints.	Small snags - Timber yield tables were adjusted to account for small diameter snags
	Purpose.	The Regional management requirements specify that sufficient snags (and green trees to replace those snags) will be provided in all managed stands to maintain habitat for primary cavity excavators at not less than 20 percent of potential.
	Rationale.	This level of habitat is needed to maintain viable populations of snag-dependent species (36 CFR 219 19).
	Tradeoff.	The first decade allowable sale quantity and present net value of most benchmarks and alternatives is reduced approximately 9 60 million cubic feet and 9.3 million dollars.
9	Constraint:	Wild and Scenic Rivers - Since issuance of the DEIS, the President signed The Omnibus Oregon Wild and Scenic Rivers Act of 1988. The timbered acres were constrained to selection harvest or minimum level management and modeled under visuals in the FORPLAN model.

01398

Purpose:	To represent passage of The Omnibus Oregon Wild and Scenic Rivers Act of 1989.
Rationale:	Passage of this Act resulted in several rivers being added to the Wild and Scenic Rivers inventory.
Tradeoff.	The first decade allowable sale quantity and present net value of most benchmarks and alternatives is reduced approximately 1.5 million cubic feet and 1.6 million dollars

To the degree that these constraints are overlapping, the FORPLAN acreages were adjusted to account for that overlap. For example, the acres of old growth found in riparian zone were modeled as old growth and not included within the acres constrained to meet riparian zone objectives. The same can be said for overlap between the Starkey Experimental Forest and riparian zone, or old-growth and the Indian Creek Research Natural Area.

The Benchmarks

Benchmarks are analyses of data designed to provide answers to questions posed by interested parties both within and outside the Forest Service. This information is presented apart from other planning data to remind the reader that benchmarks are not alternatives All benchmarks share the same tentatively suitable land base and an ending inventory constraint Economics plays no part in the formulation of those benchmarks designed to maximize timber production, to maximize domestic livestock production, or in the formulation of the minimum level of management No consideration should be given to any budgetary or efficiency data presented for those benchmarks. Economics is a consideration in those benchmarks which have as an objective function, maximization of efficiency

The Minimum Level of Management Benchmark

This is the level of management which provides for little more than retaining the Forest in Federal ownership The only costs incurred are those necessary for insuring public safety and environmental protection which is not associated with controllable outputs, allowing for a moderate degree of risk.

The only benefits associated with this level of activity occur in dispersed recreation, water, anadromous fish production, and a very low level of miscellaneous collections. No "close down" costs are included. The assumption is that these have been incurred in earlier times.

It is also assumed that developed recreation sites and recreation special uses and sites have been closed. These include summer homes and ski areas. It is further assumed that all timber sales have either been completed or terminated and that the cost of any such termination would have already been expended Grazing by domestic livestock will have been discontinued

There are to be no land adjustments. Roads are maintained at levels necessary to protect soil, water and safety of incidental users. The cost of road closures, however, would have been already spent in prior years Fire suppression and insect and disease control activities would be limited to those necessary to prevent damage to adjacent lands of other ownership.

Identification	.	Minimum level of management or the minimum level benchmark
Source	:	36 CFR 219 12(e)(1)(i)
Values	:	Market and assigned
Objective	:	Minimize costs
Management Requirements	:	Not Applicable
Harvest Control	:	Not Applicable
Minimum Timber Rotation	:	Not Applicable
Pacific Northwest Region Run Designation	:	Not Applicable
FORPLAN Run	.	Not Applicable

Maximize Efficiency Benchmark Under Nondeclining Flow -- Market Values

This benchmark estimates the maximum present net value that could be achieved by valuing market outputs only, subject to timber constraints designed to provide nondeclining flow and a minimum rotation of 95 percent of culmination of mean annual increment (CMAI).

Specific constraints were applied to protect threatened and endangered species habitat; to maintain viable populations of existing native vertebrates; to prevent significant or permanent impairment of land productivity and to maintain water quality

Since the issuance of the DEIS and Supplement, small diameter snags and Wild and Scenic Rivers constraints were added to this Benchmark run. Errors in the old data set were corrected

Identification	:	Maximize efficiency under nondeclining flow (NDF) with market values only.
Source	:	36 CFR 219.12(e)(1)(iii)(A)
Values	:	Market only
Objective	:	Maximize efficiency over 150 years
Management Requirements	.	Yes
Harvest Control	:	Nondeclining flow
Minimum Timber Rotation	:	At 95% of CMAI
Pacific Northwest Region Run Designation	:	11
FORPLAN Run	:	616180-DEIS, 616557-FEIS

Maximize Efficiency Benchmark Under Nondeclining Flow -- Market and Assigned Values

This benchmark estimates the maximum present net value that could be achieved subject to timber constraints designed to provide nondeclining flow and a minimum rotation of 95 percent of culmination of mean annual increment (CMAI).

Specific constraints were applied to protect threatened and endangered species habitat, to maintain viable populations of existing native vertebrates; to prevent significant or permanent impairment of land productivity and to maintain water quality

Identification	:	Maximize efficiency under nondeclining flow NDF) with market and assigned values.
Source	.	36 CFR 219 12(e)(1)(iii)(B)
Values		Market and Assigned
Objective	·	Maximize efficiency over 150 years
Management Requirements	:	Yes
Harvest Control	:	Nondeclining flow
Minimum Timber Rotation		At 95% of CMAI
Pacific Northwest Region Run Designation		7
FORPLAN Run		616180-DEIS

Maximize Efficiency Benchmark Without Nondeclining Flow -- Market and Assigned Values

This benchmark estimates the maximum present net value that could be achieved by valuing market and nonmarket goods subject to certain management requirements, but no nondeclining flow constraint Sequential upper and lower bounds for timber outputs are used to provide some harvest regulation Rotations are based on utilization standards

Specific constraints were applied to protect threatened and endangered species habitat; to maintain viable populations of existing native vertebrates, to prevent significant or permanent impairment of land productivity; and to maintain water quality

Identification		Maximize efficiency without nondeclining flow -- market and assigned values
Source	:	36 CFR 219 12(e)(1)(iii)(B)
Values		Market and Assigned
Objective	·	Maximize efficiency over 150 years
Management Requirements	.	Yes
Harvest Control	:	Sequential upper and lower bounds
Minimum Timber Rotation		Based on utilization standards
Pacific Northwest Region Run Designation	·	4
FORPLAN Run		616177-DEIS

Maximize Efficiency Benchmark Without Nondeclining Flow -- Market Values Only

This benchmark estimates the maximum present net value that could be achieved using market values only, subject to certain management requirements, but no nondeclining flow constraint. Sequential upper and lower bounds for timber outputs are used to provide some harvest regulation Rotations are based on utilization standards

Specific constraints were applied to protect threatened and endangered species habitat, to maintain viable populations of existing native vertebrates; to prevent significant or permanent impairment of land productivity, and to maintain water quality

Identification	.	Maximize efficiency without nondeclining flow -- market values only
Source	.	36 CFR 219.12(e)(1)(iii)(A)
Values	.	Market only
Objective	.	Maximize efficiency over 150 years
Management Requirements	.	Yes
Harvest Control		Sequential upper and lower bounds
Minimum Timber Rotation	:	Based on utilization standards
Pacific Northwest Region Run Designation	:	8
FORPLAN Run	:	616177-DEIS

Maximize Timber with Management Requirements

This benchmark estimates the biological potential of the Forest for timber production over the next ten years subject to nondeclining flow and management requirements.

Specific constraints were applied to protect threatened and endangered species habitat; to maintain viable populations of existing native vertebrates; to prevent significant or permanent impairment of land productivity; and to maintain water quality.

Identification	.	Maximize Timber with management requirements and nondeclining flow.
Source	:	36 CFR 219.12(e)(1)(ii)
Values		Market and Assigned
Objective		Maximize timber production for ten years
Management Requirements	:	Yes
Harvest Control	:	Nondeclining flow
Minimum Timber Rotation	.	95% of CMAI
Pacific Northwest Region Run Designation	.	1 with MR's
FORPLAN Run	.	616070-DEIS

Maximize Timber Without Management Requirements

This benchmark estimates the biological potential of the Forest for timber production over the next ten years subject to nondeclining flow without management requirements.

Identification	.	Maximize timber with nondeclining flow, but without management requirements
Source	:	36 CFR 219.12(e)(1)(ii)
Values	:	Market and Assigned
Objective	:	Maximize timber production for ten years
Management Requirements	:	No
Harvest Control	.	Nondeclining flow

Minimum Timber Rotation	.	95% of CMAI
Pacific Northwest Region Run Designation	·	1 without MR's
FORPLAN Run	:	616082-DEIS

Maximize Domestic Livestock Production

This benchmark estimates the maximum capability of the planning area to provide commercial range subject to certain legal requirements.

Specific constraints were applied to protect threatened and endangered species habitat, to maintain viable populations of existing native vertebrates, to prevent significant or permanent impairment of land productivity; and to maintain water quality.

Identification	:	Maximize Domestic Livestock Production
Source	:	36 CFR 219.12(e)(1)(ii)
Values		Market and Assigned
Objective		Maximize domestic livestock production
Management Requirements	:	Yes
Harvest Control	:	Nondeclining flow
Minimum Timber Rotation	:	95% of CMAI
Pacific Northwest Region Run Designation	:	None specified
FORPLAN Run		616180-DEIS

Benchmark Analysis

Regionally Required Runs

Numerous FORPLAN runs were made to test the apparent opportunity costs associated with various constraints representing MR's, policy or law within the benchmarks The reader should also see Table B-21 for a summary of constraints The runs are as follows:

Run No. 1 (FORPLAN Run 616082-DEIS)

a. Dimensions:

Objective function - maximize timber (first decade)

Land base - tentatively suitable lands

Constraints -

1 Nondeclining flow (NDF) at or below long-term sustained yield (LTSY).

2 Rotations based on 95 percent of CMAI

3. Ending inventory constraints (MR's not constraints)

b. Information provided:

1. Basis for verifying that model is reasonable in terms of timber information. The Maximize Timber FORPLAN Run No. 1 is similar to timber "RAM" runs of the mid-1970's This run produces an average 413 million cubic feet per decade in species other than lodgepole pine over the first five decades. Timber RAM produced 395 million cubic feet per decade in "pine and associated species" from a larger acre base (979,000 acres vs 881,000 acres).

   The higher output from FORPLAN is achieved in spite of substantial reductions in average standing inventory volumes due to harvest and infestations of tussock moth and pine beetle Relatively short rotations without commercial thinning allow an aggressive harvest schedule which provides these outputs. However, these high volumes are achieved only at high cost with net revenue* losses of 156 million dollars in the fifth decade.

2. Basis for understanding the relationship between NDF and the selection of timber management intensities and timing options.

3. Provides vehicle for all concerned parties to reach agreement on the validity of the yield tables and acreage base before additional runs are done.

Run No 2 (FORPLAN Run 616114-DEIS)

a Dimensions:

Objective function - maximize PNV (assigned values)

Land base - tentatively suitable lands

Constraints -

1. 20 percent sequential upper and lower bounds, 80 percent floor.

2 Rotations based solely on utilization standards (i.e., not restricted by CMAI).

3 Ending inventory constraint. (MR's not constraints)

b Information provided:

1. Forms a base run for evaluating the opportunity costs of harvest floors

2. Forms a base run to use in formulating and evaluating management requirements (36 CFR 219 27) see Section VI C.

*Net Revenue. From FORPLAN, estimated High Bid Values less all related costs.

Run No. 2A (FORPLAN Run 616115-DEIS)

a. Dimensions:

Objective function. max PNV (assigned values)

Land base - tentatively suitable lands

Constraints -

1. Sequential upper and lower only (floors, ceilings not constraints)

2. Rotations based solely on utilization standards.

3. Ending inventory constraint (MR's not constraints)

b. Information provided.

1. Compared to Run No. 2, the opportunity costs associated with the harvest floors is 2.5 million dollars in PNV and 10.9 million cubic feet in first decade allowable sale quantity (0.6 percent and 1.9 percent respectively)

2. The opportunity costs are not significant, and no additional floors were tested.

3. Floor does not need to be readjusted.

Run No 3 (FORPLAN Run 616051-DEIS)

a. Dimensions

Objective function - max PNV (assigned values)

Land base - tentatively suitable lands

Constraints -

1. NDF

2 Rotations restricted to 95 percent of CMAI

3. Ending inventory constraint (MR's not constraints)

b. Information provided

1. This run in concert with Run No 2 are base runs in analyzing MR's

2. When this run is compared to Run No 2, the opportunity costs of NDF in combination with rotations restricted to CMAI are shown to be 22 million dollars in reduced PNV and 222 million cubic feet in reduced first decade allowable sale quantity, given the absence of MR's.

3. When this run is compared to Run No. 1, the differences that result when a max PNV (assigned values) objective function is used in place of a max timber objective function is shown to be an increase in PNV of 234 million dollars and a decrease in first decade allowable sale quantity of 134 million cubic feet.

Run No. 4 - Benchmark as defined in 36 CFR 219.12(e)(1)(iii)(B) (FORPLAN RUN 616177-DEIS)

a. Dimensions.

Objective function - Max PNV (assigned values)

Land base - tentatively suitable lands

Constraints -

1. Sequential upper and lower floors and ceilings as defined previously (See Run No 3)

2. MR's

3. Rotations based solely on utilization standards

4 Ending inventory constraint

5. Hells Canyon NRA land allocations

b Information provided

1. Benchmark required by the regulations

2. When this run is compared to Run No. 2, the opportunity cost of the combination of MR's, given an objective of max PNV (assigned values) and the presences of sequential upper and lower floors and ceilings and the ending inventory constraint is shown to be 184 million dollars in reduced PNV and a decrease of 296 million cubic feet in first decade allowable sale quantity.

Run No 5 - Impact of restricting rotations to 95 percent of CMAI as required by 36 CFR 219.12(e)(1)(iii)(C) (FORPLAN Run 616178-DEIS)

a. Dimensions.

Objective function - max PNV (assigned values)

Land base - tentatively suitable lands

Constraints -

1. Sequential upper and lower floors and ceilings as defined in Part B

2 MR's

3 Rotations restricted to 95 percent of CMAI

4. Ending inventory constraint

5. Hells Canyon NRA land allocations

b Information provided

1. When this run is compared to Run No. 4, the opportunity cost of restricting rotations to CMAI is shown to be 18 million dollars in reduced PNV and 13 million cubic feet in reduced first decade allowable sale quantity given an objective of max (PNV assigned values)

Run No. 6 - Impact of NDF as required by 36 CFR 219 12(e)(1)(iii)(C) (FORPLAN Run 616179-DEIS)

a. Dimensions.

Objective function - max PNV (assigned values)

Land base - tentatively suitable lands

Constraints -

1. NDF

2 Rotations based on utilization standards

3. MR's

4. Ending inventory constraint

5 Hells Canyon NRA land allocations

b *Information provided*

1. When this run is compared to Run No 4, the opportunity costs of imposing NDF is shown to be 3 million dollars in reduced PNV given an objective of max PNV (assigned values). However, first decade allowable sale quantity increases by 14 million cubic feet as stands which would be economically deferred to the second decade are scheduled in the first to satisfy the NDF constraint.

Run No. 7 - Benchmark as defined in 36 CFR 219.12(e)(1)(iii)(B) (FORPLAN Run 616180 DEIS and 616557 FEIS)

a Dimensions

Objective function - max PNV (assigned values)

Land base - tentatively suitable lands

Constraints -

1. NDF

2 MR's

3. Rotations restricted to 95 percent of CMAI

4. Ending inventory constraint

5. Hells Canyon NRA land allocations

b. Information provided.

1 When compared to Run No 6, the opportunity costs of rotations restricted to 95 percent of CMAI are shown to be 19 million dollars in reduced PNV, and 15 million cubic feet in reduced first decade ASQ, given an objective of max PNV (assigned values) and the presence of NDF, MR's, and ending inventory constraint.

2 When compared to Run No. 5, the opportunity cost of NDF are shown to be 4 million dollars in reduced PNV, given an objective of max PNV (assigned values) and the presence of rotations restricted to 95 percent of CMAI, MR's, and ending inventory constraint. However, first decade allowable sale quantity is increased 12 million cubic feet.

3. When compared to Run No 3, the opportunity costs of the combination of MR's are shown to be 185 million dollars in reduced PNV and 74 million cubic feet in reduced first decade allowable sale quantity given an objective of max PNV (assigned values) and the presence of NDF, rotations restricted to 95 percent of CMAI and the ending inventory constraint

4 When compared to Run No. 4, the opportunity costs of NDF in concert with rotations restricted to 95 percent of CMAI are shown to be 22 million dollars in reduced PNV and 1 million cubic feet in reduced first decade allowable sale quantity given an objective of max PNV (assigned values).

Run No. 8 - Benchmark as defined in 36 CFR 219.12(e)(1)(iii)(A) (FORPLAN Run 616177-DEIS)

a Dimensions·

Same as Run No. 4, except max PNV (market values) to the extent that prescriptions define alternative combinations of market and nonmarket priced outputs, Forest can define complementary and competitive relationships in production, as required by Item C(3) in the May 17 letter to Mr. Crowell. Runs No 9, 10, and 11 provide similar information.

b. Information provided

1 Benchmark required by the regulations

2. When we compare this run to Run No. 4, we can show the difference that results from max PNV (assigned values) and max PNV (market values)

Run No 9 - Impacts of restricting rotations to 95 percent of CMAI as required by 36 CFR 219 12(e)(1)(iii)(C) (FORPLAN Run 616178-DEIS)

a. Dimensions.

Same as Run No. 5, except max PNV (market values)

b. Information provided:

1. When compared to Run No 8, Forests can show the opportunity costs of restricting rotations to 95 percent of CMAI given an objective of max PNV (market values) and given the presence of sequential upper and lower floors and ceilings, MR's, and the ending inventory constraint.

2. When compared to Run No. 5, Forests can show differences that result from the max PNV (assigned values) and max PNV (market values).

Run No 10 - Impact of NDF as required by 36 CFR 219 12(e)(1)(iii)(C). FORPLAN Run 616179-DEIS)

a. Dimensions.

Same as Run No 6, except max PNV (market values)

b Information provided·

1 When compared to Run No. 8, Forests can show the opportunity costs of NDF given an objective of max PNV (market values) and given the presence of rotations based on utilization standards, MR's, and the ending inventory constraint

2. When compared to Run No 6, Forests can show differences that result from max PNV (assigned values) and max PNV (market values)

Run No. 11 - Benchmark as defined in 36 CFR 219 12(e)(1)(iii)(A). (FORPLAN Run 616180-DEIS)

a Dimensions·

Same as Run No. 7 except max PNV (market values)

b. Information provided:

1. When compared to Run No 10, Forests can show the opportunity costs of restricting rotations to 95 percent of CMAI given an objective of max PNV (market values) and given the presence of NDF, MR's, and ending inventory constraints.

2. When compared to Run No. 9, Forests can show the opportunity costs of NDF given an objective of max PNV (market values) and given the presence of MR's, ending inventory constraint, and rotations restricted to 95 percent of CMAI).

3. When compared to Run No. 7, Forests can show the differences that result from max PNV (assigned values) and max PNV (market values)

Table B-20 summarizes some of the Regionally required benchmark runs and sensitivity tests.

The tradeoffs associated with management requirements, culmination of mean annual increment, and harvest flow constraints are summarized in Table B-21. The apparent dollar costs of the harvest flow and harvest dispersion constraints are disproportionately greater than the opportunity costs expressed in cubic foot output of timber, because both types of constraints tend to limit the amount of the high-value, low-cost stands which can be harvested in the first decade. The cost of harvest dispersion, expressed as a change in five-decade net revenues, is substantially less than the change in PNV because many of these stands are subsequently scheduled in the second, third, and fourth decades.

Timber Harvest by Proclaimed National Forest

All benchmarks and alternatives which are subject to harvest flow constraints have those constraints applied to the Wallowa-Whitman National Forest as an administrative unit Nondeclining flow is thus achieved (where applicable) for the Wallowa-Whitman National Forest as an administrative unit. This unit includes all of the Wallowa, all of the Whitman, and portions of the Nez Perce and Payette National Forests.

The Nez Perce encompasses only 12,000 acres of technically suitable forest land, of which less than 1,000 acres were found economically efficient in the maximize PNV benchmark. The contributions of the Nez Perce to the Wallowa-Whitman harvest schedule are insignificant. The Payette National Forest contributes no acreage to the suitable and economically efficient timber base (being nearly all wilderness or wild river). Its contribution to the annual allowable sale quantity is nil

The Wallowa and Whitman proclaimed National Forests each encompass far more than 200,000 acres of suitable and economically efficient forest land and both contribute substantial volumes to the annual allowable sale quantity. While nondeclining flow is satisfied on the entire administrative area, harvest flow as disaggregated to the proclaimed National Forests (Figure B-1) fluctuates irregularly from decade to decade

This fluctuation can be regarded as a departure from the base sale schedule for each of the proclaimed Forests. No base sale schedule has been calculated for them. All resource objectives have been established for the Wallowa-Whitman National Forest as a single administrative entity. Most publics recognize the Wallowa-Whitman as a single entity and it is, therefore, appropriate to establish nondeclining flow at that level.

Relationship Between Market and Nonmarket Outputs of Maximum PNV Benchmarks

Run No. 8 through Run No. 11 shared the same FORPLAN base as Run No 4 through Run No. 7. Assigned values proved insufficient to require iterative running of FORPLAN. Therefore, expected output of market and nonmarket goods is the same in the market-only and assigned-values benchmarks.

Summary of Benchmark Results

Table II-5, Chapter II summarizes acreage by prescription assignments, resource outputs, and effects of alternatives. Tables B-22 and B-23 summarize benchmark information as developed for the DEIS only.

FIGURE B-1
NONDECLINING FLOW AND HARVEST FLOW FROM PROCLAIMED NATIONAL FORESTS

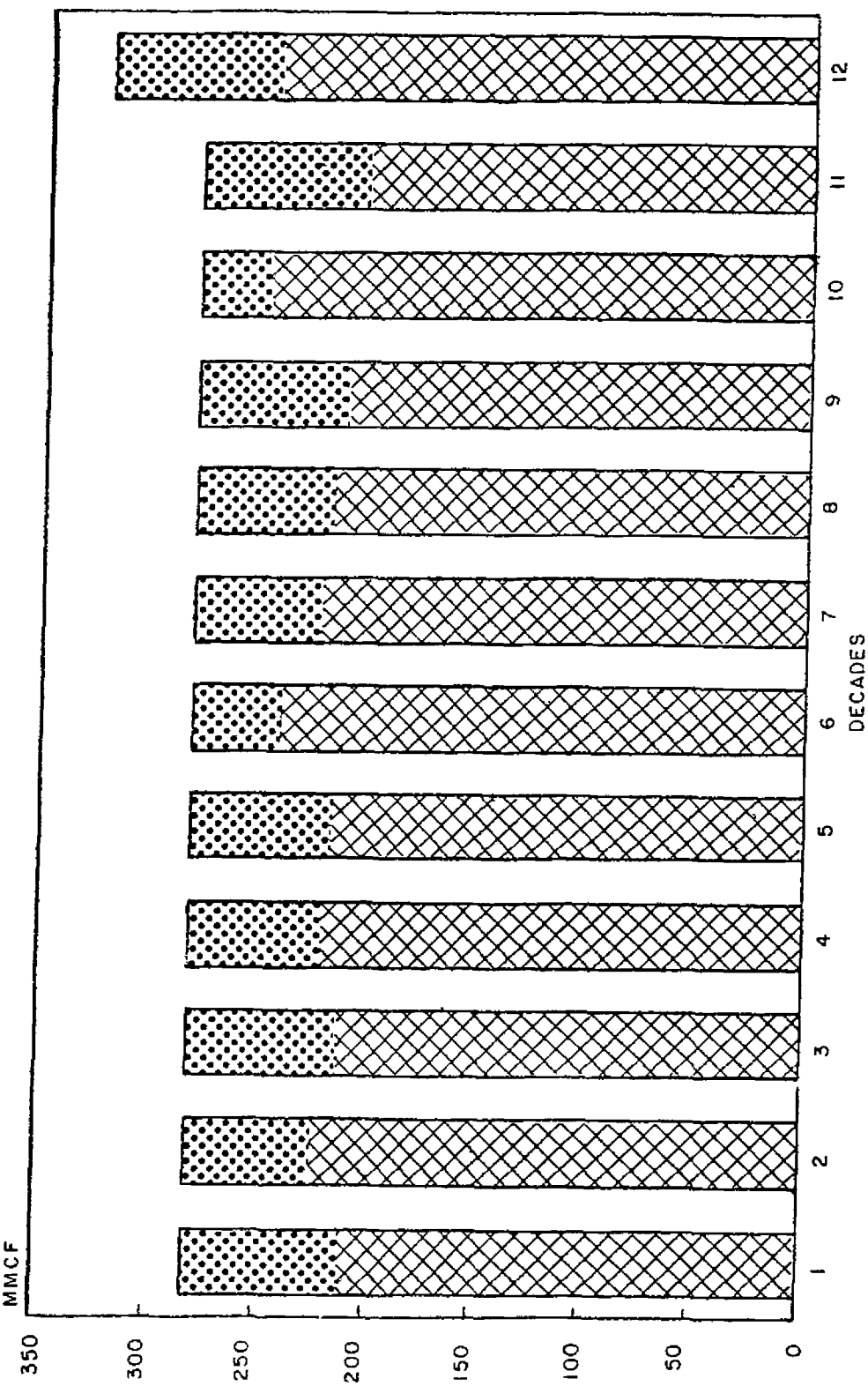


Table B-20

ADDITIONAL FORPLAN ANALYSIS PER REGIONAL DIRECTION, NOVEMBER 10, 1983

FORPLAN RUN REGION IDENTIFICATION	CONSTRAINTS							PNW TBR	DECADE NET REVENUE 3/ (MM$ OF TMBR DCPT)			ACRES TIMBER	FIRST DECADE	LTSY
	OBJ 1/	MR 5/	END INV	SEQ U&L	NDF	ROTATION UTIL STDS	0 95 CMAI	MM$ 2/	HIGH	LOW	TOTAL FIVE	MGMT (M AC)	HRVST MMCF	MMCF
RUN #1 4/	TBR/PNW		X		X		X	200	232	-156	223	1073	479	554
MAX TIMBER BENCHMARK	TBR/PNW	X	X		X		X	86	138	-99	154	950	391	453
RUN #2 4/	PNW		X	X		X		456	384	49	719	949	568	285
RUN #2A (NO HARVEST FLOOR) 4/	PNW		X	X		X		459	392	36	725	949	579	270
RUN #3 4/	PNW		X		X		X	434	272	19	774	997	346	381
RUN #4	PNW	X	X	X		X		272	179	73	593	846	272	268
RUN #5	PNW	X	X	X			X	254	175	44	559	819	259	251
RUN #6	PNW	X	X		X	X		268	156	60	570	856	286	288
RUN #7	PNW	X	X		X		X	250	147	77	525	823	271	286
RUN #7 WITHOUT HCNRA CMP	PNW	X	X		X		X	306	173	85	652	900	295	310
RUN #7 WITH MRS ONLY	PNW	X	X		X		X	345	208	81	706	925	308	326
RUN #7 WITHOUT HARVEST DISP AND 10% COVER BGWR	PNW	X	X		X		X	411	261	11	728	966	327	362
RUN #3 WITH 0% PRICE TREND	PNW		X		X		X	336	253	-12	546	997	314	344
RUN #3 WITH 2% PRICE TREND	PNW		X		X		X	579	299	99	1143	997	352	384
RUN #3 WITH 3% PRICE TREND	PNW		X		X		X	801	796	163	1886	1033	230	469
RUN #3 WITH 50% REDUCTION IN PLANTING COSTS	PNW		X		X		X	435	270	75	771	997	350	383
RUN #3 WITH 20% REDUCTION IN "SALE PREP" COSTS	PNW		X		X		X	466	288	42	834	997	350	384

("PNW" is used to refer to FORPLAN runs which use that terminology. Otherwise "PNV" is used in the document)

1/ Objective of FORPLAN run "PNW" means maximize PNW under specified condition set "TBR/PNW" means maximize PNW under specified condition set which includes a timber target set at 99% of the maximum possible first decade timber production

2/ PNW from FORPLAN, timber program only (150 years)

3/ Revenues in excess of expenditures as tracked in FORPLAN

4/ Runs #1, 2, 2A, and 3 include 90,156 acres of Forest in Hells Canyon NRA which are not available for scheduled timber harvest in any alternative Removing these acres from these benchmark runs would reduce first decade timber yield in Run #1 by approximately 40 MMCF, and PNW of Runs #2 and 3 by approximately 95 million dollars

5/ Includes constraints necessary to meet requirements of the HCNRA Act

Table B-21
CHANGES RESULTING FROM MANAGEMENT REQUIREMENTS (MR's), CULMINATION OF MEAN ANNUAL INCREMENT (CMAI) AND NONDECLINING FLOW (NDF) CONSTRAINTS

Constraint Description	Change in PNW MM$	Change in 1st Decade Timber MMCF 2/
Starting Point: Run 2A	459	579
Harvest Floor	- 3	- 11
MR's--Total 2/	-74	-38
Harvest dispersion	-53	-15
Viable populations	-7	-10
Riparian	-4	-3
Snags	-9	-10
HCNRA Act	-39	-13
HCNRA CMP	-56	-24
Rotations at 0.95 CMAI		
with nondeclining flow	- 18	- 15
without NDF	- 18	- 13
Nondeclining Flow		
with 0 95 CMAI	- 4	+ 12
without 0.95 CMAI	- 4	+ 14
NDF and 0.95 CMAI Total		
with MR's	- 22	+ 1
without MR's	+ 22	+ 222

"PNW" is used to refer to FORPLAN runs which use that terminology Otherwise "PNV" is used in the document

1/ Changes shown are for the first decade. Annual figures would be one-tenth those shown.
2/ Although the potential effects of meeting the MR's are displayed as if they were additive, there is actually overlap not reflected in the analysis

Table B-22
QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECT BY BENCHMARK
- TIMBER -

		BENCHMARK									
Outputs/Effects	Unit of Measure	Minimum Level	Max PNV Run 11	Max PNV Run 7 1/	Max PNV Run 4	Max PNV Run 8	Max Tmbr w/MMR's	Max Tmbr w/o MMR	Max Livestock	Max Elk	Current Direction 1/
Lands Tentatively Suitable for Timber Production	M Acres	NA	1,090 1	1,090 1	1,090 1	1,090 1	1,090 1	1,090 1	1,090 1	1,090 1	1,090 1
Lands Suitable for Timber Production *	M Acres	NA	822 8	858 9	845 8	845 8	950 0	1,072 1	822 8	788 2	866 5
Full Yield		NA	125 6	173 0	173 8	173 8	950 0	1,072 7	125 6	105 9	273 0
50-90% of Full Yield		NA	273 7	626 0	364 5	364 5	0	0	273 7	431 0	535 3
1-49% of Full Yield		NA	423 5	60 0	507 5	507 5	0	0	423 5	257 6	58 2
Timber Harvest Prescriptions											
Clearcut	M Acres	0	304 3	304 3	338 2	338 2	406 5	442 5	304 3	334 7	333 0
Shelterwood	M Acres	0	469 8	469 8	458 9	458 9	466 0	630 2	469 8	351 8	381 0
Selection	M Acres	0	48 7	48 7	48 7	48 7	77 5	0	48 7	101 7	153 0
Allowable Sale Quantity											
Sawlog Volume (Recent levels 28 6)	Million CF/Year										
Dec 1		0	27 1	25 5	27 2	27 2	39 1	47 9	27 1	21 5	27 1
Dec 2		0	27 1	26 2	34 0	34 0	39 1	47 9	27 1	21 5	27.3
Dec 5		0	27 1	25 4	26 3	26 3	39 1	47 9	27 1	21 5	27 2
Sawlog Volume (Recent levels 159)	Million BF/Year										
Dec 1		0	136	127	151	151	193	239	136	100	134
Long-Term Sustained Yield Timber Supply 1/	Million CF/ Year	0	28 6	48 6	26 8	26 8	47 1	57 3	28 6	25 5	40.1
Timber Growth in Dec 5	Million CF/ Year	NE	24.3	23 1	15 2	15 2	75 6	72 6	24 3	18 0	28 1

* Suitable for timber production given the multiple use objectives of the alternative (36 CFR 219.14 (d))
NA - Not Applicable
NE - Not Estimated
1/ Updated to reflect changes made between DEIA and FEIS (e g , small diameter snags, wild and scenic rivers)

Table B-22 (Continued)
QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECT BY BENCHMARK
- TIMBER -

		BENCHMARK									
Outputs/Effects	Unit of Measure	Minimum Level	Max PNV Run 11	Max PNV Run 73/	Max PNV Run 4	Max PNV Run 8	Max Tmbr w/MMR's	Max Tmbr w/o MMR	Max Livestock	Max Elk	Current Direction 3/
Unregulated Timber 1/ Rounded Volume Only	Million CF/Year										
(Recent Levels 96)											
Dec 1		0	75	73	75	75	109	134	75	59	78
Dec 2		0	63	62	79	79	91	112	63	50	65
Dec 5		0	50	49	48	48	72	88	50	39	52
Personal-Use Fuelwood	Million CF/Year	50	50	50	50	50	50	5.0	50	50	50
Fuel Treatment	M Acres/ Year										
Dec 1		0	NE	NE	NE	NE	NE	NE	NE	155	192
Dec 2		0	NE	NE	NE	NE	NE	NE	NE	189	223
Dec 5		0	NE	NE	NE	NE	NE	NE	NE	201	282
Reforestation 3/ (Recent levels 33)	M Acres/ Year										
Dec 1		0	37	116	40	409	11.4	183	3.7	43	133
Dec 2		0	32	114	35	35	48	32	32	43	12.9
Dec 5		0	07	102	02	02	25	133	07	45	69
Timber Stand Improvement	M Acres/ Year										
(Recent levels 39											
Dec 1		0	62	60	55	55	127	128	60	14	92
Dec 2		0	59	50	62	62	228	320	5.9	16	77
Dec 5		0	87	45	42	42	14.0	176	8.7	15	35

NE - Not estimated
NA - Not Applicable
1/ Salvage of cull, dead lodgepole pine, and small diameter (less than 5 inches) material
2/ Includes all acres where activities aiding the reestablishment of tree cover are employed Includes planting and other reforestation measures
3/ Updated to reflect changes made between DEIS and FEIS (e g , small diameter snags, wild and scenic rivers)

Table B-22 (Continued)
QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECT BY BENCHMARK
- RECREATION -

		BENCHMARK									
Outputs/Effects	Unit of Measure	Minimum Level	Max PNV Run 11	Max PNV Run 7 4/	Max PNV Run 4	Max PNV Run 8	Max Tmbr w/MMR's	Max Tmbr w/o MMR	Max Livestock	Max Elk	Current Direction 4/
Fire Management Effectiveness Index	$/Thousand Protected Acres/Year										
Dec 1		646	931	920	932	932	1,106	1,232	931	851	943
Dec 2		646	917	906	1,011	1,011	1,086	1,208	917	840	929
Dec 5		646	903	892	892	892	1,065	1,182	903	829	914
Developed Recreation Use	M RVD's/ Year										
(Recent Levels 367)											
Dec 1		0	399	399	399	399	399	399	399	399	399
Dec 2		0	464	464	464	464	464	464	464	464	464
Dec 5		0	621	621	621	621	621	621	621	621	621
Nonwilderness Dispersed Recreation Use 1/											
Roaded 2/ (Recent Levels 343)	M RVD's & M WFUD's/ Year										
Dec 1		NE	373	373	373	373	373	373	373	373	373
Dec 2		NE	433	433	433	433	433	433	433	433	433
Dec 5		NE	505	505	505	505	505	505	505	505	505
Unroaded 3/ (Recent Levels 389)	M RVD's & M WFUD's/ Year										
Dec 1		NE	423	423	423	423	423	423	423	423	423
Dec 2		NE	491	491	491	491	491	491	491	491	491
Dec 5		NE	572	572	572	572	572	572	572	572	572

NE - Not Estimated
M WFUD One thousand wildlife and fish user days The equivalent of 80,000 hours of recreation involving the use of wildlife or fish
1/ Figures are exclusive of wildlife anf fish recreation user days (WFUD's)
2/ Includes roaded natural, roaded modified, rural, and urban recreation opportunity spectrum classes
3/ Includes primitive, semiprimitive nonmotorized, and semiprimitive motorized recreation opportunity spectrum classes
4/ Updated to reflect changes made between DEIS and FEIS (e g , small diameter snags, wild and scenic rivers)

Table B-22 (Continued)
QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECT BY BENCHMARK
- RECREATION -

		BENCHMARK									
Outputs/Effects	Unit of Measure	Minimum Level	Max PNV Run 11	Max PNV Run 7	Max PNV Run 4	Max PNV Run 8	Max Tmbr w/MMR's	Max Tmbr w/o MMR	Max Livestock	Max Elk	Current Direction 3/
Wilderness Use 1/	M RVD's/ Year										
(Recent Levels 72)											
Dec 1		78	78	78	78	78	78	78	78	78	78
Dec 2		91	91	91	91	91	91	91	91	91	91
Dec 5		127	127	127	127	127	127	127	127	127	105
Wildlife and Fish Recreation Use	M RVD's/ Year 2/										
(Recent Levels 340)											
Dec 1		NE	368	368	368	368	368	368	368	368	370
Dec 2		NE	420	420	420	420	420	420	420	420	430
Dec 5		NE	567	567	567	567	567	567	567	567	537
Trail Construction and Reconstruction	Miles/Year										
(Recent Levels 4)											
Dec 1		0	4	4	4	4	4	4	4	4	4
Dec 2		0	5	5	5	5	5	5	5	5	5
Dec 5		0	5	5	5	5	5	5	5	5	5
Developed Site Construction and Reconstruction	PAOT/Year*										
(Recent Levels 100)											
Dec 1		0	550	550	550	550	550	550	550	550	100
Dec 2		0	50	50	50	50	50	50	50	50	100
Dec 5		0	50	50	50	50	50	50	50	50	100
Visual Quality Objectives											
Preservation	M Acres	582 7	582 7	582 7	582 7	582 7	582 7	583 7	582 7	582 7	582.7
Retention	M Acres	1,766 5	0	0	0	0	0	0	0	257 6	257 6
Partial Retention	M Acres	0	0	0	0	0	0	0	0	397 4	397.4
Modification/Max Mod	M Acres	0	1,766 5	1,766 5	1,766 5	1,766 5	1,766 5	1,766 5	1,766 5	1,111 5	1,111 5

* Persons at one time, capacity increased or improved per year

NE - Not Estimated

M WUFD One thousand wildlife and fish user days The equivalent of 80,000 hours of recreation involving the use of wildlife or fish

1/ Figures are exclusive of wildlife and fish recreation user days (WFUD's)

2/ Wildlife and fish user days (hunting and fishing)

3/ Updated to reflect changes made between DEIS and FEIS (e g , small diameter snags, wild and scenic rivers)

Table B-22 (Continued)
QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECT BY BENCHMARK
- RECREATION, WILDLIFE -

		BENCHMARK									
Outputs/Effects	Unit of Measure	Minimum Level	Max PNV Run 11	Max PNV Run 7 3/	Max PNV Run 4	Max PNV Run 8	Max Tmbr w/MMR's	Max Tmbr w/o MMR	Max Livestock	Max Elk	Current Direction 3/
Acres Remaining Unroaded at End of	M Acres										
Dec 1	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	400
Dec 2	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	380
Dec 5	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	362
Unroaded Areas Assigned to Unroaded Management Prescriptions	M Acres	NE	NE	NE	NE	NE	NE	NE	NE	NE	344
Old growth in Long-term (Recent Levels 173 0)	M Acres										
Dec1		NE	143 3	NE	143 3	143 3	131 2	69 5	143 3	174 6	154
Dec 2		NE	NE	NE	NE	NE	NE	NE	NE	NE	150
Dec 5		NE	NE	NE	NE	NE	NE	NE	NE	NE	147
Pileated Woodpecker	Pairs										
Dec 1		346	346	346	346	346	346	346	346	346	346
Dec 2		349	300	300	300	300	300	250	300	349	260
Dec 5		349	287	287	287	287	287	230	287	349	202

Figures shown indicate levels of outputs and activities expected with full funding
NE - Not estimated
1/ Numbers of management indicator species are index values only based upon acres of available habitat as described in Chapter IV
2/ Also applies to decade 13
3/ Updated to reflect changes made between DEIS and FEIS (e g , small diameter snags, wild and scenic rivers)

Table B-22 (Continued)
QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECT BY BENCHMARK
- WILDLIFE -

		BENCHMARK									
Outputs/Effects	Unit of Measure	Minimum Level	Max PNV Run 11	Max PNV Run 7	Max PNV Run 4	Max PNV Run 8	Max Tmbr w/MMR's	Max Tmbr w/o MMR	Max Livestock	Max Elk	Current Direction 4/
Primary Cavity Excavators	Pairs 1/	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Pine Marten	Pairs 1/	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Goshawk	Pairs 1/	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Resident Trout	Numbers 1/	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Rocky Mountain Elk	M Elk Summering 3/										
Dec 1		NE	21 0	21 0	NE	NE	21 0	NE	21 0	21 0	21 0
Dec 2		NE	19 3	19 3	NE	NE	19 3	NE	19 3	22 4	19 9
Dec 5		NE	19 0	19 0	NE	NE	19 0	NE	19 0	21 7	19 0

Figures shown indicate levels of outputs and activities expected with full funding
NE - Not estimated
1/ Actual numbers to be generated during monitoring
2/ Numbers of spawning fish assuming full escapement of the numbers shown, 38,203 are due to achievement of full escapement–work down by other agencies
3/ Index number of elk summering on the Forest
4/ Updated to reflect changes made between DEIS and FEIS (e g , small diameter snags, wild and scenic rivers)

Table B-22 (Continued)
QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECT BY BENCHMARK
- WILDLIFE -

		BENCHMARK									
Outputs/Effects	Unit of Measure	Minimum Level	Max PNV Run 11	Max PNV Run 7 1/	Max PNV Run 4	Max PNV Run 8	Max Tmbr w/MMR's	Max Tmbr w/o MMR	Max Livestock	Max Elk	Current Direction 1/
Wildlife Habitat Improv	Acres										
Dec 1		0	500	500	500	500	2,000	2,000	2,000	2,000	500
Dec 2		0	500	500	500	500	2,000	2,000	2,000	2,000	500
Dec 5		0	500	500	500	500	500	500	500	500	500
Wildlife Habitat Improv	Acre Equivalents										
Dec 1		0	2,500	2,500	2,500	2,500	10,000	10,000	10,000	10,000	2,500
Dec 2		0	2,500	2,500	2,500	2,500	10,000	10,000	10,000	10,000	2,500
Dec 5		0	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Water Yield	Million Acre Feet										
Dec 1		2 73	2 73	2 73	2 73	2 73	2 73	2 73	2 73	2 73	2 73
Dec 2		2 73	2 73	2 73	2 73	2 73	2 73	2 73	2 73	2 73	2 73
Dec 5		2 73	2 73	2 73	2 73	2 73	2 73	2 73	2 73	2 73	2 73
Accelerated Sediment (Index)	Thousands of tons per decade										
Dec 1		NE	NE	NE	NE	NE	NE	NE	NE	217	223
Dec 2		NE	NE	NE	NE	NE	NE	NE	NE	225	233
Dec 5		NE	NE	NE	NE	NE	NE	NE	NE	227	233
Watershed Improvement Work (Recent Levels 5)	Acres/Year										
Dec 1		0	500	500	500	500	500	500	500	500	5
Dec 2		0	500	500	500	500	500	500	500	500	5
Dec 5		0	500	500	500	500	500	500	500	500	5

Figures shown indicate levels of outputs and activities expected with full funding
NE - Not estimated
1/ Updated to reflect changes made between DEIS and FEIS (e g , small diameter snags, wild and scenic rivers)

Table B-22 (Continued)
QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECT BY BENCHMARK
- RANGE, TRANSPORTATION -

		BENCHMARK									
Outputs/Effects	Unit of Measure	Minimum Level	Max PNV Run 11	Max PNV Run 7 1/	Max PNV Run 4	Max PNV Run 8	Max Tmbr w/MMR's	Max Tmbr w/o MMR	Max Livestock	Max Elk	Current Direction 1/
Range--Permitted Grazing	M AUM's/ Year										
(Recent Levels 186)											
Dec 1		0	207	207	207	207	207	207	227	159	186
Dec 2		0	207	186	207	207	207	207	227	159	186
Dec 5		0	207	186	207	207	207	207	227	159	186
Arterial and Collector Road Construction and Reconstruction 1/	Miles/Year										
Dec 1		0	NE	NE	NE	NE	NE	NE	NE	54	69
Dec 2		0	NE	NE	NE	NE	NE	NE	NE	47	64
Dec 5		0	NE	NE	NE	NE	NE	NE	NE	54	76
Timber Purchaser Road Construction and Reconstruction	Miles/Year										
(Recent Levels 180)											
Dec 1		0	NE	NE	NE	NE	NE	NE	NE	131	178
Dec 2		0	NE	NE	NE	NE	NE	NE	NE	94	136
Dec 5		0	NE	NE	NE	NE	NE	NE	NE	90	131
Roads Suitable for Public (Passenger car)	Miles										
Dec 1		NE	NE	NE	NE	NE	NE	NE	NE	835	835
Dec 2		NE	NE	NE	NE	NE	NE	NE	NE	835	900
Dec 5		NE	NE	NE	NE	NE	NE	NE	NE	835	930

NE - Not estimated
1/ Updated to reflect changes made between DEIS and FEIS (e g , small diameter snags, wild and scenic rivers)

Table B-22 (Continued)
QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECT BY BENCHMARK
- TRANSPORTATION, MINERALS -

Outputs/Effects	Unit of Measure	BENCHMARK									
		Minimum Level	Max PNV Run 11	Max PNV Run 7	Max PNV Run 4	Max PNV Run 8	Max Tmbr w/MMR's	Max Tmbr w/o MMR	Max Livestock	Max Elk	Current Direction 1/
Roads Suitable for Public (High Clearance Vehicle)	Miles										
Dec 1		NE	NE	NE	NE	NE	NE	NE	NE	5,720	5,720
Dec 2		NE	NE	NE	NE	NE	NE	NE	NE	1,336	4,426
Dec 5		NE	NE	NE	NE	NE	NE	NE	NE	1,629	5,316
Roads Requiring User Maintenance (High Clearance Vehicle)	Miles										
Dec 1		NE	NE	NE	NE	NE	NE	NE	NE	750	750
Dec 2		NE	NE	NE	NE	NE	NE	NE	NE	750	750
Dec 5		NE	NE	NE	NE	NE	NE	NE	NE	750	750
Energy Minerals Produced	Billion BTU/ Year										
Dec 1		NE	NE	NE	NE	NE	NE	NE	NE	0	0
Dec 2		NE	NE	NE	NE	NE	NE	NE	NE	0	0
Dec 5		NE	NE	NE	NE	NE	NE	NE	NE	0	0
Nonenergy Minerals Produced	Million $/Year										
Dec 1		NE	NE	NE	NE	NE	NE	NE	NE	13 6	13 4
Dec 2		NE	NE	NE	NE	NE	NE	NE	NE	54 2	53 3
Dec 5		NE	NE	NE	NE	NE	NE	NE	NE	124 5	121 6
Mineral Operating Plans	# Active/ Year										
Dec 1		NE	379	379	379	379	379	379	379	354	352
Dec 2		NE	425	425	425	425	425	425	425	397	394
Dec 5		NE	499	499	499	499	499	499	499	466	463
Human Resource Program	Person Years/Year										
Dec 1		0	4	4	4	4	4	4	4	4	4
Dec 2		0	4	4	4	4	4	4	4	4	4
Dec 5		0	4	4	4	4	4	4	4	4	4

NE - Not estimated
1/ Updated to reflect changes made between DEIS and FEIS (e g , small diameter snags, wild and scenic rivers)

Table B-22 (Continued)
QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECT BY BENCHMARK
- LOCAL ECONOMY, COSTS, RETURNS -

		BENCHMARK									
Outputs/Effects	Unit of Measure	Minimum Level	Max PNV Run 11	Max PNV Run 7 2/	Max PNV Run 4	Max PNV Run 8	Max Tmbr w/MMR's	Max Tmbr w/o MMR	Max Livestock	Max Elk	Current Direction 2/
Forest Related Jobs	*Jobs*										
Decade 1											
(Recent Levels)											
Sawtimber (982)		0	NE	796	NE	NE	NE	NE	NE	NE	838
Roundwood (218)		0	NE	167	NE	NE	NE	NE	NE	NE	177
Livestock (93)		0	NE	104	NE	NE	NE	NE	NE	NE	93
Developed Recreation (404)		0	NE	439	NE	NE	NE	NE	NE	NE	439
Dispersed Recreation (1,258)		579	NE	1368	NE	NE	NE	NE	NE	NE	1368
TOTAL (2,955)		579	3495	2874	3655	3656	4172	4719	3453	3086	2915
Forest Related Personal Income - Decade 1	MM$/Year										
(Recent Levels)											
Sawtimber (18 4)		0 0	NE	14 9	NE	NE	NE	NE	NE	NE	15 7
Roundwood (4 4)		0 0	NE	3 4	NE	NE	NE	NE	NE	NE	3 6
Livestock (1 1)		0 0	NE	1 2	NE	NE	NE	NE	NE	NE	1 1
Developed Recreation (5 0)		0 0	NE	5 4	NE	NE	NE	NE	NE	NE	5.4
Dispersed Recreation (15 6)		7 2	NE	16 9	NE	NE	NE	NE	NE	NE	16 9
TOTAL (44.5)		7.2	56.0	41 9	59 3	59.3	69 7	80 7	55 1	47 4	42 8
Payments to Local Governments - Decade 1											
(Recent levels)											
Sawtimber (3 7 1/)		0 0	NE	4 1	NE	NE	NE	NE	NE	NE	3 7
Roundwood (1/)		0 0	NE	0 0	NE	NE	NE	NE	NE	NE	0 0
Livestock (0 3)		0.0	NE	0 3	NE	NE	NE	NE	NE	NE	0 3
Developed Recreation (0 0)		0 0	NE	0,0	NE	NE	NE	NE	NE	NE	0 0
Dispersed Recreation (0 0)		0 0	NE	0 0	NE	NE	NE	NE	NE	NE	0 0
Total (4 0)		0 0	4 4	4 5	4 6	4 6	3 3	7 5	4 4	2 8	4 0

Figures shown indicate levels of outputs and activities expected with full funding
NE - Not estimated
1/ Figure for roundwood are included in sawtimber
2/ Updated to reflect changes made between DEIS and FEIS (e g , small diameter snags, wild and scenic rivers)

Table B-22 (Continued)
QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECT BY BENCHMARK
- COSTS, RETURNS -

		BENCHMARK									
Outputs/Effects	Unit of Measure	Minimum Level	Max PNV Run 11	Max PNV Run 71/	Max PNV Run 4	Max PNV Run 8	Max Tmbr w/MMR's	Max Tmbr w/o MMR	Max Livestock	Max Elk	Current Direction 1/
Operational Costs	Million $/Year										
Dec 1		42	103	125	103	103	126	143	103	92	124
Dec 2		42	102	118	11.5	115	125	141	102	92	117
Dec 5		42	103	116	101	101	124	139	103	93	117
Capital Investment Costs	Million $/Year										
Dec 1		0	92	66	95	95	229	182	92	89	92
Dec 2		0	80	70	89	89	128	154	80	78	96
Dec 5		0	65	58	57	99	99	155	66	68	85
Total National Forest Funds											
Allocated	Million $/Year										
Dec 1		0	49	46	52	52	17.7	123	49	48	70
Dec 2		0	49	51	55	55	89	109	49	49	74
Dec 5		0	35	39	2.7	27	60	111	35	40	64
Appropriated	Million $/Year										
Dec 1		43	146	145	146	14.6	179	202	147	133	146
Dec 2		43	133	137	150	150	165	186	134	121	139
Dec 5		43	133	135	131	132	163	182	134	121	138
Returns to Government*	Million $/Year										
Dec 1		01	177	171	184	184	133	302	177	111	152
Dec 2		01	188	176	219	219	190	177	188	125	150
Dec 5		01	212	202	225	22.5	147	369	212	178	94

* Gross Federal receipts including Purchaser Credit Roads

1/ Updated to reflect changes made between DEIS and FEIS (e g., small diameter snags, wild and scenic rivers)

Table B-23
DISCOUNTED BENEFITS, DISCOUNTED COSTS AND PRESENT NET VALUE OF BENCHMARKS
(1982 MM$)
(DEIS BENCHMARK ANALYSIS)

COST, BENEFIT OR PNV	Minimum Level	Max PNV Run 11	Max PNV Run 7	Max PNV Run 4	Max PNV Run 8	Max Timber W/ MR'S 1/	Max Timber W/O MR's 1/	Max Livestock	Max Elk
Total Discounted Benefits	232	505	1102	1138	541	1071	1242	1106	997
Total Discounted Costs	108	433	433	450	450	709	822	435	411
Present Net Value	125	72	669	688	91	362	420	671	586

1/ For this comparison "maximize timber / maximize PNV rollover" runs were *not* used to represent the max timber benchmarks. Therefore the present net values derived are not comparable to present net values of the other benchmarks which were "rolled over."

Uncertainty in the Analysis

Use of Average or Representative Values

Nearly all data used in Forest planning are average (arithmetic mean) values or are derived from averages. This use of averages to represent the Forest is necessary because it would be impracticable to physically collect precise data on every acre of a 2 3 million acre Forest in a timely manner. Even if it were possible, each acre would be represented as an average situation

The use of averages means that some areas of the Forest may have their costs or benefits or other characteristics substantially overstated or understated. Thus a decision to manage or not manage timber on a certain land type based on averages is not always correct That is one reason for requiring project level analysis

To minimize this problem, the Forest has been stratified into capability areas which describe potential growth, value of species, cost of logging, and other characteristics which are relevant to the decisionmaking process These capability areas are further disaggregated into analysis areas (Section III, this appendix) to provide more specific information about existing stand conditions and the potential for growth on those existing stands and the stands that will succeed them The detail of this stratification approaches the limits of practicality for assembling and analyzing data.

We have taken the opportunity to be more specific within our analysis whenever it was practical As an example, logging haul costs for the Hells Canyon National Recreation Area are significantly higher than the average expected for the rest of the Wallowa-Whitman National Forest. That difference is reflected in the model.

Our intent in identifying the HCNRA in the Forest model was to be able to answer questions about it At the time the model was constructed, the decision on the HCNRA CMP (Comprehensive Management Plan) was being held in abeyance. There was reason to identify the HCNRA as a distinct unit so that if changes were made in the HCNRA CMP, they could be accommodated in the model

Even today there is movement afoot to legislatively establish the harvest level for the HCNRA There seems to be no reason to think interest in the HCNRA as a distinct entity will soon diminish

FORPLAN runs have been made to respond to anticipated queries regarding the cost of implementing the CMP. Differences in stumpage values for the HCNRA are reflected in the HCNRA's working group mix. The HCNRA's incidence of high-valued stands is therefore reflected in the model.

Because the HCNRA was geographically identified within the FORPLAN model, we used the more specific haul and road maintenance costs for the HCNRA rather than simply applying Forest-wide average haul and road maintenance costs It would have been desirable to have had even greater geographic specificity in haul costs with our FORPLAN model for the entire Forest This might have resulted in different decisions on certain portions of the Forest. However, it proved to be impractical because of model size limitations to incorporate that level of geographic specificity in the model. The fact that geographically-specific haul and road maintenance costs could not be included in the FORPLAN model for all Forest areas does not obviate the need to track significant haul and road maintenance cost differences, where possible, as in the case of the HCNRA

01426

Projections and Sensitivity Tests

Another area of uncertainty is that which rises in making projections into the future This includes such things as the growth rates of timber, anticipated trends in recreation use, or in the values stated for recreation and timber. By definition all projections into the future are extrapolations beyond known data points. The farther the projection is extended, the greater the uncertainty becomes

Our assumptions regarding future timber prices and other questions as to the adequacy of our data have been subjected to sensitivity tests A sensitivity test attempts to answer "what if" questions. What if our projected price trends for timber are overstated or understated in our FORPLAN model, for instance? Would the results change significantly?

If disproportionately large changes occur from relatively small changes in an input datum, the model would be said to be highly sensitive to that bit of input. If on the other hand, large changes could be made in that input with little or no change in the model's output, then we would deduce that the model was relatively insensitive to that input *Sensitivity tests thus can be used to show areas in which more precision is needed* relative to others

Some sensitivity testing is obvious, if not intuitive For instance, logic tells us that the model will be more sensitive to relative changes in an assigned cost of $200 per acre than to relative changes in an assigned cost of $20 per acre and that much more effort should be expended in looking into the former. Likewise, relatively less effort need be spent on costs and benefits which can change little between alternatives because they will not loom that great in the decisionmaking process That is, the rankings of the alternatives would not likely be affected.

In way of illustration, FORPLAN was run several times with different price trends for timber The rate of increase assumed in the alternatives is 1 percent compounded annually for 50 years. The sensitivity tests were run at 0 percent, 2 percent, and 3 percent, all compounded annually In addition, the costs of "sale preparation"* and planting were also varied significantly in other sensitivity tests The results of these sensitivity tests are presented as part of Table B-20 None of the tests indicated unacceptable risk of decision error from reasonably anticipated variations in costs or trends.

Inventory Data and Logging System Assumptions

Since the time of the last timber inventory much has happened on the Forest in terms of fire and disease epidemics. These changes, although evident, have not yet been quantified. Those changes, along with estimate of net growth, will be provided by the upcoming timber inventory.

*Sale preparation as used here refers to a cost center including a wide array of costs in support of the timber program

01427

Another significant area of uncertainty involves the Forest's distribution of long-span and helicopter ground These lands have been grouped together for analysis in this planning process No specific mapping has been done on these areas to identify which can be accessed by long-span cable logging systems and those which will need to be logged with helicopters or other aerial appliances This question is significant because helicopter logging is generally more expensive than is long-span logging. The best estimates are that 75 percent of the lands so categorized outside the HCNRA could be harvested with long-span equipment, the balance being logged by helicopter. Inside the HCNRA, the percentages are reversed

Because of the significant cost differential between these two modes of operation, the use of these averages influences the outcome of the analysis. The exact distribution, however, will not be known unless and until these lands are actually layed out for timber sale--at which time the logging system will be identified.

Some observations can, however, be made. Most noteworthy is the fact that regardless of the exact distribution, helicopter logging is the most costly system identified on the Forest and thus would always be selected last and least for harvesting Because of its costliness it is scheduled later for harvesting when its cost disadvantage can be discounted

The sensitivity of the model to this question has been addressed indirectly in the sensitivity tests of cost differences and (even more indirectly) through the price increase sensitivity test. We can say that a price sensitivity test provides insight because the model does not differentiate between an increase in benefits and a decrease in costs Its objective is to maximize the excess of benefits over costs Those sensitivity tests, detailed in Table B-20, tend to indicate that the percentage distribution between long span and helicopter logging could be substantially off without causing disruptive shifts in model outcome. This is partly due to the fact that only Alternative G is run without a timber target All others have sacrificed significantly with regards to efficiency in order to meet timber targets and have, therefore, presumably moved more heavily into these aerial systems than would have otherwise been the case

Accounting Information

Forest historical data is not free from uncertainty. The Management Attainment Reporting Systems (MARS), for instance, is used to record Forest achievements Live Timber Offerings are included in MARS Code 17 1, Mortality Offerings in 17.2. Historically, the Forest has reported merchantable endemic tree mortality as Live Timber Offerings This is understandable because the material can be processed like live sawtimber. Strictly speaking, however, the material should be included in mortality offerings. This causes concern when comparing future FORPLAN empiric yields (which exclude all mortality volume, no matter how recent the mortality or how valuable the timber) with historical Live Timber Offerings which include merchantable endemic mortality volume.

The amount of mortality volume included is not known, nor can it be retrieved from Forest records which were not set up to track this data for future recall. Using Forest inventory statistics, it appears reasonable to assume that there would be an additional 2 6 percent sawtimber volume harvested in any alternative in any time period. This would be merchantable endemic mortality sawtimber Depending on market conditions, additional mortality volume might be offered in the form of mortality salvage sales. Figures shown in this document for the alternatives track these volumes as roundwood

01428

The terms "Offered", "Sold", and "Harvested" are themselves not as clear or as distinct as they might sound. "Offerings", as used in the Forest Service, refers to timber offered for sale. Now and again, individual timber sales are offered but not sold Such sales are still counted against the Forest's target for offering sales. Therefore, the Forest could put up unsalable sales and still meet its target.

An unsold sale may be reoffered substantially unchanged (if market conditions were to change, e.g.) In such a case, no credit is earned toward meeting the offering target. To claim credit in such a case would be doublecounting--an error. Alternatively the sale may be substantially restructured, be reoffered, and be counted again against the current offerings target

Another twist was added with the recent Timber Buy-Back legislation. That timber volume sold back to the federal government is tracked separately under a unique heading It will not be counted in achieving the Forest Plan ASQ (Allowable Sale Quantity) or targeted offering level.

Sales are the volumes actually sold and they are total figures irrespective of the categories outlined above for offerings As with offerings, sales are frequently distinguished as being either sales of sawtimber or sales of roundwood Material offered in one year may be actually sold in another year. (Sales on the Forest during the period 1977-1981 actually outpaced offerings by an annual average of 10 MMBF)

Harvests or Cuts refers to the volume actually removed, at the time it is removed from the Forest Material may be logged and decked but until it is removed, it is not included in the Cut figure. Cut figures may, therefore, exceed Sold figures or Offered figures.

Effects on the Local Economies

Estimates of jobs, personal income, and payments to local governments also have a high degree of uncertainty. All three rely on all the base data used to generate timber yields, recreation use, and the like and therefore share all the uncertainty implicit in those estimates Beyond those concerns, jobs and personal income estimates are necessarily approximate in that they rely on the IMPLAN Model which uses 1972 average technological coefficients, though later (1977) figures were available for income and employment effects related to sawtimber processing Payments to local governments are primarily a function of Forest stumpage values--values which can be modified through changes in the appraisal process, the period allowed a contractor for harvesting the timber, etc

Recreation

During the course of the analysis, it became apparent that every alternative would fail to meet total projected demand for semiprimitive motorized, primitive, and rural recreation opportunities (as identified in the Recreation Opportunity Spectrum--ROS).

Our assumption was that once the ROS capacity was exceeded that recreation would be lost to the Forest. Some argue that this would not occur--that that group of recreationists would remain on the Forest because the deficits don't begin occurring until some 20 years in the future, because recreationists' views of the world and their recreational opportunities will have changed, and because much alternative off-Forest semiprimitive recreation opportunities will no longer exist

Budgetary Considerations

Perhaps it also needs to be said that there is no guarantee that the Allowable Sale Quantity will all be offered, that livestock will be run at their permitted levels, or that projected recreation use will actually occur, for example. The Forest will be managed to provide such opportunities only insofar as is possible within the limits established by the budget provided by Congress.

Big Game Numbers

During the analysis considerable effort went into developing a Habitat Effectiveness Index which considered such things as forage, thermal cover, hiding cover, and the effects of roads on the habitat for big game. The results of that analysis showed very small percentage differences among the alternatives in terms of habitat effectiveness. Because of that small amount of difference and because the linkage between habitat effectiveness, animal numbers, and ultimately hunting is quite tenuous, no changes in hunting numbers have been portrayed.

Timeliness

Much time has passed during the development of the Forest Plan. Consequently, much of the data used in the analysis is quite old. The stumpage values used in all the modeling processes are the average stumpage values for the period of April, 1977 through September, 1983 The values shown below are those set forth in the Regional Office Direction Package of April, 1984.

Species	High Bid Stumpage Value Used in the Forest Planning Process Per MBF (1982 $)
Douglas-fir	$ 81
Lodgepole pine	40
Ponderosa pine	134
White fir	77
Western larch	90
Englemann spruce	58

These values and other benefits and costs have changed in the past and will continue to change in the future Market conditions affect all costs and prices and reflect changes in laws, regulations, and policies. Some costs have gone up since the model was developed, some have gone down. This was anticipated during the development of the model input data and care was taken to ensure that such data would not be unduly influenced by a single year's market conditions Cost and benefit data were meant to be representative of the conditions to which they were assigned.

As shown below, Forest stumpage values have ranged widely in the past and are expected to continue thusly in the future. The values shown below are not directly comparable with those shown above because those shown above also include the dollar value of the roadwork performed by the timber purchaser which is accepted as a payment-in-kind for purchasing the timber. The purpose in showing the figures below is to acquaint the reader with the volatility of the local timber market and help to explain why it has not been necessary to redo the Forest Plan model with later figures.

Fiscal Year	Statistical High Bid Per MBF (2400-17 Report 2) (1982 $)
1989	87 90
1988	73 60
1987	29 32
1986	34 36
1985	48.37
1984	69.60
1983	38 48
1982	34 50
1981	60 31
1980	84 76
1979	88.02
1978	138.72
1977	85.91

During the period 1977-1983 stumpage values averaged $76. During the most recent seven-year period available (1983-1989), the average was $54, a substantial drop However, given the increases displayed in 1988 and 1989, when stumpage values averaged $81, the decision was made to not update stumpage price projections.

Recent price increases may just reflect normal annual fluctuations However, given recent timber supply shortages in the Pacific Northwest, it appears likely that an upward trend will continue

It is possible that prices may again fall to the levels experienced in the mid-1980's The consequences of lower stumpage values are largely self-evident Timber benefits decline, payments to local governments and to the federal treasury decline. There is a greater incidence of sales whose costs exceed their benefits In layman's terms, the timber management program would be said to be "less profitable," possibly even to the extent that its costs would exceed its benefits. There would also likely be more need for Congress to appropriate funds related to timber management--allocated fund sources would be scarcer.

To address concerns arising about changes in costs and benefits and their affect on the model, sensitivity tests were conducted to show how the model would be affected if costs and prices were to change. Those tests are summarized in the Projections and Sensitivity Tests section above

FORMULATION OF ALTERNATIVES

Overview

A Forest Plan alternative is a mix of management prescriptions applied in specific amounts and locations on the Forest to achieve a desired management goal and objectives. According to NFMA (36 CFR 219.12(f) alternatives must

- Be within the maximum and minimum resource potential of the Forest to provide a full range of major commodity and environmental resource uses and values that could be produced from the Forest.
- Be formulated to facilitate analysis of opportunity costs, resource use, and environmental tradeoffs among alternatives
- Be formulated to facilitate evaluation of present net value, benefits, and costs of achieving various outputs and nonpriced benefits
- Address and respond differently to major public issues, management concerns, and resource opportunities.
- Represent the most cost-efficient combination of management prescriptions to meet the objectives of the alternative
- State the condition and uses that will result from long-term implementation.
- State what goods and services will be produced, including timing and flow of outputs, and the costs and benefits generated
- State the resource management standards and guidelines
- State the purposes of the proposed management direction

Formulation of alternatives, planning step five, followed the analysis of the management situation Benchmarks from this analysis defined the range within which alternatives were developed.

In addition, six alternatives were required by the Chief, USDA Forest Service or by the Regional Forester

- one which responds to the RPA Program targets;
- one which meets the State of Oregon Forestry Program for Oregon (FPFO) targets;
- one which reflects current and future level of goods and services if current management was continued (the no-action alternative);
- one that emphasizes high market opportunities;
- one that emphasizes high nonmarket opportunities, and
- one that emphasizes undeveloped lands in an undeveloped state.

The following is a listing of the planning actions involved in the process of analyzing and evaluating alternatives

Step 1 Major public issues, management concerns, and opportunities were identified through public and internal meetings and Forest Plan Reports The Issues, Concerns, and Opportunities were consolidated and treated as though they were one and the same What was an issue to some people was viewed as an opportunity by others and may have been a concern to the Forest.

Unroaded lands is an example They are an issue because of the question of how to manage them, yet there are opportunities to use them for undeveloped recreation or for the development of geothermal resources. They are a concern to the Forest Service because we need to establish some stable and long-term management direction for these areas.

Step 2. A comprehensive multi-resource data base was formed based on the identified issues and concerns and stored on overlays and in computer "flat files."

Step 3 Analysis areas which represent similar physical and biological attributes were identified and mapped. The capability, suitability, and management opportunities of specific areas of the Forest were considered in this step

Step 4. A set of management prescriptions was prepared to represent a variety of possible ways and intensities to manage the Forest.

Step 5. The 355 analysis areas identified in Appendix B III C were assigned management prescriptions Some analysis areas were assigned only one prescription while others were given the opportunity to select from a variety of prescriptions. Single prescription assignments limit the model's choices to either applying or not applying the prescription

Step 6 Resource outputs and the associated costs and dollar values that would result when a prescription was implemented were calculated and entered into the computer model FORPLAN.

Step 7. Demand was estimated for those resource outputs which were identified as issues.

Step 8 During the analysis of the management situation, supply potentials were determined using the FORPLAN computer model and other techniques Various assumptions, constraints, and objectives were used to establish benchmarks for supply potentials of each resource A benchmark was established for maximum present net value Existing resource supply and projected demand was compared

Opportunities to resolve issues and management concerns were explored by comparing existing and projected demand to potential production levels. These potentials, when compared to the current direction benchmark, indicate opportunities and/or the need for change. This step concluded the analysis of the management situation

Step 9. Alternatives were developed to provide a broad range of options for future management of the Forest in response to issues and concerns A goal or goals associated with each issue and its related management concerns were identified by the Interdisciplinary Planning Team. These goals were further refined into factors which

could be used for comparing alternatives. These goals and comparative factors are described below. For a detailed description of major issues and concerns, see Chapter 1 and Appendix A, this EIS.

Issue Timber Production

Goal - Maintain or increase timber production.

Comparative Factor - Projected annual timber production in the first decade.

Issue Transportation System Management

Goal - Minimize new road construction.

Comparative Factor - Miles of road existing after the fifth decade.

Issue. Management of Undeveloped Areas

Goal - Retain existing undeveloped area

Comparative Factor - Acres of undeveloped area remaining after two decades.

Issue: Local Economy

Goal - Maintain economic stability of local communities

Comparative Factor
-First decade jobs.
-First decade personal income
-First decade payments to local governments

Issue Recreation Diversity

Goal - Maintain or enhance the diversity of recreational opportunities.

Comparative Factor - Acres by Recreation Opportunity Spectrum (ROS) class.

Issue: Livestock Production

Goal - Maintain or increase forage available to domestic livestock.

Comparative Factor - Animal Unit Months (AUM's) of forage allocated to use by livestock

Issue: Old-Growth Timber

Goal - Maintain existing old growth

Comparative Factor - Acres meeting Regional old-growth definition.

Issue Minerals

Goal - Maximize opportunities for mineral exploration and extraction.

Comparative Factor - Acres of known mineral potential available for mineral entry

Issue: Wildlife Habitat - Deer and Elk

Goal - Provide optimum big game habitat across the Forest.

Comparative Factor - Habitat effectiveness compared to current.

Issue: Fish Habitat - Water Quality

Goal: Meet state water quality goals; maintain or enhance riparian habitat, improve anadromous fish habitat.

Comparative Factor - Meet state water quality goals Acres of riparian habitat improved, anadromous fish habitat improved (acres and structures).

Each alternative emphasizes one or more of the issue goals. The issue goals represent the means for addressing the planning question raised by the issue, and are met by combinations of management prescriptions selected in the formulation of each alternative.

Stage II Analysis Summary/Role of Economics Within Alternative Formulations

Economics played an important role in selecting the mix of timber management intensities which were available within each alternative. In advance of FORPLAN runs, an exhaustive review was made of alternative silvicultural practices considering the many possible combinations of reforestation method, precommercial thinning, commercial thinning, regeneration, and rotation length

In this review the number of prescription possibilities was reduced from over 100 to approximately 15 which were carried forward into the FORPLAN model. (These figures are exclusive of the great number of permutations which result from the various possible rotation lengths)

Cost efficiency was considered including and excluding existing inventories, for both single rotations and perpetual rotations, with and without real price increases, with and without thinning slash treatment; and for a wide range of rotation lengths The potential for producing timber volume was also considered.

Forest timber lands identified as being suitable for timber production pursuant to 36 CFR 219 14(a) were further analyzed prior to the development of alternatives "...to determine the costs and benefits for a range of management intensities for timber production" (36 CFR 219.14(b)

To that end, analyses were conducted of the different methods available to achieve reforestation including the following

Natural regeneration without site preparation--designing a timber sale so that there is a reasonable chance of securing natural regeneration following timber sale closeout without doing any reforestation work. No site preparation, no planting, no tree seeding. The sale would be designed to facilitate natural regeneration by leaving a seed source, shading, and so on.

Natural regeneration with a later interplant--this method was the same as natural regeneration described above except that a later planting effort was assumed to be done to fill in gaps where natural regeneration had not succeeded in achieving minimum stocking levels.

Augmented natural regeneration--called for doing site prep work only, with no planting.

Planting--this method involved site prep and planting genetically improved stock with followup treatments for animal protection.

Each of these alternatives was evaluated for its economic performance considering any regeneration lag, expected volumes, species composition, genetic effects, and the like. All these methods included provision for mitigation, environmental protection, brush disposal, and other logging-related activities appropriate for the individual site. All were determined to meet the requirement that sites would be regenerated within five years of final harvest

Each of these regeneration modes were adjusted to reflect the individual conditions that apply for the Forest's identified species groups:

Mixed Conifer--(CW-CE)
Douglas-fir--Ponderosa Pine (CD-CP)
True Fir--(CW-CE less its ponderosa pine and Douglas-fir)
Douglas-fir--Ponderosa Pine Shrubfield Competition (CD-B)
Lodgepole Pine--(CL or LP)

The Forest land was also categorized by the logging system that would be used to harvest timber from it

Tractor--traditional ground-based skidding systems such as tractors, wheeled vehicles, high flotation vehicles. Applies only to those lands with slopes of 35% or less

Shortspan--cable yarding of logged material with the yarding distance not to exceed 2,000 feet.

Longspan--cable yarding of logged material with the yarding distance of greater than 2,000 feet.

Helicopter--use of helicopter or other aerial platforms to yard logged material.

Analysis was also done to assess the relative costs and benefits of precommercial thinning, commercial thinning(s), and rotation lengths In general the analyses showed that the largest payback in discounted terms resulted from those silvicultural regimes which relied on walk-away natural regen, precommercial thinning, and a harvest at 95% of culmination of mean annual increment (CMAI)

01436

In practical terms, 95% CMAI means regeneration harvest in the decade before the stand achieves its largest annual increment of commercial growth In simple terms, that means short rotations--on the order of fifty to eighty years with the shortest rotations reserved for fast-growing lodgepole pine.

Commercial thinnings were lower in efficiency terms than silvicultural regimes without commercial thinning. Basically, if the stands were truly commercial, it made more sense to log them in their entirety. The extra growth caused by the commercial thinning, both in terms of volume and diameter, was not sufficient to overcome the adverse effects of discounting for an extra twenty years of growth.

Precommercial thinnings performed during the stand's second decade of existence were economically sound practices. They more than paid back the cost of the practice in terms of increased volume and diameter growth Costs were held down by thinning before the stems exceed two inches in diameter thus obviating the need for costly slash treatment.

The full range of management intensities carried forward into FORPLAN was allowed in all alternatives Within the issue-related constraints specified for the desired Forest conditions of each alternative, the full range of these management intensities and the possibility of a decision to not manage for timber production was included. Therefore FORPLAN solutions provide the most cost-efficient means of achieving the desired future conditions within each alternative

Translating these desired conditions into FORPLAN constraints allowed for the coordination of many Forest resources as an integrated mix. There are additional outputs and costs, however, which were not included in the FORPLAN model They were included in a spreadsheet analysis This analysis incorporated all benefits and costs into a single economic efficiency analysis, and provided the overall present net value statements for each alternative.

The FORPLAN model was used to estimate the outputs and costs for each alternative by reflecting the objective of the alternative through a given set of constraints FORPLAN prescriptions (including constraints) approximating the desired Forest conditions were developed considering the mix of issue goals emphasized by each alternative. The starting point was Benchmark 7, because it contained the basic constraint set needed to meet management requirements.

FORPLAN was used to select the combination of prescriptions and harvest schedule in each alternative which maximizes present net value, given the alternative goals and constraints. A detailed description of how FORPLAN computer runs were formulated is found in Section III of this appendix. All alternatives except Alternative NC were modeled in FORPLAN Constraints applied to each alternative are discussed in detail in this section.

Several alternatives were run under both maximize present net worth and maximize timber objective functions, and then iteratively run with various percentages of the maximum timber level for that alternative set as a minimum timber output constraint. Table B-24 displays the relationship between present net worth and timber outputs, and timber investments

Increased timber outputs require increased investments in planting and precommercial thinning, and increased harvest of economically marginal lands These relationships are curvilinear rather than linear (Figure B-2) with the last increment of timber output costing a disproportionately large reduction in present net worth Conversely, the last increment in present net worth causes a disproportionately large reduction in timber outputs

FIGURE B-2
PRESENT NET VALUE VS TIMBER HARVEST LEVEL

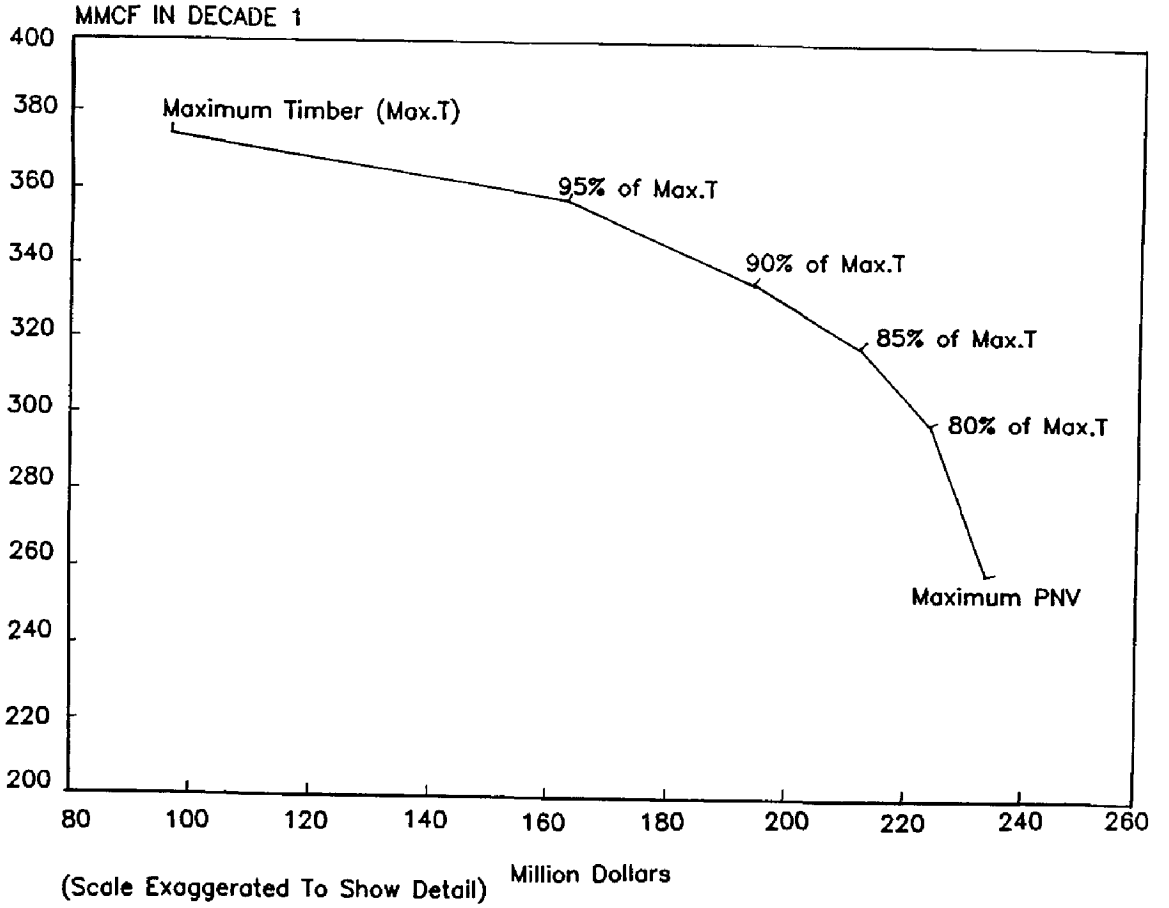


Table B-24
PRESENT NET VALUE, TIMBER OUTPUTS AND TIMBER ACTIVITIES *

Objective	PNV MM$/ 150	MMCF /YR	Decade 1 MMBF /YR	TM Acres	First Decade Logging Systems (M AC) TRCTR	SKYLN	HL/LS	Fourth Decade Logging Systems (M AC) TRCTR	SKYLN	HL/LS	First DEC Cut Treat (M AC/YR) Plant	PRECOM	TMBR BDGT MM$/YR
MAX PNV 0 70 MAX T	232	25 9	128	810	14 8	2 2	0 1	8 1	8 7	1 6	4 6	4 9	8 5
MAX PNV 0 80 MAX T	222	30 0	149	851	15 7	3 6	0 1	7 5	11 7	3 1	5 3	6 5	10 2
MAX PNV 0 85 MAX T	212	31 9	158	875	17 7	4 0	0 1	6 0	13 5	3 3	5 7	7 8	11 3
MAX PNV 0 90 MAX T	192	33 8	167	898	17 9	4 8	0 3	8 3	14.6	3 3	6 4	9 4	12.4
MAX PNV 0 95 MAX T	159	35 7	174	911	18 8	5 5	0 7	7 2	14.8	3 9	8 5	12 2	14 0
MAX PNV 0 99 MAX T	96	37 2	180	932	17 3	6 6	2 0	13 0	10.1	3 8	13 1	12 3	16 5

* Economic data from FORPLAN, exclusive of nontimber considerations

This relationship makes selecting an alternative more difficult as there is considerable overlap between potential timber outputs from substantially different land allocations. These tradeoffs are further illustrated within the alternatives we have selected for detailed analysis

Common Constraints

Since issuance of the DEIS and Supplement, additional direction was provided by The Omnibus Oregon Wild and Scenic Rivers Act of 1988 and Regional direction to provide for small diameter snags. Also several data errors were noted and appropriate correction was made to the data sets. The new direction and data errors were incorporated in all FEIS alternatives See Appendix B VI A and B for discussion of above.

Some constraints and prescriptions were common to all the alternatives These were necessary to meet planning requirements, to meet existing law or policy, or to meet the objectives of prescriptions.

The constraints listed under the benchmark discussion in Section VI above are common to all alternatives except as superseded by more specific constraints Several additional constraints are also common to all alternatives. Figures shown were generated during the DEIS benchmark analysis and are, therefore, not directly comparable with information presented elsewhere for the alternatives They are described below.

1	Constraint.	No scheduled timber harvest was allowed for the Anthony Lakes Ski and summer home area or in other developed recreation sites (Management Area 16).
	Purpose·	To assure continuation of the current level of developed recreation opportunity, particularly that high-valued opportunity associated with the Anthony Lakes Ski Area and summer home area.
	Rationale:	Many dollars have been invested in the development of the Anthony Lakes Ski Area and summer home area. This area provides substantial benefit to the local economy in terms of recreation visitor days, as well as the annual use fees to the Forest Service.
	Tradeoff.	This constraint may actually increase the present net value over what would be experienced if clear-cutting were allowed on a scheduled basis within these recreation areas The PNV associated with visitor days at Anthony Lakes Ski Area is approximately 4 0 million dollars vs approximately 0 6 million dollars in timber production foregone The actual cost in terms of lost recreation visitor days associated with timber harvest on a scheduled basis in these areas would be difficult to estimate. As example, portions of the ski area could be clearcut resulting in an additional run; but cutting large portions of the area might degrade the recreation experience.
2	Constraint:	Selection harvest was specified for the Phillips Lake Recreation Area (Management Area 5)
	Purpose.	To comply with the agreement between the Forest Service and the Bureau of Reclamation to manage this area emphasizing recreation around Phillips Lake.

	Rationale:	The model would otherwise schedule large blocks of this area to be clearcut or shelterwood cut within the next several decades. Selection harvest was chosen as the most effective way to represent protection of the highly sensitive visual foreground and recreation opportunity in this area. Dominance of pure ponderosa pine stands lend themselves to selection and group selection management
	Tradeoff:	The first decade allowable sale quantity and present net value of all alternatives are reduced approximately 0 3 million cubic feet and 0.4 million dollars as a result of selection harvest.
3	Constraint	A selection-harvest-only constraint was used for modelling timber *management within the Dispersed Recreation/Timber Management* Area of the Hells Canyon National Recreation Area
	Purpose:	To appropriately model the selective harvest requirement from the Comprehensive Management Plan.
	Rationale	This approach was used for two reasons First, it provided an estimate of the timber harvest reduction (on a per acre basis) likely to result from the harvest adjustments necessary to meet the special management objectives in these areas. Second, it could be accomplished without greatly increasing the size of the FORPLAN model. The alternative of modeling timber harvest in these areas using even-age methods was considered, but would have required nearly 800 more prescriptions in the FORPLAN model Although modeled using selection harvest only, other silvicultural tools may be used in specific situations It is not intended that *management of these areas will always be limited to selection* harvest techniques
	Tradeoff.	The first-decade allowable sale quantity and present net value of all alternatives are reduced approximately 0 3 million cubic feet and 10 million dollars as a result of selection harvest

Development of Alternatives Considered in Detail

General

Figures shown were generated during the DEIS benchmark analysis and are, therefore, not directly comparable with information presented elsewhere for the alternatives

Alternative A (FEIS RUN ID 616540 or 616548)

This alternative represents continued implementation of management direction provided by the six existing land management (unit) plans, including the management plan for the Hells Canyon National Recreation Area The intent of this alternative is to provide an *estimate of the activities likely to occur if management were to continue* under direction found in the unit plans. It also serves as a standard of comparison for evaluating the other alternatives

To make this alternative consistent with and comparable to the other alternatives, current resource yield tables are used along with the most recent inventory information

This includes current timber inventory information and improved data on the suitability of land for timber production. Only National Forest Management Act requirements that are part of current direction as established in unit plans are incorporated in this alternative.

The intensive wood/forage management area (Management Area 1) is represented in FORPLAN with only minimum harvest dispersion constraints. The optimum wood-big game strategy is represented as Management Area 3.

The low investment timber management and the quality hunt/critical cover management of the current unit plans is also represented by Management Area 3 but is constrained by prescription to natural regeneration and harvest only. This constraint applies to approximately 289,000 acres (178,000 timbered acres) and is set as a proportion of each analysis area in Management Area 3 that must go to the natural regeneration and harvest-only management intensity. This constraint represents direction in the existing unit plans to not plant or precommercial thin acres of timber within these allocations.

Alternative B (FEIS RUN ID 616507 or 616549)

This alternative was formulated with the primary emphasis on issue goals for timber, livestock, and the local economy. This alternative is the RPA alternative and attempts to provide outputs and activities as assigned to each Forest through National and Regional planning.

Implementation of this alternative would result in 1.22 million acres of the Forest being intensively managed for timber and forage and having a highly developed road system. Compared with Alternative A, this alternative represents a marked increase in emphasis on commodity outputs

Major differences from Alternative A include significantly reduced emphasis on providing big-game cover, both on summer ranges and winter ranges, a reduced level of old-growth timber (though it would be better distributed across the Forest), fewer opportunities for primitive and semi-primitive recreation; reduced water quality; and more intensive timber management within the three domestic supply watersheds

This alternative is a small increment toward a commodity/amenity blend from the max present net value and max timber benchmarks Only two constraints are added to the benchmark and other resource constraints common to all alternatives. A third added constraint was to achieve a higher timber output. They are.

1	Constraint:	23,000 acres of highly sensitive visual foregrounds are constrained to selection harvest only
	Purpose.	Provide for maintenance of high scenic quality along highly sensitive travel routes.
	Rationale.	The maintenance of visual quality requires distribution of age classes which would be approximated by a rate of regeneration of harvest constraint not to exceed 4 percent per decade. The incorporation of selection harvest yield tables approximates a similar management on a group selection basis

	Tradeoff·	The decadal allowable sale quantity and fifteen decade present net value are reduced approximately 3.9 million cubic feet and 5.1 million dollars respectively.
2.	Constraint·	Management Area 2 was applied across all big-game winter ranges outside the Hells Canyon National Recreation Area and Wilderness.
	Purpose:	To maintain more effective deer and elk cover on big-game winter range.
	Rationale·	The model otherwise would be able to schedule large blocks for regeneration harvest on big game winter range within the first several decades While acceptable at the minimum viable population level, this would reduce habitat quality to the degree that current huntable populations could not be maintained.
	Tradeoff.	The decadal allowable sale quantity and fifteen decade present net value are reduced approximately 7 0 million cubic feet and 12 0 million dollars respectively
3.	Constraint:	Timber harvest was constrained to achieve 310 1 million cubic feet in the first decade subject to nondeclining flow afterwards
	Purpose:	To provide a higher level of wood to local industry
	Rationale.	The last increment of present net value gained results in a disproportionately high reduction in timber outputs The maximum timber level would provide a disproportionately large reduction in present net value Therefore, an intermediate level providing approximately 85 percent of the maximum possible timber output was set as an objective
	Tradeoff:	The decadal allowable sale quantity is increased by 62 7 million cubic feet over what is achieved on a max present net value basis without such constraint at a cost of 20 0 million dollars in reduced present net value

Alternative B-Departure (FEIS 616526 or 616550)

With the addition of small diameter snags, Wild and Scenic Rivers, and data error corrections to the Alternative B-departure data set, it was impossible to obtain the FPFO five decadal timber targets. A feasible run was obtained when the FPFO decadal timber targets were reduced by one percent.

This alternative was formulated with the primary emphasis on goals for timber, forage, and the local economy. Timber outputs are provided at the level prescribed in the Oregon Department of Forestry program for Oregon (FPFO) except as noted above. This program calls for high levels of timber outputs for five decades

In order to achieve the FPFO timber output levels, it is necessary to depart from nondeclining flow (i.e., harvest timber at a high level for the first five decades, and at

substantially lower levels in subsequent decades). It is also necessary to harvest many timber stands significantly earlier than culmination of mean annual increment (CMAI) Since the National Forest Management Act requires that CMAI be generally reached before harvest occurs, this alternative cannot be implemented without a change in law This alternative's allocation is otherwise similar to Alternative B and it shares the same FORPLAN formulation except.

1. Constraint: Nondeclining flow and culmination of mean annual increment constraints are released in this alternative Also, FPFO five decadal timber targets reduced by one percent.

   Purpose. To meet Oregon FPFO objectives within the allocation of Alternative B

   Rationale: It is not feasible to achieve Oregon FPFO levels without releasing both culmination of mean annual increment and nondeclining flow constraints and decreasing decadal timber targets by one percent

   Tradeoff First decade allowable sale quantity is increased 108 5 million cubic feet, but very large reductions in timber output occur in the sixth decade with timber falling from 405.9 million cubic feet of green saw timber to 272 million cubic feet of green saw timber.

   Present net value of timber is reduced 162.7 million dollars because of the scheduling of timber from lands requiring sophisticated logging systems and the very large investments in planting and precommercial thinning that are required.

Alternative C (FEIS 616505 or 616546)

Specific modeling changes made to Alternative C as a result of public and management concerns follow.

The area of big game habitat emphasis (Management Area 3) has been reduced by 62,000 acres to help increase the level of timber harvesting Adjustment of analysis area acres was made within FORPLAN from Management Area 3 (MA 3) to Management Area 1 (MA 1).

The miles of road corridor managed for higher visual quality objectives (foreground retention and partial retention) has been reduced by 18 percent to help increase allowable timber harvests. FORPLAN analysis areas assigned to visuals were reduced by 18 percent In addition, the visual middleground constraint was changed from 12.7 percent to 13 0 percent

Annual ponderosa pine timber harvest levels in the first decade of plan implementation have been increased from 29 MMBF in the DEIS to 34 MMBF in the FEIS in response to public input.

Other adjustments included the land reallocation within the Lake Fork, Downie Lake, and East Eagle-Boulder Park areas

The net result of all changes between DEIS and FEIS is shown below:

	MMCF	PNV MM$	MMBF
DEIS	28 3	168 936	142.8
FEIS	27 7	161 280	143.5
	----	-------	-----
	-0.6	- 7.656	+ 0.7

This alternative was formulated to deal with goals for timber and range by maintaining moderately high outputs of timber and forage for livestock, but with greater emphasis on deer and elk habitat than Alternatives B or B-Departure. Emphasis is also placed on transportation management and recreation diversity issue goals.

It provides near-optimum hiding cover, thermal cover, and forage conditions on big-game winter ranges and on selected summer ranges. Nonwilderness portions of the North Fork John Day watershed are managed emphasizing anadromous fish habitat protection Alpine and subalpine areas in the Elkhorn Mountains around the perimeter of the Wallowa Mountains remain in the wilderness condition to provide additional semiprimitive recreation opportunities Old-growth objectives exceed MR levels in order to provide better distribution and to incorporate some existing goshawk habitat

1. Constraint· The North Fork John Day drainage on the Wallowa-Whitman National Forest, selected portions of summer ranges, and most big-game winter ranges outside Hells Canyon National Recreation Area or wilderness are represented by a maximum area of 12 7 percent in age class 0.

   Purpose: To allow for maintenance of near-optimum cover conditions on big-game winter range and selected summer ranges To preserve stream flow characteristics of the North Fork John Day River, an important anadromous fishery

   Rationale· Without such harvest dispersion constraints, the FORPLAN model would otherwise schedule large blocks to be harvested within three decades rendering the areas severely deficient in thermal cover and altering the snow accumulation and snow melt regimes within those blocks of land.

   Tradeoffs: The 15-decade present net value and first decade timber outputs are reduced by 22 5 million dollars and 19.7 million cubic feet respectively.

2 Constraint. Selection harvest only is applied to 46,700 acres of sensitive visual foreground areas

   Purpose To maintain the inventoried visual quality objective for these areas.

   Rationale: Provides for maintenance of high visual quality in an area that would otherwise be converted to a tree farm appearance

	Tradeoffs.	This level of visual management in foreground areas reduces present net value by approximately 10 4 million dollars and first decade timber outputs by 7.9 million cubic feet.
3.	Constraint·	125,058 acres are constrained to minimum level management
	Purpose:	To maintain primitive and semiprimitive recreation opportunities associated with alpine areas in the Wallowa and Elkhorn Mountains.
	Rationale:	Scheduled timber harvest would substantially change the character of this area from primitive to one of roaded natural or roaded natural modified.
	Tradeoff:	First-decade timber outputs and present net value are reduced approximately 16 2 million cubic feet and 11.2 million dollars respectively Approximately 125,100 acres are allocated in this alternative. However, 80,873 acres are not available for timber management because they are not forest or are technically unsuitable forest.
4.	Constraint	37,299 acres are constrained to minimum level under old-growth management emphasis.
	Purpose	To achieve a better distribution of old growth, promoting diversity and enhancing the viability of many wildlife populations.
	Rationale:	The option for managing many of these areas for old-growth would be lost in the first decade as a result of harvest scheduling in FORPLAN if not for this constraint
	Tradeoff:	An additional 9,115 acres of old growth was added to the old growth management area beyond MR requirements. First-decade timber harvest is reduced 3 3 million cubic feet and 15-decade PNV is reduced 2 3 million dollars from the Benchmark 7 (max PNV) level
5.	Constraint	The timber harvest was constrained to provide 282.5 million cubic feet in the first decade subject to nondeclining flow in subsequent decades. In addition, the CD working group was constrained to provide 70 million cubic feet in the first decade and 50 million cubic feet in the second decade.
	Purpose·	Provide some increase in timber output beyond that achievable without this objective Provide higher levels of timber sale offerings in ponderosa pine in the first decade
	Rationale.	This level of timber harvest is a compromise between what might be a pure maximize PNW objective and that level of timber output which might be derived from a maximize timber objective

	Tradeoff·	Providing an additional 65.5 million cubic feet of timber in this alternative reduces present net value 33 5 million dollars from what could otherwise be achieved by seeking the most cost-efficient management of timber in this alternative.

Alternative C-departure (FEIS 616513 or 616555)

This alternative was formulated similar to Alternative C of the DEIS, but with additional emphasis on attempting to maintain approximately the current levels of timber offerings among species other than lodgepole pine This addresses an industry concern over species mix which is one of the major facets of the timber production issue All constraints are similar to Alternative C of the DEIS with the exception of the timber output objective. Other constraints are as noted previously.

1	Constraint	Nondeclining flow is released between the first and second decade in this alternative and a timber output level of 354 6 MMCF is established for the first decade, allowing a drop in the second decade to 258 9 MMCF with nondeclining flow maintained thereafter.
	Purpose:	To provide near-current levels of timber sale offerings in species other than lodgepole pine
	Rationale:	It is necessary to provide a specific constraint on total timber offerings in order to maintain near-current levels of offerings in species other than lodgepole pine
	Tradeoff	Providing an additional 140.3 million cubic feet of timber in this alternative reduces present net value 35.4 million dollars from what could otherwise be achieved by seeking the most cost-efficient management of timber.

Alternative D (FEIS 616518 or 616552)

Alternative D attempts to meet and address the goals of timber and forage production, but is somewhat less commodity-oriented than Alternative B. Big-game winter ranges are managed under Area 3, where summer ranges are managed under Area 1. Primitive and semiprimitive recreation opportunities are provided in the high elevation areas in the Wallowa and Elkhorn Mountains similar to those found in Alternative C. Visual quality objectives will be implemented in accordance with the visual resource management inventory Old growth is provided at the MR level with some additional areas to improve old-growth distribution and incorporate currently occupied goshawk habitat.

1.	Constraint	Area 3 on big-game winter range is represented by a maximum area in age class 0 of 12.7 percent per decade applied through all decades
	Purpose.	To provide for near-optimum conditions on important big-game winter ranges
	Rationale.	Maintenance of high quality hunting and wildlife viewing opportunities is dependent on maintenance of high quality elk habitat, particularly on limited big-game winter range.

	Tradeoff:	The first decade outputs and present net value are reduced approximately 13 0 million cubic feet and 14 9 million dollars respectively.
2	Constraint:	The maintenance of visual quality at inventoried levels requires that approximately 57,286 acres of visual foreground be open to selection harvest-only
	Purpose:	To maintain current high quality recreation experience along visual foreground areas on the Wallowa-Whitman National Forest
	Rationale:	FORPLAN would otherwise convert large acreages of these visual foreground areas to a tree farm appearance.
	Tradeoff:	First decade outputs and present net value have been reduced approximately 9 6 million cubic feet and 12 8 million dollars, respectively
3.	Constraint:	36,296 acres of old-growth outside the Hells Canyon National Recreation Area and Wilderness areas are constrained to minimum level management in this alternative.
	Purpose.	To improve the old-growth distribution for a variety of wildlife species above and beyond the level to maintain minimum viable populations
	Rationale:	The option for managing many of these areas for old-growth would be lost in the first decade as a result of harvest scheduling in FORPLAN if not for this constraint.
	Tradeoff:	First decade outputs are reduced approximately 3.0 million cubic feet and the present net value is reduced approximately 2.1 million dollars.
4.	Constraint:	The timber harvest was constrained to provide 294.6 million cubic feet in the first decade subject to nondeclining flow in subsequent decades.
	Purpose:	Provide some increase in timber output beyond that achievable without this objective
	Rationale:	This level of timber harvest is a compromise between what might be a pure maximize PNW objective and that level of timber output which might be provided under a maximize timber objective function
	Tradeoff:	Providing an additional 69.4 million cubic feet in decadal allowable sale quantity in this alternative reduces present net value 33 2 million dollars from what could otherwise be achieved by seeking the most cost-efficient management of timber in this alternative.

Alternative E (FEIS 616543 or 616547)

Upper Grande Ronde and Beaver Creek Roadless Areas were added to the inventory since the DEIS was issued.

Alternative E attempts to address the issue of maintaining semiprimitive or primitive recreation experience in roadless areas at a minimum cost in terms of commodity production. The Wallowa-Whitman National Forest has been criticized in the past for not fully considering the possibility of maintaining the maximum amount of roadless area in a roadless condition while attempting to maintain timber production at high output levels through intensive management on lands already available for timber harvest

This alternative is developed specifically to address that criticism. Its land allocation resource objectives and FORPLAN model formulation are similar in all respects to Alternative B except for the acreage maintained in a roadless condition.

1.	Constraint:	245,688 acres are allocated to a minimum level management intensity within the backcountry management emphasis in the FORPLAN model.
	Purpose:	To maintain all areas that will be roadless when this plan is implemented in a roadless condition
	Rationale	To display the tradeoffs associated with managing for increased acreage in a roadless condition
	Tradeoff:	First decade timber harvest and present net value for 15 decades was reduced approximately 33 6 million cubic feet and 31.8 million dollars, respectively
2.	Constraint.	The timber harvest was constrained to provide 276 5 million cubic feet in the first decade subject to nondeclining flow in subsequent decades.
	Purpose	Provide some increase in timber output beyond that achievable without this objective
	Rationale:	This level of timber harvest is a compromise between what might be a pure maximize PNW objective and that level of timber output which might be provided under a maximize timber objective function
	Tradeoff	Providing an additional 63 2 million cubic feet in decadal allowable sale quantity in this alternative reduces present net value 28.9 million dollars from what could otherwise be achieved by seeking the most cost efficient management of timber in this alternative.

Alternative F (FEIS 616545

This alternative emphasized old-growth, big-game habitat, habitat for snag-dependant species, and roadless recreation, though at a somewhat lesser level than Alternative E Big-game winter range and summer range are managed under Area 3 which is big-game habitat emphasis A 40 percent snag habitat objective level is also specified for

these acres in this alternative. Approximately 75 percent of the existing roadless areas are retained in a roadless condition. This alternative is the maximum big-game alternative as well.

1. Constraint: All big-game habitat outside wilderness, the Hells Canyon National Recreation Area, or the Starkey Experimental Forest is managed to emphasize the maintenance of near-optimum habitat conditions for elk. This is represented in FORPLAN by a constraint of 12.7 percent per decade applied to age class 0, across all decades.

   Purpose: To enhance wildlife habitat on the Wallowa-Whitman National Forest across all available acres and thereby enhance recreational opportunities for viewing and/or hunting elk.

   Rationale: Without this constraint, FORPLAN would schedule large blocks of land for regeneration harvest within three decades leaving many areas severely deficient in terms of thermal cover and somewhat deficient in the total cover available.

   Tradeoff: This constraint reduces first decade output of timber approximately 55.1 million cubic feet and present net value over 15 decades by approximately 62.9 million dollars.

2. Constraint: Old-growth is maintained as near current levels as possible considering those acres that are currently under contract or anticipated to be under contract prior to the implementation of this plan. 40,312 acres outside of the Hells Canyon NRA, Wilderness, backcountry, and Starkey Experimental Forest are managed for old growth.

   Purpose: Maximize community type/successional stage diversity and associated wildlife populations.

   Rationale: Options for managing many of these areas for old-growth will be lost within the first decade without this constraint.

   Tradeoff: First decade outputs are reduced approximately 4.4 million cubic feet and present net value over 15 decades by approximately 3.1 million dollars from the Max Present Net Value Benchmark (Run No. 7).

3. Constraint: 146,571 acres are constrained to minimum level management intensity under a backcountry emphasis in this alternative. Of this, 64,938 acres are suitable for timber management.

   Purpose: This maintains approximately 75 percent of the currently unroaded areas in an undeveloped state.

   Rationale: The option for maintaining these areas in a roadless condition would be lost within the first one to two decades without this constraint. This level of roadless area allocation provides

for a full consideration of the range of recreation opportunities.

Tradeoff: First decade timber output is reduced approximately 23 8 million cubic feet and present net value over 15 periods is reduced by approximately 16.5 million dollars.

4. Constraint: The timber harvest was constrained to provide 214.5 million cubic feet in the first decade subject to nondeclining flow in subsequent decades

Purpose. Provide some increase in timber output beyond that achievable without this objective.

Rationale: This level of timber harvest is a compromise between a pure maximize PNW objective and that level of timber output produced by a maximize timber objective function

Tradeoff. Providing an additional 104.3 million cubic feet in first decadal allowable sale quantity in this alternative reduces present net value 22.1 million dollars from what could otherwise be achieved by seeking the most cost efficient management of timber in this alternative.

Alternative G (FEIS 616524 or 616553)

Alternative G is similar to Alternative B, except that timber harvest is limited to those lands and those prescriptions that produce a positive return. This alternative, when compared to Alternative B, displays the tradeoffs associated with maintaining Alternative B's high levels of timber production on the Wallowa-Whitman National Forest

Constraints applied are similar in all respects to those that were applied in Alternative B The apparent tradeoffs of these constraints in timber outputs is somewhat less than experienced within Alternative B, because many available timber lands are not managed First decade allowable harvest is reduced approximately 63.8 million cubic feet, but present net value over 15 decades is increased 15 8 million dollars compared to Alternative B, because Alternative G was given no timber harvest floor.

1 Constraint: 23,000 acres of highly sensitive visual foregrounds are constrained to selection harvest only.

Purpose Provide for maintenance of high scenic quality along highly sensitive travel routes.

Rationale The maintenance of visual quality requires distribution of age classes which would be approximated by a rate of regeneration of harvest not to exceed 4 percent per decade The incorporation of selection harvest yield tables approximates a similar management on a group selection basis

Tradeoff The decadal allowable sale quantity and fifteen decade present net value are reduced approximately 3.9 million cubic feet and 5.1 million dollars respectively

2.	Constraint	Management Area 2 was applied across all big game winter ranges outside the Hells Canyon National Recreation Area and Wilderness
	Purpose	To maintain more effective deer and elk cover on big game winter range
	Rationale.	The model otherwise is able to schedule large blocks for regeneration harvest on big game winter range within the first several decades. While acceptable at the minimum viable population level, this would reduce habitat quality to the degree that current huntable populations could not be maintained.
	Tradeoff:	The decadal allowable sale quantity and fifteen decade present net value are reduced approximately 11.4 million cubic feet and 6.7 million dollars respectively.
3	Constraint:	Timber harvest was restricted to those land/prescription groupings producing a positive return
	Purpose·	Provide an estimate of the timber production level consistent with positive returns at the project level
	Rationale:	Without this constraint, FORPLAN would blend in inefficient land/prescription groupings which would, due to harvest scheduling constraints, increase the alternative's overall present net value.
	Tradeoff.	Present net value is reduced 4 0 million dollars from what could otherwise have been achieved by seeking the most cost-efficient management of timber for the entire alternative rather than for each of the components

Alternative H (FEIS 616512 or 616554)

Alternative H is identical to Alternative C of the DEIS in its FORPLAN resource management objectives except that timber is provided at approximately 80 percent of the maximum first decade potential within those resource objectives This allows for a more cost-efficient management of timber within the other resource management objectives.

Constraints applied within this FORPLAN run were identical to those found in Alternative C of the DEIS with the following exception

1.	Constraint:	The timber harvest was constrained to provide 247.8 million cubic feet in the first decade subject to nondeclining flow in subsequent decades.
	Purpose:	Provide some increase in timber output beyond that achievable without this objective.
	Rationale:	This level of timber harvest is a compromise between what might be a pure maximum PNW objective and that level of timber output found in Alternative C of the DEIS

Tradeoff: Providing an additional 33 5 million cubic feet in decadal allowable sale quantity in this alternative reduces present net value 7.4 million dollars from what could otherwise be achieved by seeking the most cost efficient management of timber in this alternative.

Alternative NC

This alternative is developed to display the current timber management plan Since the plan was completed in 1962, it has been amended nine times. These amendments reflect wilderness additions, recognition of the Starkey Experimental Forest and Range, dispersed recreation areas from the Unit Plans, and the land allocations from the Hells Canyon Comprehensive Management Plan

It does not make allowance for land allocations where harvest is reduced for such things as big-game habitat, old growth, or water quality protection Adjustments for these factors were to take place through the Forest Plan which was to have been published in the first part of this decade Consequently, harvest levels and existing land allocations are not fully integrated

This alternative was not modeled in FORPLAN, hence no constraint analysis is portrayed.

Summary

Alternative A represents continuation of current management direction of approved land use plans. This is the "No Action" alternative required by NEPA Alternatives B, E, and G emphasize timber production on lands available for timber harvest.

Alternative B would consider all lands outside of wilderness, Hells Canyon NRA, and Starkey Experimental Forest available for timber harvest. Alternative E would exclude from that consideration those lands and areas that are currently unroaded, and Alternative G would exclude from available lands prescriptions that are not economically efficient.

Alternatives D, C, H, and F place increasing emphasis on satisfying amenity values These are addressed in various combinations with Alternative H representing a more cost efficient way of producing timber on lands that have management objectives similar to Alternative C. B-Departure and C-departure attempt to meet local timber needs with B-departure emphasizing FPFO objectives and C-departure emphasizing maintenance of green sawtimber volumes other than lodgepole pine.

Alternative NC portrays the old timber management plan

Table B-25
OPPORTUNITY COST COEFFICIENTS FOR BENCHMARK AND ALTERNATIVE CONSTRAINTS 1/

Constraint	Constraint Formulation	CF/AC/Decade	PNV/Acre	Runs Compared
MS-1 (MR HRVST Dispersion)	Max Area Age 0 @ 33% per Decade per AA	19 5	68 64	Run #7 with MR'S and Run #7 w/o harv dispersion (#182-183) 326 9-308 1 MMCF 411 2-344 9 MM$/965,890 acres
MS-2 (Modified Timber Emph) 2/	Max Area Age 0 @ 16.7% per Decade per AA	40.4	68 86	Run #7 and Run #7 with MS-2 on big game winter rng (#180-145) 271 4-264 3 MMCF 249 7-237 6 MM$/174,950 acres
MS-3 (Big Game Emphasis) 2/	Max area age 0 @ 13 3% per Decade per AA	79 7	91.00	Alt C basis without timber target (#204-205) 245 6-224 6 MMCF 224 5-200 5 MM$ /263,180 acres
MS-5 (Phillips Lake) 2/	Selection Harvest	168 4	223 22	Same constraint formulation as visual
MS-6 (Undeveloped Disp Rec) 2/	Minimum Level	366 9	252 97	Alt B and Alt E basis without timber target (#170-142) 259 4-228 9 MMCF 231 6-210 4 MM$/83,517 acres
MS-7 (Wild and Scenic River)	Not Modeled			
MS-8 (Snake River Corridor)	Minimum Level	0	0	No suitable timber lands
MS-9 (NRA Disp Rec/Natve Veg) 3/	Minimum Level	265 1	627 74	Run #7 W/O HCNRA CMP and Run #7 with CMP (#181-180) 295 3-271 4 MMCF 306 3-249 7 MM$/90,165 acres
MS-10 (NRA Forage Production) 3/	Minimum Level	265 1	627 74	Same constraint formulation as MS-9
MS-11 (NRA Disp Rec/Timber) 2/	Selection Harvest	95 6	288 37	Run #7 W/O HCNRA CMP and Run #7 W/MR'S all lands (#182-181) 308 1-295 3 MMCF 344 9-306 3 MM$/133,854 acres
MS-12 (Indian Cr Research Natural Area) 2/	Minimum Level	366 9	252 97	Same constraint formulation as MS-6
MS-14 (Starkey Ex For) 2/	Minimum Level	366 9	252 97	Same constraint formulation as MS-6
MS-15 (Old-Growth) 2/	Minimum Level	366 9	252 97	Same constraint formulation as MS-6
MS-16 (Adm Sites, Rec Sites) 2/	Minimum Level	366 9	252 97	Same constraint formulation as MS-6
MS-18 (Anadromous Fish Habitat) 2/	Max Area Age 0 @ 13.3% Per Decade Per AA	79 7	91 00	Same constraint formulation as MS-3
Riparian 2/	Selection Harvest	168 4	223 22	Same constraint formulation as visual foreground
Visual Foreground 2/	Selection Harvest	168 4	223 22	Run #7 W/MS-2 on BGWR and Alt B w/o timber target (#145-170) 264 3-259.4- 8 MMCF 237 6-231 6- 5 MM$/24,787 acres
Visual Middle Ground 2/	Within MS-1 Max Area Constraint Tightened to 30 4% Per Decade, MS-3 to 12 7% PER DEC	48 0	66 37	Alt C w/o timber target and same w/o VIS MG (#204-181) 224 6-221 2 MMCF 200 5-195 8 MM$/70,825 acres

1/ Economic data from FORPLAN exclusive of nontimber considerations
2/ Cost in excess of MR level for harvest dispersion
3/ Cost in excess of MR level for Hells Canyon National Recreation Area

Table B-25 (cont.)
OPPORTUNITY COST COEFFICIENTS FOR BENCHMARK AND ALTERNATIVE CONSTRAINTS 1/

Constraint	Constraint Formulation	MMCF/Decade	PNV/MM$	Runs Compared
Changes between DEIS/Supp and FEIS				
Small diameter snags	FORPLAN Timber Yield Table Reduction	-96	-93	FORPLAN Run ID #'s (386-555) 273 01-263 44 MMCF, 251 147-241 886 MM$
Wild and Scenic Rivers	Analysis area acreage adjustments from various management strategies to minimum level or selection harvest (used visuals in FORPLAN analysis for selection harvest)	-15	-16	FORPLAN Run ID. #'s (556-557), 264 15-262 65 MMCF, 242 376-240 820 MM$
Thermal Cover MR	Delete inventory constraint numbers 131-135 from FORPLAN data sets	+16	+15	FORPLAN Run ID #'s (180-386), 273 01-271.42 MMCF, 251 147-249.681 MM$

1/ Economic data from FORPLAN exclusive of nontimber considerations

ESTIMATING EFFECTS OF BENCHMARKS, DISCRETIONARY CONSTRAINTS, AND ALTERNATIVES

Introduction

Many FORPLAN runs were made for the purpose of identifying, estimating, and displaying the effects of each benchmark, discretionary constraint, and alternative. The purpose was to provide the decisionmaker with more specific information as to the particular tradeoffs between the resource objectives of a given alternative

It provides the technical reviewer with specific estimates of opportunity costs associated with various resource constraints so that the reasonableness of the constraint (as a representation of a given resource objective) and whether that resource objective is being met in the most cost efficient manner might be better assessed.

Testing of Constraints

Many of the benchmarks and numerous alternatives were run with one or more constraints deleted from the "package" that represented that alternative Several alternatives were incremental variations of other alternatives. For example, Alternative E added a substantial increment of roadless area to the allocation in Alternative B without other significant changes in the model This isolated the cost of allocating areas to roadless management.

The isolation of such constraints allowed the calculation of per acre coefficients of opportunity costs for present net value and cubic foot output of timber. These are then used to make estimates of the cost of that constraint within the context of other alternatives Nearly all alternatives were run with five different objective levels of timber, as well as the variations in constraints which moved one alternative to the next

It is not practicable (each FORPLAN runs costs hundreds of dollars in processing time and considerably more in personnel costs) to incrementally add or remove individual constraints in the context of each alternative As one moves from one alternative to the next, increasing or decreasing the allocations to other potentially overlapping resource objectives may result in that particular constraint having either higher or lower per acre opportunity cost coefficients

Generally, the overlap is partial and it is expected that these coefficients represent reasonable approximations of the distribution among individual constraints of the total tradeoff between alternatives. Table B-25 summarizes the constraints, the per acre coefficients for timber and present net value associated with a constraint, and the runs that were compared in isolating each particular constraint.

Appendix M contains a detailed analysis of individual management requirements.

Analysis of Tradeoffs Among Alternatives

The response of each alternative to ICO's or groups of ICO's is summarized in Chapter II of the EIS as are the resource output levels The description of how the alternatives affect individual resources and more detailed discussions of the environmental consequences are found in Chapter IV of the EIS. Social and Economic effects are displayed in the tables summarizing the responses to ICO's and are discussed in Chapters II and IV of the EIS.

01456

As shown in Table B-26, Alternative G generates the highest present net value, the primary decision criterion for economic efficiency. It achieved this standing because it was given the least restrictive land allocation (in terms of allowing timber to be harvested) and the alternative was designed to maximize economic efficiency Alone among the alternatives, Alternative G was modeled to preclude the possibility of harvesting any stand types which would not generate a positive present net value if sold alone.

Alternative B gives up $41 million in present net value to Alternative G because it was assigned a very high timber target Achieving this timber target of 151 MMBF in decade one, an increase of 34 MMBF over Alternative G's more efficient level of 117 MMBF, cost $41 million While both G and B share the same FORPLAN data input set, Alternative B harvests the Lake Fork Roadless Area outside the HCNRA in order to meet its assigned timber target. Alternative G with no such timber target leaves the area unharvested

(Throughout this document reference is made to timber offerings in board foot measure. FORPLAN, however, used cubic foot measure. Therefore, all board foot timber targets have to be converted to cubic foot measure for input to FORPLAN Because the Forest has a wide range of conversion ratios in different timber stands--depending on such considerations as species, age, and condition--these efforts are necessarily approximate.)

The effects of extremely high timber targets on economic efficiency are shown in Alternative B-departure which sacrifices $218 million in present net value to generate average annual five-decade timber offerings 68 MMBF higher than the Alternative G level Part of that $218 million cost occurs in the sixth and subsequent decades when Alternative B-departure's timber production falls

It is important to note that the true cost of implementing Alternative B-departure would be even higher than the $218 million shown. This is because Alternative B-departure was allowed to violate NFMA provisions which require that regeneration harvests shall not occur unless stands shall generally have achieved culmination of mean annual increment. In B-departure, stands are generally harvested prior to culmination of mean annual increment If Alternative G were run free of that requirement, as was Alternative B-departure, its present net value would have been even higher The $218 million is, therefore, an underestimation of the loss in present net value

Alternatives H and C-departure share the same FORPLAN input land allocation and vary only with respect to meeting timber targets (the same is true for Alternatives G, B, and B-departure). The primary reason this land allocation generates lower present net value figures than the G, B, B-departure family is that this land allocation imposes more restrictions on timber harvest. These restrictions include fewer acres available due to increased emphasis on roadless recreation and old-growth timber, additional constraints added to the rate of timber harvest on big-game winter ranges, some big-game summer ranges and anadromous fisheries emphasis areas, and more acres allocated to visual retention and partial retention

Table B-26
INCOME TRANSFERS FOR DECADES 1, 2, 5, AND 6
(1982 MILLION DOLLARS, AVERAGE ANNUAL UNDISCOUNTED FIGURES PORTRAYED BY DECADE)
(Ranked In Order of Decreasing Present Net Value)

Alternative	G	H	B	E	D	C Preferred	C-dep	F	A	B-dep 1/	NC 2/
Present Net Value	624	593	583	575	562	551	545	543	498	406	399 2/
Decade 1											
Willingness-To-Pay Values for Forest Outputs 3/	36 2	35 2	39 0	36 8	37.5	37 4	39.6	31 9	36 1	37 4	NE
Forest Receipts 4/ and Payments in Kind	16 4	15 4	19 2	17 0	17 6	17 6	19 7	12 0	16 3	17 5	NE
Income Transfers	19 8	19 9	19 9	19 8	19 9	19 9	19 9	19 8	19 8	19 9	NE
Decade 2											
Willingness-To-Pay Values for Forest Outputs 3/	41.5	40 1	43 5	42 1	42.4	41 2	38 6	37 3	40 0	46.6	NE
Forest Receipts 4/ and Payments in Kind	18 6	17 1	20 5	19 2	19 3	18 2	15 5	14 3	17 1	23 5	NE
Income Transfers	23 0	23 0	23 0	23 0	23 0	23 0	23 0	23 0	22 9	23 0	NE
Decade 5											
Willingness-To-Pay Values for Forest Outputs 3/	49 0	49 7	49 4	46 7	45 6	44 9	44 7	47 9	39 2	31 4	NE
Forest Receipts 4/ and Payments in Kind	21 8	21 8	22 6	17.7	17 7	16 8	16 8	19 2	11 6	4 6	NE
Income Transfers	27 2	27 9	26 8	29 0	27 9	28 1	27 9	28 7	27.6	26 8	NE
Decade 6											
Willingness-To-Pay Values for Forest Outputs 3/	47 9	47 1	46 8	47 7	46 2	46 7	46 0	49 5	41 2	40 7	NE
Forest Receipts 4/ and Payments in Kind	20 7	47.1	20 0	18 7	18 2	18 4	18 0	20 8	13.5	13 8	NE
Income Transfers	27 2	28 0	26 9	29 0	28 0	28 2	28 0	28 8	27 6	26 9	NE

NE = Not estimated

1/ Alternative B-dep cannot be implemented without change to Federal legislation It violates NFMA requirements that stands shall generally have achieved culmination of mean annual increment (CMAI) before harvesting

2/ PNV estimated as follows (Alternative B-dep's Decade 1 ASQ in MMBF/Alternative NC's Decade 1 ASQ in MMCF) x Alternative B-dep's PNV Because Alternative NC does not meet management requirements it cannot be implemented without change to federal legislation

3/ Undiscounted benefits from all Forest outputs quantified including those in 4/ below as well as benefits accruing from recreation, water, and anadromous fish

4/ Undiscounted high bid stumpage values, grazing receipts, and miscellaneous receipts

Moving from Alternative H's five-decade average annual sawtimber harvest level of 129 MMBF to Alternative C's 146 costs about $42 million in present net value Alternative C-departure, with its even higher first-decade harvest levels, 169 MMBF, is itself $6 million lower in present net value than Alternative C

Alternative E was formulated in response to the wishes of those who felt the Forest should manage its roaded areas intensively for timber and stay out of the remaining roadless areas It manages to do this and to still generate a present net value some 92 percent of the maximum present net value alternative. Its land allocation is more restrictive than is that used for G, B, or B-departure. Compared to the land allocation in H and C-departure, that used in Alternative E is more restrictive in some respects, less restrictive in others Alternative E designates the roaded sections of the Forest for intensive timber management while the land allocation in Alternatives H, C, and C-departure reserves much of this land for less intensive timber management to help meet other multiple use objectives.

Table B-27 breaks out costs between those which are designed to generate benefits over a long period of time (capital investments) and those which are meant to meet short-term objectives (operational and maintenance costs) Investments "pay off" over a period of years and thus are more properly viewed against a backdrop which includes future benefits as well.

Capital investment costs include costs like reforestation, road construction, fish habitat construction. Operation and maintenance costs include costs for road maintenance, property boundary maintenance, and utilities, among others.

As shown in Table B-28, Alternatives E, C, D, and F all share a common timber target when expressed as a percentage of the maximum possible nondeclining flow first-decade timber harvest on their respective land allocations The 90 percent target is respective to the individually determined land allocations The 90 percent target is necessarily lower for Alternative F because more lands have been allocated to an amenity emphasis. Alternatives E, C, and D with their similar first decade offerings of 136, 144, and 143 MMBF indicate comparable maximum timber harvest capabilities The ranking, in terms of Present Net Value, would tend to indicate that achievement of the 90 percent goal was most difficult for Alternative C and least difficult for Alternative E which managed to approximate Alternative C's production level and still maintain a higher present net value.

In the balance then, Alternative E's land allocation would be viewed as being less restrictive to timber harvesting than either Alternative C's or Alternative D's

Alternative F is the alternative which most emphasizes amenities. As such, it dedicates extensive areas of the Forest to nonharvest prescriptions with a resulting decrease in timber outputs as well as present net value Assignment of a timber target to an amenity emphasis alternative may seem incongruous to many. The purpose of assigning the timber target was to make the alternative more viable given the dependence of the local economy on timber industry. Without the timber target, first-decade output levels would be much less than the 98 MMBF finally identified for the alternative.

Table B-27
UNDISCOUNTED AVERAGE ANNUAL FIRST DECADE COSTS BY ALTERNATIVE FOR OPERATIONAL AND MAINTENANCE COSTS (O & M) *CAPITAL INVESTMENT COSTS (CI)* 1982 MILLION DOLLARS (May Not Sum Due to Rounding) (Ranked in Order of Decreasing PNV)

Alternatives	G	H	B	E	D	C Preferred	C-dep	F	A	B-dep 1/	NC 2/
Present Net Value	624	593	583	575	562	551	545	543	498	406	399 2/
Operational and Maintenance Costs	11.8	12.1	13.4	12 6	12 8	12 8	14 2	11 4	12 4	14 4	NE
Capital Investment Costs	6 2	6 6	8 5	8 1	8 9	9 4	9 3	6 4	9 2	13 1	NE
Total Budget Costs Historical Budget Level FY 1980-1983 Averaged $23 1 Million	17 9	18.7	21 9	20 7	21 7	22 2	23 4	17 9	21 6	27 5	NE

NE = Not estimated

1/ Alternative B-dep cannot be implemented without change to federal legislation. It violates NFMA requirements that stands shall generally have achieved culmination of mean annual increment (CMAI) before harvesting

2/ PNV estimated as follows (Alternative B-dep's Decade 1 ASQ in MMBF/Alternative NC's Decade 1 ASQ is MMCF) x Alternative B-dep's PNV Because Alternative NC does not meet management requirements, it cannot be implemented without a change to federal legislation

Table B-28
TIMBER TARGETS ESTABLISHED BY ALTERNATIVE
(Ranked in Order of Decreasing PNV)

	ALTERNATIVE										
	G	H	B	E	D	C Preferred	C-dep	F	A	B-dep 1/	NC 2/
FORPLAN Run Identification	616524	616512	616507	616543	616518	616505	616513	616545	616540	616526	NA
Percentage of Maximum Timber Production Possible in Decade 1 (Used as a Timber Target)	No Target--Maximized Efficiency	80	85	90	90	90	116 Departure	90	99	96 Departure	NA
Actual Timber Target Assigned (MMCF/Year in Decade 1) 3/	No Target--Maximum Efficiency Resulted in Output Level of 24 5	24 8	31 0	27 7	29 5	28 3	35 5	21 5	27 9	35 7	NA
Land Suitable for Timber Production (Thousands of Acres)	NE	806	880	789	857	837	846	798	866	940	NE
Land Suitable for Timber Production at Maximum PNV (Thousands of Acres)	801	768	824	716	768	758	768	744	NE	824	NE

NA = Not Appropriate
NE = Not Estimated
1/ Alternative B-dep cannot be implemented without change to federal legislation It violates NFMA requirements that stands shall generally have achieved culmination of mean annual increment (CMAI) before harvesting
2/ Because it does not meet management requirements, this alternative cannot be implemented without change to federal legislation
3/ Figures shown are for actual FORPLAN volume, not adjusted for change in lodgepole utilization standards

The Forest's current management direction is best summarized by Alternative A It reflects the direction contained in the Forest's various unit plans which were designed to manage different sections of the Forest As such, it is a combination of different direction. The historical sawtimber offering levels (159 MMBF) cannot be maintained under this alternative's land allocation Timber output levels are estimated at 134 MMBF in the first decade of implementation

These differences, combined with the unique land allocation based on existing unit plans, make comparison with other alternatives extremely difficult Perhaps most noticeable is the fact that in terms of timber extraction, Alternative A has--except for Alternative F--the most restrictive land allocation. Another observation is that the Forest's historical budget levels have not impeded its economic performance in the timber management program The Forest has in fact been offering timber sales at a level far in excess of what could be justified from the viewpoint of economic efficiency.

Specific Points of Comparison

Net Cash Flow

Table B-29 displays the Forest's net cash flow over time by alternative. This information is presented to answer the recurring question of how the Forest's cash receipts compare with its cash expenditures Because the timber program accounts for close to 99 percent of all Forest receipts, the discussion here will focus on their variation over time by alternative.

Variations do occur in Forest outputs for range levels and attendant grazing receipts No changes are projected between alternatives for miscellaneous receipts

Factors Affecting Timber Receipts

Timber receipts are affected by the amount of timber sold, the species, its quality, its accessibility, and market conditions. They are also affected by overall sale design Timber sales typically blend in a portion of noneconomic stands with economic stands and still provide attractive sale packages All Forest alternatives except G (which allows harvest only on those stands which can generate positive present net values independently) adopt this practice

Timber Targets

Another consideration is the role played by timber targets which were assigned every alternative but G These targets were assigned the alternatives in response to the alternative's respective responses to issues, concerns, and opportunities. Achievement of timber targets in alternatives with highly restrictive land allocations (in terms of timber extraction) is generally more difficult and thus more costly in terms of present net value.

The effect of timber floors on present net value in any given land allocation is typified in Table B-30 which shows present net value change resulting from application of minimum timber harvest levels These reductions in present net value arise because they force the model to schedule timber which is economically less desirable due to its species mix, quality, or accessibility.

Table B-29

AVERAGE ANNUAL NET CASH FLOWS, RECEIPTS, AND COSTS BY ALTERNATIVE FOR THE FIRST, SECOND, FIFTH AND SIXTH DECADES, UNDISCOUNTED 1/
1982 MILLION DOLLARS
(Ranked in Order of Decreasing PNV)

Alternative	G	H	B	E	D	C Preferred	C-dep	F	A	B-dep 2/	NC 9/
Present Net Value	624	593	583	575	562	551	545	543	498	406	399 7/
Decade 1											
Noncash Benefits 3/	23 1	23 3	24 0	23 6	24 1	24 6	23 9	23 0	24 1	25 3	NE
Cash Receipts 4/	13 1	11 9	15 0	13 3	13 3	12 8	15 7	8 8	12.1	12 0	NE
Costs 5/	15 9	16 3	19 0	18 0	18 6	18 6	20 5	15 5	18 5	23 2	NE
Net Cash Flow 6/	-2 8	-4 4	-4 0	-4 7	-5 3	-5 7	-4 9	-6 7	-6 4	-11 2	NE
Jobs	2,798	2,800	3,054	2,914	2,983	2,974	3,188	2,631	2,915	3,183	3,255
Personal Income (Million 1982 $)	40 4	40 6	45 3	42 8	44 0	43 9	47 9	37 5	42 8	47 8	49 2
Timber Sale Offerings (ASQ)(MMBF)	117	118	151	136	143	144	169	98	134	167	183 8/
Decade 2											
Noncash Benefits 3/	27 9	28 1	28 0	27 9	28 4	27 6	27 9	27 7	28 6	29 5	NE
Cash Receipts 4/	13 6	12 1	15 5	14 2	14 0	13 6	10 7	9 6	11 4	17 1	NE
Costs 5/	15 2	15 6	18 2	17 3	17 9	17 7	17 1	14 8	17 8	22 8	NE
Net Cash Flow 6/	-1.6	-3 5	-2 7	-3 1	-3 9	-4 1	-6 4	-5 3	-6 3	-5 7	NE
Decade 5											
Noncash Benefits 3/	31 0	32.2	31 3	33 3	32 5	32 3	32 2	32 5	32 3	36 8	NE
Cash Receipts 4/	18 0	17 5	18 1	13 4	13 1	12 6	12 5	15 4	6 9	-5 4	NE
Costs 5/	15 1	15 5	17 9	17 2	17 7	17 6	17 0	14 8	17 6	23 3	NE
Net Cash Flow 6/	3 0	2 0	0 3	-3 8	-4 6	-5 0	-4 5	0 7	-10 8	-28 7	NE
Decade 6											
Noncash Benefits 3/	31 6	31 8	30 7	32.6	31 8	31 7	31 6	32 2	31 7	30.9	NE
Cash Receipts 4/	16 4	15 3	16 2	15 2	14 3	14 9	14 3	17 3	9 5	9 8	NE
Costs 5/	15 1	15 5	17 9	17.2	17 7	17 6	17.0	14 8	17 6	20 0	NE
Net Cash Flow 6/	1 3	-0 2	-1.7	-2 1	-3 4	-2.6	-2 6	2 5	-8 1	-10 1	NE

1/ Costs are limited to agency expenditures Payments to Local Governments are not counted as costs
2/ Alternative B-dep cannot be implemented without change to federal legislation It violates NFMA requirements that stands shall generally have achieved culmination of mean annual increment (CMAI) before harvesting by allowing widespread harvesting of stands two or more decades prior to achievement of CMAI
3/ Noncash benefits are benefits not collected as cash receipts
4/ Comprises timber stumpage receipts (statistical high bid), grazing fee receipts, and miscellaneous receipts
5/ All Forest costs except those for purchaser credit roads, co-op road maintenance, and treatment of activity fuels which costs are already reflected in lower statistical high-bid values
6/ The difference between the receipts and the costs shown
7/ PNV estimated as follows (Alternative B-dep's Decade 1 ASQ in MMBF/Alternative NC's Decade 1 ASQ in MMBF) x Alternative B-Dep's PNV
8/ Potential yield not directly comparable to allowable sale quantity
9/ Because it does not meet management requirements, this alternative cannot be implemented without a change to federal legislation

Table B-30
EXAMPLES OF PRESENT NET VALUE RESPONSE
TO MINIMUM TIMBER HARVEST LEVELS (FLOORS) 1/

Timber Emphasis Land Allocation Input to FORPLAN

Alternative	G	B	B-dep 2/
Present Net Value (1982 Million $)	624	583	406
Timber Harvest Floor in Decade 1 (MMCF/Year)	3/	31 0	35.7
Land in Timber Management (Thousands of Acres)	801	880	940

Timber-Amenity Blend Land Allocation Input to FORPLAN

Alternative	H	C	C-dep
Present Net Value (1982 Million $)	593	551	545
Timber Harvest Floor in Decade 1 (MMCF/Year)	24.8	28 3	35.5
Land in Timber Management (Thousands of Acres)	806	837	846

1/ Other factors change the present net value, but only to a small extent. They do not mask the effects explained in the narrative.
2/ Alternative B-departure cannot be implemented without change to Federal legislation. It violates NFMA requirements that stands shall generally have achieved culmination of mean annual increment (CMAI) before harvesting
3/ Yielded 24 5 MMCF/year in decade 1 without a timber harvest floor

Species Mix

Species mix affects timber receipts in more ways than one The obvious implication is that more valuable species, such as ponderosa pine, bring a greater return than do the lesser valued species such as lodgepole pine. More subtle effects arise due to differences in timber yield tables, silvicultural practices, and alternative-respective responses to issues, concerns, and opportunities. Timber quality relates to such dimensions as timber size, clarity, freedom from defect, and the like

Differences in accessibility costs reflected site-respective considerations such as the logging system required (tractor, short-span or long-span cable, helicopter), harvest method (commercial thin, regeneration harvest, overwood removal); and degree of roading required

Harvest Patterns

Consider the cases shown in the preceding tables Referring to the timber-emphasis land allocation used in Alternatives B, B-Departure, and G, we see that as progressively more timber is harvested from a particular land allocation that more acres of timber land are brought into timber production and the present net value declines.

Alternative G, free from any timber harvest floor, schedules virtually no long-span cable or helicopter ground in Decade 1 (Table B-31) and about nine percent less lodgepole sawtimber than does Alternative B (Table B-32). By the second decade, Alternative G is taking about 21 percent less lodgepole pine sawtimber than does Alternative B

Alternative B, with a first-decade timber harvest higher than that economically indicated, still manages on the whole to bypass the difficult and costly-to-log helicopter and long-span lands. However, it must increase its incidence of short-span cable logging by about 250 percent (in the first decade) over that specified in Alternative G. It also must absorb the costs of accessing the Lake Fork Roadless Area which Alternative G elected to avoid for economic reasons The figures in Table B-30 also reveal that the volume came off land less heavily wooded on the average than in the case of Alternative G.

Table B-31
TIMBER OUTPUTS AND ACTIVITIES BY ALTERNATIVE

All figures represent average annual conditions in the first decade except for PNV and BCR which reflect the entire planning horizon.
All dollar figures are in 1982 terms except for those shown for the FY 1985 budget

	PNV MM$ 1/	BCR 2/	Timber Sale Volume X06 MMCF 3/	X06 MMBF 3/	X07 MMCF 4/	X08 MMCF 5/	SUM MMCF 5/	TMBR MGT M AC 6/	HARVEST METHOD T-SS-LSH M AC/YR 7/	PRCHSR CREDIT ROADS MM$ 8/	PLT MAC 9/	E04 MAC 10/	TSI MAC 11/	TMBR RLDT BDGT MM$ 12/	SUM BDGT MM$ 13/	M JOBS	PRSNL INCM MM$	PMNTS TO CNTS MM$
HISTORICAL LEVELS																		
Latest FY 1985 budget			23	127	9	5	37				24	47	32		194			
Recent Historical			29	159	10	5	44					33	39	89	231	30	445	40
ALTERNATIVES																		
A (Current Direction)	498	1 96	27	134	8	5	40	888	17-4-1	31	43	133	92	94	216	29	428	40
B (RPA)	583	2 11	30	151	9	5	44	880	18 4-0	29	31	14.8	77	88	219	31	453	47
B-Departure 14/	408	1 60	34	167	10	5	49	940	17-9-1	42	99	206	120	134	275	32	478	43
C (Preferred)	551	2 06	28	144	8	5	41	837	18-6-1	36	47	143	74	97	222	30	439	43
C-Departure	545	2 04	34	169	10	5	49	846	22-17-2	29	51	167	66	97	234	32	479	4.9
D	562	2 08	29	143	8	5	42	857	17-5-0	31	44	150	74	91	217	30	440	44
E	575	2 15	27	136	8	5	40	789	16-4-0	27	4.1	143	82	85	207	29	428	42
F	543	2 25	21	98	6	5	32	798	14-3-1	23	38	106	2.0	67	179	26	375	30
G	624	2 42	24	117	7	5	36	801	15 2-0	20	16	11 4	4.8	62	179	28	404	4.0
H	593	2 31	24	118	7	5	36	806	15 3-0	2.3	32	130	54	67	187	28	406	38
NC 15/	399	NE	35	183	10	5	50	NE	NE	NE	60	196	104	NE	284	33	492	46

M = Thousand
MAC = Thousand Acres
MMBF = Million Board Feet
MMCF = Million Cubic Feet
MM$ = Million Dollars
1/ Present net value for 15 decades
2/ Benefit cost ratio for 15 decades
3/ Sawtimber - This is the volume of softwood sawlogs and veneer bolts sold
4/ Roundwood - This is the volume of softwood other than sawtimber and fuelwood
5/ Softwood personal use fuelwood
6/ Thousand acres which come into solution for timber management during the first 15 decades
7/ Harvest method -- Tractor Shortspan Cable Longspan Cable and Helicopter
8/ Purchaser credit road expenditures in millions of dollars
9/ Thousand acres planted This figure is also included in the total amount of reforestation activity shown in 10/
10/ Thousand acres of reforestation - Includes all acres where activities aiding the reestablishment of a tree cover are employed, includes 9/
11/ Precommercial thinning, thousand acres
12/ E - prefixed MIH codes plus purchaser road credits and activity fuels treatment. Excludes many timber support cost centers
13/ Total Forest budget. Includes $1 14 million annually for construction of capital investments as designated in the HCNRA Comprehensive Management Plan in all alternatives except Alternative A FY 1985 budget included $1 5MM(PCR)
14/ Alternative formulated to make up for protected shortfall from private lands Not implementable without a change in federal legislation
15/ PNV estimated as follows (Alternative B-dep's Decade 1 ASQ in MMBF/Alternative NC's Decade 1 ASQ in MMBF) x Alternative B-dep's PNV Because this alternative does not meet management requirements, it cannot be implemented without a change in federal legislation

Table B-32
PROPOSED TIMBER HARVEST PER YEAR BY ALTERNATIVE

Timber Harvest / Component	NC 1/ MMCF	NC 1/ MMBF	A MMCF	A MMBF	B MMCF	B MMBF	B-dep 1/ MMCF	B-dep 1/ MMBF	C Preferred MMCF	C Preferred MMBF	C-dep MMCF	C-dep MMBF	D MMCF	D MMBF	E MMCF	E MMBF	F MMCF	F MMBF	G MMCF	G MMBF	H MMCF	H MMBF
Decade 1																						
SAWTIMBER																						
P,D,F,S,L 2/	25 4	155 7/	24.9	129	28 0	146	31 2	159	26 3	141	31 7	162	26 5	138	25 1	131	18 5	93	21 8	112	22 1	113
LP 3/	9 7	28 8/	2 1	5	2 2	5	3 2	8	1 4	3	2 7	7	2 1	5	1 8	5	2 1	5	2 0	5	1 9	5
ROUNDWOOD 4/	10 1 9/		7 8		8 7		10 0		7 9		9 9		8 2		7 7		6 0		6 9		6 9	
FUELWOOD 5/	5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0	
TOTAL 6/	50 2	183 10/	39 8	134	43 9	151	49 4	167	40 6	144	49 3	169	41 8	143	39 6	136	31 6	98	35 7	117	35 9	118
Decade 2																						
SAWTIMBER																						
P,D,F,S,L 2/	25 4		25 7		28 3		35 7		25 1		23 4		27 0		25 9		19 8		24 0		22 7	
LP 3/	9 7		1 6		1 9		0 8		2 2		1 7		1 6		1 2		1 1		0 4		1 5	
ROUNDWOOD 4/	7 8 9/		6 5		7 3		8 6		6 6		6 1		6 9		6 5		5 0		5 7		5 8	
FUELWOOD 5/	5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0	
TOTAL 6/	47 9		38 8		42 5		50 1		38 9		38 2		40 7		38 6		30 9		35 1		35 0	
Decade 3																						
SAWTIMBER																						
P,D,F,S,L 2/	25 4		26 7		30 5		38 1		27 8		25 4		28 9		27 2		19 4		24 2		24 1	
LP 3/	9 7		0 9		0 4		0 9		0 4		0 3		0 4		0 3		1 5		0 3		0 5	
ROUNDWOOD 4/	6 1 9/		5 2		5 7		7 3		5 2		4 8		5 5		5 1		4 0		4 5		4 6	
FUELWOOD 5/	5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0	
TOTAL 6/	46 2		37 8		41 6		51 3		38 2		35 5		39 8		37 6		28 9		34 0		34 2	
Decade 4																						
SAWTIMBER																						
P,D,F,S,L 2/	25 4		24 8		30 2		34 7		25 6		23 9		27 0		25 5		19 4		22 9		23 3	
LP 3/	9 7		2 2		1 0		4.2		1 9		1 4		1 7		1 5		1 5		1 2		1 0	
ROUNDWOOD 4/	7 5 9/		5 2		5 7		7 5		5 2		4 8		5 5		5 1		4 0		4 5		4 6	
FUELWOOD 5/	5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0	
TOTAL 6/	47 6		37 2		41 9		51 4		37 7		35 1		39 2		37 1		29 9		33 6		33 9	
Decade 5																						
SAWTIMBER																						
P,D,F,S,L 2/	25 4		25 4		28 2		35 1		24 8		23 3		26 0		24 5		20 8		22 8		24.1	
LP 3/	9 7		1 8		2 0		3 8		2 4		1 8		2 5		2 2		0 4		1 3		0 5	
ROUNDWOOD 4/	7 5 9/		5 2		5 7		7 5		5 2		4 8		5 5		5 1		4.0		4 5		4 8	
FUELWOOD 5/	5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0		5 0	
TOTAL 6/	*47 6*		*37 4*		*40 9*		*51 5*		*37 4*		*34 9*		*39 0*		*36 8*		*30 2*		*33 6*		*34 2*	

Recent Levels (1979-1983)	MMCF	MMBF
P,D,S,L,2/	27 1	155
LP 3/	1 5	4
Roundwood 4/	9 6	
Fuelwood 5/	5 0	
Total	43 2	159

1/ Because this alternative does not meet management requirements, it cannot be implemented without change to federal legislature

2/ Tree species other than lodgepole pine (P - ponderosa pine, D - Douglas-fir, F - true fir, S - Engelmann spruce, L - western larch) Regulated volume - included in allowable sale quantity

3/ Lodgepole pine exceeding seven inches in diameter Regulated volume - included in allowable sale quantity

4/ Volume other than fuelwood or sawtimber, includes cull material, small diameter (less than seven inches) material, and dead material Unregulated volume - not included in the allowable sale quantity Not normally sawn into boards

5/ Personal use fuelwood No board foot volume is shown since these products are normally not sawn into boards and are not sold on a board foot basis.

6/ The total represents the Timber Sale Program Quantity

7/ Includes standard and special components of the regulated harvest from the Timber Management Plan Does not include commercial thinnings, harvest from slopes greater than 60%, or lodgepole pine

8/ Includes commercial thinnings, harvest from slopes greater than 60%, and lodgepole pine

9/ This item is not addressed in the 1982 Timber Management Plan The figure was estimated based on the proportion of Alternative NC's board foot volume to Alternative B-departure's board foot volume

10/ Potential yield from the Timber Management Plan Actual sawtimber volume cut during the period 1977-1986 averaged 152 MMBF/YR

NOTE All alternatives except B dep and C-dep were formulated on a nondeclining flow basis Adjustments to lodgepole pine utilization standards, made outside the FORPLAN model, account for ASQ differences between decades.

With the imposition of the even higher timber targets contained in B-departure, the model is forced to harvest long-span and helicopter ground even in the first decade (Table B-31).

Similar patterns are evident in the timber/amenity blend land allocation used for Alternatives H, C, and C-departure. Alternative H harvests no long-span or helicopter ground in the first decade while Alternative C harvests that land type to the extent that it makes up about 4 percent of its total acres harvested (Table B-31). Likewise, while Alternative H harvests shortspan ground in the first decade on 17 percent of the total area harvested, Alternative C harvests it on 24 percent. Alternative C-departure follows this same trend, moving more heavily into both short-span cable ground (23 percent) and long-span-helicopter ground (6 percent) in the first decade

Timber Quality

Timber quality includes consideration of whether the material is suitable for sawing (sawtimber); pulping or chipping (roundwood); or personal use fuelwood Sawtimber is the only material tracked in FORPLAN

Another dimension of quality is the conversion ratio or the number of board feet which can be produced from a single cubic foot of sawtimber This is primarily a concern in the regenerated stands which are still growing rapidly and which, therefore, are still experiencing significant changes in conversion ratios as they grow The earlier the regenerated stand is harvested, the less its value per cubic foot. The smaller the diameter of the tree, the less its conversion ratio These characteristics are included in FORPLAN dollar valuations so the model can consider these changes in value over time along with other differences in making its harvest decisions.

Put basically, the higher the timber target, the more likely the model is to call stands to harvest early in their regeneration cycles. This is illustrated in Table B-29 which shows, among other things, Forest receipts over time Compare the receipt figures for Alternatives B and B-departure. Remember that B-departure was run with its achievement of CMAI constraint relaxed. Notice that Forest receipts are higher in Alternative B than in Alternative B-departure in all decades except one and that Alternative B-Departure actually generates negative receipts in one decade. The Forest would have to pay the contractor to remove the timber This helps show, in an exaggerated way, the effects of harvesting early in the rotation cycle. A great deal of this effect is caused by Alternative B-departure's premature entry into regenerated stands which have not achieved culmination of their economic efficiency

Accessibility

The term accessibility reflects on the stand's proximity to the established road system and to the local processors, as well as to the site-specific characteristics which determine to a great extent what logging systems may be employed. Timber values are adjusted within FORPLAN to reflect differences in net value which result from using more costly logging systems as opposed to less costly logging systems.

Costs

With the exception of Alternative A, which alone has a budget constraint at recent historical levels, all alternatives provide for constructing all capital improvements specified in the Hells Canyon National Recreation Area Comprehensive Management Plan in as close to the specified time frame as is possible Alternative A reflects the historical record of accomplishments and stretches out the completion date for these projects well into the future Thus all other alternatives experience a sharp drop in HCNRA CMP-related expenditures in the second decade.

In those alternatives which share identical FORPLAN input data (G, B, and B-departure--H, C, and C-departure) parallels exist In both land allocation groups, costs increase as the timber target is increased Moreover, these increased costs are not matched by increased benefits; the net effect being that net cash flow decreases. Extra costs occasioned by the timber targets largely take the form of increased planting incidence (rather than relying on natural regeneration); increased precommercial thinning incidence (rather than settling for the reduced yields which accompany stagnated stands); and road costs to access areas determined to be economically inefficient to enter.

Disaggregation of Benefits Between Those with and Those Without Market Values

Some Forest outputs, such as stumpage, are normally traded in the market place and are therefore said to have market values. Others, such as hiking on National Forest trails, are not and therefore have been assigned values. The fact that one is not exchanged in the market place does not make it valueless

Table B-33 provides a breakout of total Forest benefits by these two categories. The most noticeable feature portrayed there is that while total market resource values vary substantially among the alternatives--the high-value alternative exceeding the low-value alternative by 60 percent--total nonmarket resource values vary hardly at all, with a variation of less than 1 percent. Variation in total market value is explained in the preceding passages dealing with variations in stumpage values.

Nonmarket resource values change little because Forest Plan alternatives do not change the Forest character to the extent that marked shifts in recreation are expected. For instance, all the Forest Plan Alternatives call for protection, maintenance, and expansion of developed recreation sites so that no variation in developed recreation site use is attributed to any alternative

Some Forest dispersed recreation is expected to be lost to the Forest as Forest capacity in some Recreation Opportunity Spectrum (ROS) categories are fully utilized in the future. Recreationists are expected to be sensitive to the differences among the ROS categories and no longer choose this Forest for recreation

Table B-33
UNDISCOUNTED AVERAGE ANNUAL FIRST DECADE ECONOMIC BENEFITS FOR BOTH MARKET AND NONMARKET RESOURCES
1982 MILLION DOLLARS
(Ranked in Order of Decreasing Present Net Value)

Alternatives	G	H	B	E	D	C Preferred	C-dep	F	A	B-dep 1/	NC
Present Net Value	624	593	583	575	562	551	545	543	498	406	399 4/
Average Annual Market Resource 2/ Values, Undiscounted, for the First Decade	16 4	15 4	19 2	17,0	17 6	17 6	19 7	12 0	16 3	17 5	NE
Average Annual Non-Market Resource 3/ Values, Undiscounted, for the First Decade	19 8	19 9	19 9	19 8	19 9	19 9	19 9	19 8	19 8	19 9	NE
Total Average Annual Undiscounted Resource Values, for the First Decade	36 2	35 2	39 0	36 8	37.5	37 4	39 6	31 9	36 1	37 4	NE

1/ Alternative B-dep cannot be implemented without change to federal legislation It violates NFMA requirements that stands shall generally have achieved culmination of mean annual increment (CMAI) before harvesting
2/ High bid stumpage values, grazing receipts, anadromous fish, and miscellaneous receipts
3/ Recreation and water
4/ PNV estimated as follows (Alternative B-dep's Decade 1 ASQ in MMBF/Alternative NC's Decade 1 ASQ in MMBF) x Alternative B-dep's PNV Because this alternative does not meet management requirements, it cannot be implemented without a change to federal legislation

Overall, these changes will occur gradually over a span of decades that will slowly change the recreationists' perceptions of the Forest's recreation opportunities. During this timespan other Forests and other lands will be changing, along with society as a whole. Recreationists might be willing to accept more users in any ROS category without abandoning the area, but that assumption was not used in the analysis.

Incremental Differences in Economic Efficiency Criteria

Various economic data are contained in Tables B-34, B-35, and B-36. Because the information is summary in nature, some explanation is in order. The max PNV benchmark is the starting point for the review. It provides a reference point as the benchmark which most closely approximates an alternative

Alternative G

Alternative G generated the highest present net value for any alternative because its land allocation constrainted timber production least; because its livestock grazing use is at economically efficient levels; and because it was not required to harvest uneconomical timber stands It forms the true base of comparison for the alternatives because it comprises a fully implementable alternative.

Alternative H

Moving from Alternative G to Alternative H entails loss of some $31 million in present net value. Discounted costs increased $15 million and discounted benefits fell $16 million. Significant benefit decreases occurred in timber ($22 million) and range ($1 million) outputs. The range improvements necessary to accommodate livestock at Alternative H's levels were more economically efficient than those associated with G's higher levels, but this small increase to present net value was greatly overshadowed by increased costs in the timber ($11 million), roads ($1 million), and reduced timber benefits ($22 million). As would be expected, the benefit/cost ratio declined from Alternative G's 2.42 to Alternative H's 2.31.

The reason Alternative H has a lower present net value and a lower benefit/cost ratio than Alternative G is that Alternative H offers more timber than is economically efficient for its land allocations and that land allocation is itself more restrictive in terms of management flexibility than is Alternative G's. This is reflected in a higher first decade incidence of logging on short-span, long-span and helicopter lands. The timber harvest floors were established to make Alternative H more responsive to the timber and local ecomony issues.

Table B-34
UNDISCOUNTED BENFITS, JOBS, AND PERSONAL INCOME
1982 MILLION DOLLARS
(Ranked In Order Of Decreasing Present Net Value)

Alternative	G	H	B	E	D	C Preferred	C-dep	F	A	B-dep 1/	NC 2/
Present Net Value	624	593	583	575	562	551	545	543	498	406	399
Decade 1											
Willingness-To-Pay Values for Forest Outputs 3/	36 2	35 2	39 0	36 8	37 5	37 4	39.6	31 9	36 1	37 4	NE
Forest Receipts 4/	13 1	11 9	15 0	13 3	13 3	12 8	15.7	8 8	12 1	12 0	NE
Noncash Benefits 5/	23 1	23 3	24 0	23 6	24 1	24 6	23.9	23 0	24 1	25 3	NE
Thousand Jobs/Year	2.8	2 8	3 1	2 9	3 0	3 0	3 2	2.6	2 9	3 2	NE
Personal Income (Million $/Year)	40 4	40 6	45 3	42 8	44 0	43 9	47.9	37 5	42 8	47 8	NE
Decade 2											
Willingness-To-Pay Values for Forest Outputs 3/	41 5	40 1	43 5	42 1	42 4	41 2	38.6	37 3	40 0	46 6	NE
Forest Receipts 4/	13 6	12 1	15 5	14 2	14 0	13 6	10.7	9.6	11 4	17 1	NE
Noncash Benefits 5/	27.9	28 1	28 0	27 9	28 4	27 6	27.9	27 7	28 6	29 5	NE
Decade 5											
Willingness-To-Pay Values for Forest Outputs 3/	49 0	49 7	49 4	46 7	45 6	44 9	44.7	47 9	39 2	31 4	NE
Forest Receipts 4/	18 0	17 5	18 1	13 4	13 1	12 6	12.5	15.4	6 9	-5 4	NE
Noncash Benefits 5/	31 0	32 2	31.3	33 3	32 5	32 3	32 2	32 5	32 3	36 8	NE
Decade 6											
Willingness-To-Pay Values for Forest Outputs 3/	47 9	47 1	46 8	47 7	46 2	46 7	46 0	49 5	41 2	40 7	NE
Forest Receipts 4/	16 4	15 3	16 2	15.2	14.3	14.9	14.3	17.3	9 5	9 8	NE
Noncash Benefits 5/	31 6	31 8	30 7	32 6	31 8	31 7	31.6	32.2	31 7	30 9	NE

NE = Not estimated

1/ Alternative B-dep cannot be implemented without change to federal legislation. It violates NFMA requirements that stands shall generally have achieved culmination of mean annual increment (CMAI) before harvesting.

2/ PNV estimated as follows (Alternative B-dep's Decade 1 ASQ in MMBF/Alternative NC's Decade 1 ASQ in MMBF) x Alternative B-dep's PNV Because this alternative does not meet management requirements, it cannot by implemented without a change in federal legislation

3/ Undiscounted benefits from all Forest outputs quantified including those in 4/ below as well as benefits accruing from recreation, water, and anadromous fish

4/ Statistical high bid stumpage values, grazing receipts, and miscellaneous receipts

5/ Noncash benefits are not collected as fees because of current laws and policies

Table B-35
PRESENT NET VALUE, DISCOUNTED BENEFITS, AND DISCOUNTED COSTS BY RESOURCE GROUPS 1/
1982 MILLION DOLLARS
(Ranked in Order of Decreasing PNV)

Alternative	G	H	B	E	D	C Preferred	C-dep	F	A	B-dep 2/	NC 3/
Present Net Value	624	593	583	575	562	551	545	543	498	406	399
Discounted Benefits											
Timber	410	388	460	411	424	411	412	318	365	433	NE
Recreation	571	576	564	589	576	579	576	586	577	564	NE
Range	36	35	36	31	36	32	32	27	35	36	NE
Other 4/	45	47	47	45	47	47	47	45	42	47	NE
Total	1,062	1,046	1,108	1,076	1,083	1,068	1,067	976	1,019	1,083	NE
Discounted Costs											
Timber 5/	153	164	209	202	214	215	215	161	223	332	NE
Roads 6/	99	100	116	107	112	109	112	92	108	130	NE
Recreation 7/	36	40	41	41	38	40	41	41	37	41	NE
Range 8/	21	19	20	18	21	18	18	15	21	28	NE
Other 9/	129	130	138	134	136	135	136	125	132	146	NE
Total	438	453	524	502	522	517	522	433	520	676	NE

NE = Not estimated

1/ Direct comparisons of benefits and costs displayed for individual resource outputs provide general indications of relationships but they may be misleading because many outputs in multiple use have common costs of production that cannot be reliably separated and attributed to individual resources Displayed in order of decreasing present net value

2/ Alternative B-dep cannot be implemented without change to federal legislation It violates NFMA requirements that stands shall generally have achieved culmination of mean annual increment (CMAI) before harvesting

3/ PNV estimated as follows (Alternative B-Dep's Decade 1 ASQ in MMBF/Alternative NC's Decade 1 ASQ in MMBF) x Alternative B-dep's PNV Since this alternative does not meet management requirements, it cannot be implemented without a change to federal legislation

4/ Primarily water, but also anadromous fish and miscellaneous collections

5/ Costs shown are for E-prefixed MIH codes As discussed in Appendix B, timber-related costs include many outside the formally designated timber program

6/ Costs shown are those related to the Forest facilities program, the bulk of which is a cost to the timber program

7/ Costs shown are those from the Forest's recreation, wilderness, and fish and wildlife programs costs.

8/ Costs shown are those from the livestock grazing program

9/ Costs shown are those from the Forest programs not elsewhere classified The bulk of these costs are associated with the timber program

Table B-36
DECADAL TIMBER TRADEOFFS FOR ALTERNATIVE CONSTRAINTS 1/
--ALTERNATIVE A--

Management Strategy/Constraint	Total Acres 2/	Suitable Acres	*Alt A vs Run #7* MMCF	MM$ 3/	*Alt A vs Alt C* MMCF	MM$ 3/
MS-1 (MR Hrvst Dispersion)	386838	316321	0	0	0	0
MS-2 (Modified Timber Emph)	NA 4/					
MS-3 (Big Game Emphasis)	682069	398542	-31 7	-36 3	-8 5	-9 7
MS-5 (Phillips Lake)	2971	1743	-0 3	-0 4	0	0
MS-6 (Undeveloped Disp Rec)	135930	47391	-17 5	-27 8	-7 3	-11 7
MS-9 (NRA Disp Rec/Native Veg)	157739	44542	-11 8	-28 0	0	0
MS-10 (NRA Forage Production)	130133	45614	-12 1	-28 6	0	0
MS-11 (NRA Disp Rec/Timber)	75653	57727	-5 5	-16 6	0	0
MS-12 (Indian Cr Res Nat Area)	965	870	0	0	0	0
MS-14 (Starkey Experimental For)	27123	15506	0	0	0	0
MS-15 (Old Growth)	61382	41757	-5 0	-8 0	-1 3	-2 1
MS-16 (Admin Sites, Rec Sites) 5/	3742	2010	-0 7	-1 2	0	0
MS-18 (Anadromous Fish Habitat)	NA	NA				
Riparian	19759	19759	0	0	0	0
Visual Foreground	55816	55816	-10 1	-11 9	0	0
Visual Middle Ground	75060	75060	-3 6	-5 0	0	0

1/ Tradeoffs are in excess of those generated by the MR's which are already a part of Benchmark Run #7. These tradeoffs are discussed as part of the analysis prior to alternative formulation
2/ Total acres of a given management emphasis includes acres not suitable or not cost effective for timber management. Tradeoffs calculated on suitable timbered acres Acres relate to FORPLAN reports Acres differ from those shown in alternatives because of the need to represent certain prescriptions as management emphases in FORPLAN that are part of other management strategies in alternatives (Riparian and visual management emphases are prescriptions within MS-1, MS-2 and MS-3)
3/ Economic data are from FORPLAN and are therefore exclusive of nontimber considerations
4/ NA - Management emphasis is not applicable in this alternative
5/ Includes "a lake" and "recsite" management emphasis in FORPLAN

Alternative B

Selecting Alternative B rather than Alternative H would mean moving to a different land allocation, one significantly more attuned to commodity production Making this move would mean losing benefits in recreation ($12 million) due to reductions in scarce nonmotorized recreational opportunities. The cost increases associated with the timber program ($45 million) and with timber-related activities in roads ($16 million) were about equal to the $72 million increase in timber benefits

Had both of these alternatives been run with identical timber targets (in terms of percent of alternative-respective maximum possible first-decade offerings) the spread between the two would widen appreciably. As stated, Alternative B's timber target was 85 per cent of its maximum possible first-decade offering, while Alternative H (with a more restrictive land allocation) was assigned a target of 80 percent.

Alternative H's less intensive range program offers no obvious advantage over Alternative B's in terms of present net value though it would look more attractive in times of austere budgets. Alternative H manages to increase recreation-related benefits and decrease recreation-related costs relative to Alternative B by spreading out some of the program's investments over time.

Alternative E

Alternative E has, in the balance, a more restrictive land allocation than does Alternative B. This can be deduced from the fact that it generates a lower level of timber than does Alternative B, with the same alternative-respective 90 percent of maximum possible timber production target.

Alternative E's reduction in present net value of $8 million occurs because its $22 million decrease in costs causes a disproportionately large decrease in benefits ($32 million). Thus, while timber (minus $49 million); range (minus $5 million); and other programs (minus $2 million) benefits decreased; recreation (plus $25 million) increased. The reductions in range costs ($2 million) were offset by even greater reductions in range benefits ($5 million)

Alternative D

Alternative D is ranked next in terms of present net value. Significant increases in timber harvest benefits ($13 million) and range benefits ($5 million) are offset by a $13 million falldown in recreation benefits and cost increases of $12 million in timber and $5 million in timber-related roads. A small reduction in costs for recreation ($3 million) is matched by a similar increase in range costs.

Alternative C (Preferred)

Next in line in terms of overall efficiency is Alternative C with a present net value reduction of $11 million, though its benefit/cost ratio, at 2 06 is only a hair lower than D's 2.08 Costs fall by some $5 million; but the benefits fall even further, by $15 million The reduction in benefits comes about from a lower value of timber offerings (minus $13 million) along with a reduction ($4 million) in the range program These reductions were offset to a small extent by increased recreation benefits (plus $3 million) and by cost reductions in timber-related road work of $3 million and in range program costs (down $3 million).

Alternative C-Departure

Put basically, Alternative C-departure generates a lower present net value than does Alternative C because it has a higher timber target and thus forces the model to harvest timber in a less economical manner. These timber targets cause a $6 million reduction in present net value--the result of a $1 million decrease in benefits and a $5 million increase in costs

Benefits fall and costs rise because, with its somewhat restrictive land allocation and elevated first decade timber harvest, the model is forced to harvest much more lodgepole sawtimber in the first decade (2.7 MMCF compared to 1.4 MMCF) and also to move very heavily into difficult-to-log lands even in the first decade--harvesting about 7,000 acres of short-span ground compared to Alternative C's 6,000 acres and harvesting about twice as much helicopter long-span acreage

Another effect of this elevated first decade timber harvest is that average volumes removed per acre falls from 5.13 MBF per acre to 4 86 MBF per acre based on sawtimber offerings and acres needing reforestation. The effect on the benefit side of the equation is that total timber benefits increase some $1 million and recreation benefits decrease some $3 million.

Alternative F

Alternative F provides the sharpest drop in timber benefits between any successively ranked alternatives ($94 million). Range benefits are also reduced ($5 million) but recreation benefits increase $10 million A long string of cost reductions contribute to the total $89 million cost reduction: timber ($54 million), roads ($20 million), and range ($3 million). The primary reason for the decline in overall present net value is that this land allocation is the most restrictive in terms of timber harvesting This coupled with a high timber target, 90 percent of its maximum possible for the first decade on a nondeclining flow basis, to generate the lower present net value.

Alternative A

No other nondeparture alternative has a higher first-decade timber target expressed as a percentage of its maximum possible first-decade offerings--99 percent. This target was assigned to enable the alternative to approximate to the fullest extent possible, both the existing land allocation and recent historical timber offerings.

Coupled with the second most restrictive land allocation, this resulted in a low present net value (498 million). This was the net result of the $43 million increase in benefits being overshadowed by an $87 million increase in costs. The benefits themselves were the net result of an $47 million increase in timber, a $9 million decrease in recreation, and an $8 million increase in range

Alternative B-Departure

The largest incremental increase in discounted economic costs ($156 million) and the sharpest falldown in incremental present net value ($92 million) are recorded by Alternative B-departure. It also manages the largest incremental increase in discounted economic benefits ($64 million).

Benefits also increase in the range program by $3 million. The timber program increased its benefits by $68 million, the result of operating with the least constrained

01476

timber land allocation Recreation benefits fell by $13 million because this alternative is arguably the most disruptive to big game habitat. Costs increase for timber ($109 million), roads ($22 million), recreation ($4 million), and range ($7 million).

Alternative NC

This alternative's present net value was estimated to be some $7 million lower then Alternative B-Departure's. Because it fails to meet management requirements, the alternative cannot be implemented without change to federal legislation

Implications of FORPLAN Runs on Current Management Direction

Certainly the most obvious implication is that the Forest is harvesting timber at rates in excess of those which economic efficiency would indicate. Whereas recent offering levels for sawtimber on the Forest have been at 159 MMBF, FORPLAN selected far less for the existing land allocation, 134 MMBF, even when directed to harvest timber at levels far in excess of those indicated by economic efficiency criteria Another observation is that the Forest has moved into more costly logging systems more rapidly than efficiency would indicate was appropriate. This appears to have occurred as management has sought to harvest difficult ground to establish empirically its economic suitability for timber production and to meet the intent of unit plans to distribute the harvest.

The analysis done for this plan indicates that the local economy and the federal treasury would have been better off had the Forest managed its easily-logged, high-valued stands more intensively rather than moving so quickly into the more difficult-to-log stands. Adopting the practice of more intensive management of easily-logged land in the immediate future would also allow the Forest to benefit from refinements in technology developed elsewhere to log difficult sites. Thus, the Forest could, in the future, reap the benefits of research and development (R & D) done elsewhere. Logging the more difficult lands now means that the Forest, the local economy, and the federal treasury are helping pay the cost of R & D in the form of lower stumpage values.

Other features in the analysis include projections of sizeable increases in precommercial thinning (rising especially from the clearcuts of dead and dying lodgepole pine), the increased use of regeneration harvests rather than partial harvests, the reduced incidence of planting as a means to achieve regeneration; the reduction to insignificant levels of the incidence of commercial thinning on regenerated stands; and acceptance of regeneration lags well in excess of five years

Analysis of Constraints Within and Between Alternatives

Tables B-37 through B-46 display the trade-offs associated with each of the major other resource objectives expressed as FORPLAN constraints These are compared to the maximize present net value benchmark and the next most similar alternative.

Alternative A represents the current situation The constraints are compared to the max present net value benchmark and to Alternative C which is a somewhat more commodity-oriented alternative Substantial acreages in Alternative A have a wildlife emphasis so this alternative most nearly maintains current elk numbers and most nearly approximates the achievement of Oregon Department of Fish and Wildlife objectives for elk over the next 50 years.

Alternative B adds some consideration for visual quality along the highly sensitive travel routes and some additional consideration for big-game winter range beyond that provided by management requirements

Alternative E adds to the acreage maintained in roadless recreation in Alternative B. This serves to satisfy questions raised as to what we could maintain in an undeveloped condition if we just managed lands that are currently available to us in an intensive manner. This increment resulted in reductions of present net value and timber outputs

Alternative G adds a constraint to limit prescriptions to only those producing a positive rate of return in Alternative B's model formulation All other resource constraints are maintained as in the Alternative B land allocation, but a higher economic efficiency is sought through managing only those timbered lands that produce a positive return. Unlike all other alternatives, there is no predetermined timber output level This results in a reduction in first decade allowable sale quantity, but increases the present net value.

Alternative D adds some high quality roadless or undeveloped area around the fringe of the Eagle Cap Wilderness and in the Elkhorn Mountains to the undeveloped dispersed recreation strategy. It provides for additional old growth to enhance the successional stage diversity within community types and the viability of associated wildlife indicator species. It also seeks to manage elk and deer winter range at nearly optimum habitat conditions, thereby providing high quality elk habitat through the critical winter and spring periods and coming closer to providing the potential for maintaining current Oregon Department of Fish and Wildlife elk objectives Opportunity costs in terms of timber volume and the present net value of timber foregone are displayed in Table B-42, compared to both the max present net value benchmark and to Alternative B

Alternative C (Preferred) adds optimum habitat objectives to selected elk summer ranges and protection for certain key anadromous fisheries streams along the Elkhorn Range to the other resource objectives found in Alternative D. Table B-40 compares the opportunity costs of the present net value of timber foregone and cubic feet of timber foregone to present net value Benchmark 7 and to Alternative D.

Alternative H maintains the other resource objectives of Alternative C, but seeks increased economic efficiency by reducing the objective first decade output Apparent opportunity costs associated with maintaining these resource objectives and with achieving this level of timber output are displayed in Table B-46.

Alternative F seeks to provide near optimum habitat conditions for elk across the entire managed portion of the Wallowa-Whitman National Forest. It provides as near current levels of old-growth as is possible, given volumes planned to be under contract at the start of this plan As a result, it is an incremental step from C, though it adds several elements at the same time Opportunity costs or tradeoffs are displayed in Table B-44 comparing this alternative with max present net value benchmark and with Alternative C

How best to interpret Tables B-37 through B-46. Use Table B-37 Alternative A versus Run No 7 as explained below.

MA-1 shows 314,449 suitable timber acres in the FORPLAN solution with a constraint of 30 4 percent. This constraint is actually made up of a harvest dispersion constraint at 33.0 percent (Table B-25) but has been further reduced to 30.4 percent to account for visual middleground (Table B-25). Run No. 7 has only the harvest dispersion constraint (33.0 percent). Alternative A has 309,156 suitable timber acres less than Run No. 7 in the FORPLAN solution This implies that Run No. 7 has a total of 623,605 suitable timber acres in MA-1 in its FORPLAN solution

01478

MA-2 shows shows that this management area (NA) does not apply to either of these runs

MA-3 shows 399,020 suitable timber acres in the FORPLAN solution with a constraint of 12.7 percent. This constraint is actually made up of a harvest dispersion constraint at 13.3 percent (Table B-25), but has been further reduced to 12.7 percent to account for visual middleground (Table B-25). Run No. 7 has a 33.0 percent constraint (harvest dispersion) The difference in suitable timber acres shows that Alternative A has 220,859 acres more than Run No 7 in its FORPLAN solution

MA-5 shows that Alternative A has 1,743 suitable timber acres in its FORPLAN solution accessing the selection harvest timber yield tables Run No. 7 (NA) has these acres allocated elsewhere. This gives Alternative A 1,743 acres more than Run No 7.

MA-6 shows Alternative A with 54,090 suitable timber acres which go to minimum level (MINLVL) in the FORPLAN solution. MINLVL implies that these acres access other resource yield tables but do not have any scheduled timber harvest. Run No 7 also goes to minimum level (MINLVL) but Alternative A has 54,090 more suitable timber acres with no scheduled timber harvest.

MA-7 shows Alternative A with 3,919 suitable timber acres that access the selection harvest timber yield tables. Run No 7 also accesses these same yield tables, however, Alternative A has 165 acres less than Run No. 7 allocated to this area.

MA-11 shows Alternative A with 56,411 suitable timber acres accessing the selection harvest timber yield tables Run No. 7 also accesses these same yield tables, however, Alternative A has 23,076 more suitable timber acres in its FORPLAN solution.

MA-15 shows Alternative A with 41,758 suitable timber acres which go to minimum level (MINLVL) in its FORPLAN solution Run No. 7 also goes to minimum level (MINLVL), however, Alternative A has 13,574 more suitable timber acres. See also MA-6 above.

MA-16 shows Alternative A having 2,411 suitable timber acres which go to minimum level (MINVLVL). See MA-6 above. Run No. 7 (NA) says this area is not applicable and the acres are allocated elsewhere This gives Alternative A 2,411 suitable timber acres more than Run No 7

MA-18 shows that this management area (NA) does not apply to either of these runs.

Riparian: Shows that Alternative A has 19,759 suitable timber acres accessing the selection harvest timber yield tables. Run No. 7 accesses these same yield tables. The difference in suitable timber acres is zero which implies that Run No. 7 has the same acres in its FORPLAN solution.

Visual Foreground: Shows Alternative A with 51,561 suitable timber acres accessing the selection harvest timber yield tables Run No. 7 (NA) has these acres allocated elsewhere.

Other constraints:

- One hundred seventy-eight thousand suitable timber acres in Alternative A go to the natural and harvest (NAT H) only prescriptions This is to comply with direction from existing unit plans Run No 7 (NA) does not have this constraint.

- Budget for Alternative A is constrained to the average budget during the period 1980-83. This was to approximate as closely as possible the budget and outputs of existing unit plans. This constraint is not applicable to Run No. 7.

- Timber Shows Alternative A set at 99 percent (Table B-28) of its first decade maximum timber for Decade one or 279.3 million cubic feet per decade. In addition to this constraint, plus all of the above, it must maximize present net value (PNV) Run No 7 has no such timber target and is allowed to maximize present net value.

- CD WG: Shows that this constraint (NA) does not apply to either of these two runs It does apply to Alternative C (preferred) This constrains the Douglas-fir, ponderosa pine working group (CD WG) to produce at least 70 million cubic feet for Decade one and 50 million cubic feet for Decade two.

- PNV Million $. Shows that for all the differences explained above or shown on Table B-37, Alternative A gives up 133 million dollars in present net value (PNV) over Run No 7.

- Timber Million CU FT/Dec' Shows that for all the differences explained above or shown on Table B-37, Alternative A first decadal timber target is increased by 16.6 million cubic feet over Run No. 7.

One may attempt to use the difference in suitable timber acres column shown in Table B-37 and the opportunity cost coefficients for benchmark and alternative constraints (Table B-25) and arrive at approximate tradeoffs. However, the sums would not equal the present net value (PNV) and timber values shown in Table B-37 The coefficients shown on Table B-25 are generally derived with an objective function to maximize present net value and do not have an established timber target. Different per acre coefficients would be obtained if one were to include a percentage of maximum timber for Decade one and then rerun with a present net value objective function.

This can easily be illustrated by Figure B-2. As one moves from left to right, the timber volume decreases and the PNV increases On a per acre basis, higher timber and lower PNV coefficients are obtained with a high timber target. As one moves towards the present net value objective function, the timber per acre coefficient become smaller and the PNV per acre coefficent become larger Only if Table B-25 contained additional per acre coefficients at the respective percentage of maximum timber run (see Table B-28) for each alternative could one approximate the values shown on the bottom of Tables B-37 through B-46.

Table B-37
TRADEOFFS FOR ALTERNATIVE CONSTRAINTS
-- ALTERNATIVE A --

Management Area/Constraint	Suitable Timber Acres	Alt A vs Run No 7		Diff Suitable Tbr.Acres	Alt A vs. Alt C		Diff Suitable Tbr Acres
MA-1 (MR Hrvst Dispersion)	314449	30 4% 1/	33 0%	- 309156	30.4% 1/	30.9% 1/	- 167980
MA-2 (Modified Timber Emph)	NA 2/		NA			NA	
MA-3 (Big Game Emphasis)	399020	12 7% 1/	33,0%	+ 220859	12 7% 1/	13 0% 1/	+ 151669
MA-5 (Phillips Lake)	1743	Selection	NA	+ 1743	Selection	Selection	0
MA-6 (Undeveloped Disp Rec)	54090	Min Lvl	Min Lvl	+ 54090	Min Lvl	Min Lvl	+ 9905
MA-7 (Wild & Scenic Rivers)	3919	Selection	Selection	- 165	Selection	Selection	- 102
MA-11 (NRA Disp Rec/Timber)	56411	Selection	Selection	+ 23076	Selection	Selection	+ 14432
MA-15 (Old Growth)	41758	Min Lvl	Min Lvl	+ 13574	Min Lvl	Min Lvl	+ 4459
MA-16 (Admin Sites, Rec Sites) 3/	2411	Min Lvl	NA	+ 2411	Min Lvl	Min Lvl	0
MA-18 (Anadromous Fish Habitat)	NA		NA				4/
Riparian	19759	Selection	Selection	0	Selection	Selection	+ 916
Visual Foreground	51561	Selection	NA	+ 51561	Selection	Selection	+ 11138
Other Constraints							
178,000 acres timber to NAT H		178000	NA		178000	NA	
Budget (FY 80-83) Million $/Dec		$109 55	NA		$109 55	NA	
Timber Target Million CU FT/Dec		99% 279 3	PNV		99% 279 3	90% 282 5	
CD WG 70 MMCF Dec-1, 50 MMCF Dec-2		NA	NA		NA	70-1,50-2	
PNV Million $				-$133.218			-$53 677
Timber Million CU FT/Dec				+ 16 643			- 3 200

1/ Includes Visual Middleground Constraint
2/ NA - Management emphasis is not applicable in this alternative
3/ Includes "a lake" and "recsite" management emphasis in FORPLAN
4/ Not differentiated from MA-3

Table B-38
TRADEOFFS FOR ALTERNATIVE CONSTRAINTS
-- ALTERNATIVE B --

Management Area/Constraint	Suitable Timber Acres	Alt B vs Run No 7		Diff Suitable Tbr Acres	Alt B vs Alt A		Diff Suitable Tbr Acres
MA-1 (MR Hrvst Dispersion)	621094	33 0%	33 0%	- 2511	33 0%	30 4% 1/	+306645
MA-2 (Modified Timber Emph)	174036	16 6%	NA 2/	+ 174036	16 6%	NA	+ 174036
MA-3 (Big Game Emphasis)	NA		33 0%	- 178161		12 7% 1/	- 399020
MA-5 (Phillips Lake)	1743	Selection	NA	+ 1743	Selection	Selection	0
MA-6 (Undeveloped Disp Rec)	0	Min Lvl	Min Lvl	- 1490	Min Lvl	Min Lvl	- 54090
MA-7 (Wild & Scenic Rivers)	5688	Selection	Selection	+ 1604	Selection	Selection	+ 1769
MA-11 (NRA Disp Rec/Timber)	37850	Selection	Selection	+ 4515	Selection	Selection	- 18561
MA-15 (Old Growth)	28184	Min Lvl	Min Lvl	0	Min Lvl	Min Lvl	- 13574
MA-16 (Admin Sites, Rec Sites) 3/	2411	Min Lvl	NA	+ 2411	Min Lvl	Min Lvl	0
MA-18 (Anadromous Fish Habitat)	NA		NA			NA	
Riparian	19759	Selection	Selection	0	Selection	Selection	0
Visual Foreground	20264	Selection	NA	+ 20264	Selection	Selection	- 31297
Other Constraints Timber Target Million CU FT/Dec		85% 310 1	PNV		85% 310 1	99% 279 3	
PNV Million $				-$37,371			+$95 847
Timber Million CU FT/Dec				+ 47 400			- 30 800

1/ Includes Visual Middleground Constraint
2/ NA - Management emphasis is not applicable in this alternative
3/ Includes "a lake" and "recsite" management emphasis in FORPLAN

Table B-39
TRADEOFFS FOR ALTERNATIVE CONSTRAINTS
-- ALTERNATIVE B-DEPARTURE --

Management Area/Constraint	Suitable Timber Acres	Alt B-dep. vs. Run No 7		Diff Suitable Tbr.Acres	Alt B-dep vs Alt A		Diff Suitable Tbr Acres
MA-1 (MR Hrvst Dispersion)	657109	33.0%	33 0%	+ 33504	33 0%	30 4% 1/	+ 342660
MA-2 (Modified Timber Emph)	177150	16 6%	NA 2/	+ 177150	16 6%	NA	+ 177150
MA-3 (Big Game Emphasis)	NA		33 0%	- 178161	NA	12 7% 1/	- 399020
MA-5 (Phillips Lake)	1743	Selection	NA	+ 1743	Selection	Selection	0
MA-6 (Undeveloped Disp Rec)	0	Min Lvl	Min Lvl	- 1490	Min Lvl	Min Lvl	- 54090
MA-7 (Wild & Scenic Rivers)	6469	Selection	Selection	+ 2385	Selection	Selection	+ 2550
MA-11 (NRA Disp Rec/Timber)	54760	Selection	Selection	+ 21425	Selection	Selection	- 1651
MA-15 (Old Growth)	28184	Min Lvl	Min Lvl	0	Min Lvl	Min Lvl	- 13574
MA-16 (Admin Sites, Rec Sites) 3/	2411	Min Lvl	NA	+ 2411	Min Lvl	Min Lvl	0
MA-18 (Anadromous Fish Habitat)	NA		NA			NA	
Riparian	19759	Selection	Selection	0	Selection	Selection	0
Visual Foreground	23044	Selection	Selection	+ 23044	Selection	Selection	- 28517
Other Constraints							
Nondeclining Flow		No	Yes		No	Yes	
CMAI		No	Yes		No	Yes	
178,000 acres timber to NAT H		NA	NA		NA	178000	
Budget (FY 80-83) Million $/Dec		NA	NA		NA	$109.55	
Timber Target Million CU FT/Dec		Yes 5-Dec	PNV		Yes 5-Dec	99% 279 3	
PNV Million $				-$179 929			-$46 711
Timber Million CU FT/Dec				+ 80 400			+ 77 600

1/ Includes Visual Middleground Constraint
2/ NA - Management emphasis is not applicable in this alternative
3/ Includes "a lake" and "recsite" management emphasis in FORPLAN

Table B-40
TRADEOFFS FOR ALTERNATIVE CONSTRAINTS
-- ALTERNATIVE C (PREFERRED) --

Management Area/Constraint	Suitable Timber Acres	Alt C vs Run No 7		Diff Suitable Tbr Acres	Alt C vs Alt D		Diff Suitable Tbr Acres
MA-1 (MR Hrvst Dispersion)	482429	30 9% 1/	33 0%	- 141176	30 9% 1/	30 4% 1/	+ 50218
MA-2 (Modified Timber Emph)	NA 2/		NA			NA	
MA-3 (Big Game Emphasis)	247351	13 0% 1/	33 0%	+ 69190	13 0% 1/	12 7% 1/	- 48214
MA-5 (Phillips Lake)	1743	Selection	NA	+ 1743	Selection	Selection	0
MA-6 (Undeveloped Disp Rec)	44185	Min Lvl	Min Lvl	+ 44185	Min Lvl	Min Lvl	+ 11357
MA-7 (Wild & Scenic Rivers)	4021	Selection	Selection	- 63	Selection	Selection	+ 25
MA-11 (NRA Disp Rec/Timber)	41979	Selection	Selection	+ 8644	Selection	Selection	- 2078
MA-15 (Old Growth)	37299	Min Lvl	Min Lvl	+ 9115	Min Lvl	Min Lvl	- 897
MA-16 (Admin Sites, Rec Sites) 3/	2411	Min Lvl	NA	+ 2411	Min Lvl	Min Lvl	0
MA-18 (Anadromous Fish Habitat)	4/		NA			NA	
Riparian	18843	Selection	Selection	- 916	Selection	Selection	- 186
Visual Foreground	40423	Selection	Selection	+ 40423	Selection	Selection	- 9046
Other Constraints							
Timber Target Million CU FT/Dec		90% 282.5	PNV		90% 282 5	90% 294 6	
CD WG 70 MMCF Dec-1, 50 MMCF Dec-2		70-1, 50-2	NA		70-1, 50-2	NA	
PNV Million $				-$79 541			-$5 337
Timber Million CU FT/Dec				+ 19 843			- 12.100

1/ Includes Visual Middleground Constraint
2/ NA - Management emphasis is not applicable in this alternative
3/ Includes "a lake" and "recsite" management emphasis in FORPLAN
4/ Not differentiated from MA-3

Table B-41
TRADEOFFS FOR ALTERNATIVE CONSTRAINTS
-- ALTERNATIVE C-DEPARTURE

Management Area/Constraint	Suitable Timber Acres	Alt C-dep vs Run No 7		Diff Suitable Tbr Acres	Alt C-dep vs Alt D		Diff Suitable Tbr Acres
MA-1 (MR Hrvst Dispersion)	432211	30 4% 1/	33 0%	- 191394	30 4% 1/	30 4% 1/	- 138225
MA-2 (Modified Timber Emph)	NA 2/	NA				NA	
MA-3 (Big Game Emphasis)	295565	12 7% 1/	33 0%	- 202031	12 7% 1/	12 7% 1/	+ 132349
MA-5 (Phillips Lake)	1743	Selection	NA	+ 1743	Selection	Selection	0
MA-6 (Undeveloped Disp Rec)	32828	Min Lvl	Min Lvl	+ 32828	Min Lvl	Min Lvl	+ 623
MA-7 (Wild & Scenic Rivers)	3996	Selection	Selection	- 88	Selection	Selection	- 123
MA-11 (NRA Disp Rec/Timber)	44057	Selection	Selection	+ 10722	Selection	Selection	- 5343
MA-15 (Old Growth)	38196	Min Lvl	Min Lvl	+ 10012	Min Lvl	Min Lvl	0
MA-16 (Admin Sites, Rec Sites) 3/	2411	Min Lvl	NA	+ 2411	Min Lvl	Min Lvl	0
MA-18 (Anadromous Fish Habitat)	4/	NA				NA	
Riparian	19029	Selection	Selection	- 730	Selection	Selection	0
Visual Foreground	49469	NA	Selection	+ 49469	Selection	Selection	+ 19
Other Constraints							
Timber Target Million CU FT/Dec		354 6	PNV		354 6	90% 294.6	
PNV Million $				-$79 540			-$12 133
Timber Million CU FT/Dec				+ 19,843			+ 90 000

1/ Includes Visual Middleground Constraint
2/ NA - Management emphasis is not applicable in this alternative
3/ Includes "a lake" and "recsite" management emphasis in FORPLAN
4/ Not differentiated from MA-3

Table B-42
TRADEOFFS FOR ALTERNATIVE CONSTRAINTS
-- ALTERNATIVE D --

Management Area/Constraint	Suitable Timber Acres	Alt D vs Run No 7		Diff Suitable Tbr Acres	Alt D vs. Alt B		Diff Suitable Tbr Acres
MA-1 (MR Hrvst Dispersion)	570436	30 4% 1/	33 0%	- 53169	30 4% 1/	33 0% 1/	- 50658
MA-2 (Modified Timber Emph)	NA 2/		NA			16 6%	- 174036
MA-3 (Big Game Emphasis)	163216	12 7% 1/	33 0%	- 14945	12 7% 1/	NA	+ 163216
MA-5 (Phillips Lake)	1743	Selection	NA	+ 1743	Selection	Selection	0
MA-6 (Undeveloped Disp Rec)	32205	Min Lvl	Min Lvl	+ 32205	Min Lvl	Min Lvl	+ 32205
MA-7 (Wild & Scenic Rivers)	4119	Selection	Selection	+ 35	Selection	Selection	- 1569
MA-11 (NRA Disp Rec/Timber)	49400	Selection	Selection	+ 16065	Selection	Selection	+ 11550
MA-15 (Old Growth)	38196	Min Lvl	Min Lvl	+ 10012	Min Lvl	Min Lvl	+ 10012
MA-16 (Admin Sites, Rec Sites) 3/	2411	Min Lvl	NA	+ 2411	Min Lvl	Min Lvl	0
MA-18 (Anadromous Fish Habitat)	NA		NA			NA	
Riparian	19029	Selection	Selection	- 730	Selection	Selection	- 730
Visual Foreground	49450	Selection	NA	+ 49450	Selection	Selection	+ 29186
Other Constraints *Timber Target Million CU FT/Dec*		*90% 294 6*	PNV		*90% 294 6*	*85% 310 1*	
PNV Million $				-$74 203			-$36 833
Timber Million CU FT/Dec				+ 31.943			- 15 500

1/ Includes Visual Middleground Constraint
2/ NA - Management emphasis is not applicable in this alternative.
3/ Includes "a lake" and "recsite" management emphasis in FORPLAN

Table B-43
TRADEOFFS FOR ALTERNATIVE CONSTRAINTS
-- ALTERNATIVE E --

Management Area/Constraint	Suitable Timber Acres	Alt E vs Run No 7		Diff Suitable Tbr Acres	Alt E vs Alt B		Diff Suitable Tbr.Acres
MA-1 (MR Hrvst Dispersion)	544540	33 0%	33 0%	- 79065	33 0%	33.0%	- 76554
MA-2 (Modified Timber Emph)	154228	16 6%	NA	+ 154228	16 6%	16 6%	- 19808
MA-3 (Big Game Emphasis)	NA 1/		33 0%	- 178161		NA	
MA-5 (Phillips Lake)	1743	Selection	NA	+ 1743	Selection	Selection	0
MA-6 (Undeveloped Disp Rec)	127648	Min Lvl	Min Lvl	+ 127648	Min Lvl	Min Lvl	+ 127648
MA-7 (Wild & Scenic Rivers)	3693	Selection	Selection	- 391	Selection	Selection	- 1995
MA-11 (NRA Disp Rec/Timber)	49420	Selection	Selection	+ 16085	Selection	Selection	+ 11570
MA-15 (Old Growth)	23295	Min Lvl	Min Lvl	- 4889	Min Lvl	Min Lvl	- 4889
MA-16 (Admin Sites, Rec Sites) 2/	2411	Min Lvl	NA	+ 2411	Min Lvl	Min Lvl	0
MA-18 (Anadromous Fish Habitat)	NA		NA			NA	
Riparian	16829	Selection	Selection	- 2930	Selection	Selection	- 2930
Visual Foreground	21027	Selection	NA	+ 21027	Selection	Selection	+ 763
Other Constraints							
Timber Target Million CU FT/Dec		90% 276.5	PNV		90% 276 5	85% 310.1	
PNV Million $				-$69,198			-$31 827
Timber Million CU FT/Dec				+ 13 843			- 33 606

1/ NA - Management emphasis is not applicable in this alternative
2/ Includes "a lake" and "recsite" management emphasis in FORPLAN

Table B-44
TRADEOFFS FOR ALTERNATIVE CONSTRAINTS
-- ALTERNATIVE F --

Management Area/Constraint	Suitable Timber Acres	Alt F vs Run No. 7		Diff Suitable Tbr Acres	Alt F vs Alt C		Diff Suitable Tbr Acres
MA-1 (MR Hrvst Dispersion)	NA 2/		33 0%	- 623605		30 9% 1/	- 482429
MA-2 (Modified Timber Emph)	NA		NA			NA	
MA-3 (Big Game Emphasis)	691018	12 7% 1/	33 0%	+ 512857	12 7% 1/	13 0% 1/	+ 443667
MA-5 (Phillips Lake)	1743	Selection	NA	+ 1743	Selection	Selection	0
MA-6 (Undeveloped Disp Rec)	64938	Min Lvl	Min Lvl	+ 64938	Min Lvl	Min Lvl	+ 20753
MA-7 (Wild & Scenic Rivers)	3670	Selection	Selection	- 414	Selection	Selection	- 351
MA-11 (NRA Disp Rec/Timber)	34344	Selection	Selection	+ 1009	Selection	Selection	- 7635
MA-15 (Old Growth)	40312	Min Lvl	Min Lvl	+ 12128	Min Lvl	Min Lvl	+ 3013
MA-16 (Admin Sites, Rec Sites) 3/	2411	Min Lvl	NA	+ 2411	Min Lvl	Min Lvl	0
MA-18 (Anadromous Fish Habitat)	4/		NA			4/	
Riparian	18409	Selection	Selection	- 1350	Selection	Selection	- 434
Visual Foreground	47957	Selection	Selection	+ 47957	Selection	Selection	+ 7534
Other Constraints							
Timber Target Million CU FT/Dec		90% 214 5	PNV		90% 214 5	90% 282 5	
CD WG 70 MMCF Dec-1, 50 MMCF Dec-2		NA	NA		NA	70-1;50-2	
PNV Million $				-$114 960			-$35 419
Timber Million CU FT/Dec				- 48 157			- 68 000

1/ Includes Visual Middleground Constraint
2/ NA - Management emphasis is not applicable in this alternative
3/ Includes "a lake" and "recsite" management emphasis in FORPLAN
4/ Not differentiated from MA-3

Table B-45
TRADEOFFS FOR ALTERNATIVE CONSTRAINTS
-- ALTERNATIVE G --

Management Area/Constraint	Suitable Timber Acres	Alt G vs Run No 7		Diff Suitable Tbr.Acres	Alt G vs Alt B		Diff Suitable Tbr Acres
MA-1 (MR Hrvst Dispersion)	566128	33 0%	33.0%	- 57477	33 0%	33 0%	- 54966
MA-2 (Modified Timber Emph)	164820	16 6%	NA 1/	+ 164820	16 6%	16.6	- 9216
MA-3 (Big Game Emphasis)	NA 2/		33 0%	- 178161		NA	
MA-5 (Phillips Lake)	1743	Selection	NA	+ 1743	Selection	Selection	0
MA-6 (Undeveloped Disp Rec)	10186	Min Lvl	Min Lvl	+ 10186	Min Lvl	Min Lvl	+ 10186
MA-7 (Wild & Scenic Rivers)	4128	Selection	Selection	+ 44	Selection	Selection	- 1560
MA-11 (NRA Disp Rec/Timber)	29675	Selection	Selection	- 3680	Selection	Selection	- 8175
MA-15 (Old Growth)	27456	Min Lvl	Min Lvl	- 728	Min Lvl	Min Lvl	- 728
MA-16 (Admin Sites, Rec Sites) 2/	2411	Min Lvl	NA	+ 2411	Min Lvl	Min Lvl	0
MA-18 (Anadromous Fish Habitat)	NA		NA			NA	
Riparian	19573	Selection	Selection	- 186	Selection	Selection	- 186
Visual Foreground	14705	Selection	Selection	+ 14705	Selection	Selection	- 5559
Other Constraints							
Timber Target Million CU FT/Dec		PNV	PNV		PNV	85% 310 1	
Harv Stds with Positive PNV		Yes	NA		Yes	NA	
PNV Million $				-$21 260			+$16 090
Timber Million CU FT/Dec				- 17.338			- 64 781

1/ NA - Management emphasis is not applicable in this alternative.
2/ Includes "a lake" and "recsite" management emphasis in FORPLAN

Table B-46
TRADEOFFS FOR ALTERNATIVE CONSTRAINTS
-- ALTERNATIVE H --

Management Area/Constraint	Suitable Timber Acres	Alt H vs Run No 7		Diff Suitable Tbr Acres	Alt H vs Alt C		Diff Suitable Tbr Acres
MA-1 (MR Hrvst Dispersion)	420007	30 4% 1/	33 0%	- 203598	30 4% 1/	30 9% 1/	- 62422
MA-2 (Modified Timber Emph)	NA 2/		NA			NA	
MA-3 (Big Game Emphasis)	283169	12 7% 1/	33 0%	+ 105008	12 7% 1/	13 0% 1/	+ 35818
MA-5 (Phillips Lake)	1743	Selection	NA	+ 1743	Selection	Selection	0
MA-6 (Undeveloped Disp Rec)	32828	Min Lvl	Min Lvl	+ 32828	Min Lvl	Min Lvl	- 11357
MA-7 (Wild & Scenic Rivers)	3963	Selection	Selection	- 121	Selection	Selection	- 58
MA-11 (NRA Disp Rec/Timber)	28977	Selection	Selection	- 4358	Selection	Selection	- 13002
MA-15 (Old Growth)	38196	Min Lvl	Min Lvl	+ 10012	Min Lvl	Min Lvl	+ 897
MA-16 (Admin Sites, Rec Sites) 3/	2411	Min Lvl	NA	+ 2411	Min Lvl	Min Lvl	0
MA-18 (Anadromous Fish Habitat)	NA		NA			4/	
Riparian	19029	Selection	Selection	- 730	Selection	Selection	+ 186
Visual Foreground	49063	Selection	Selection	+ 49063	Selection	Selection	+ 8640
Other Constraints							
Timber Target Million CU FT/Dec		80% 247 8	PNV		80% 247 8	90% 282 5	
CD WG 70 MMCF Dec-1, 50 MMCF Dec-2		NA	NA		NA	70-1,50-2	
PNV Million $				-$58 322			+$21 217
Timber Million CU FT/Dec				- 14 857			- 34 700

1/ Includes Visual Middleground Constraint
2/ NA - Management emphasis is not applicable in this alternative
3/ Includes "a lake" and "recsite" management emphasis in FORPLAN
4/ Not differentiated from MA-3

Literature Cited

Alward, Gregory S and Charles J. Palmer IMPLAN: An Input-Output Analysis System for Forest Service Planning. n.d.

Barrett, James W 1978. Height Growth and Site Index Curves for Managed, Even-aged Stands of Ponderosa Pine in the Pacific Northwest USDA Forest Service Res Paper PNW-232 14 pp

Barrett, James W 1979. Silviculture of Ponderosa Pine in the Pacific Northwest The State of Our Knowledge. USDA Forest Service Gen. Tech Rep PNW-97, 106 pp

Beecher, Jan A Social Profile of Eastern Oregon Counties Boulder, Colorado Western Interstate Commission for Higher Education, 1975

Cartwright, J. Estimating the Regional Economic Impact of Forest Service Programs Regional Analyses Division, Bureau of Economic Analysis, U S. Department of Commerce 1979

Center for Population Research and Census (CPRC) Portland State University, Letter Report, December 31, 1984 Original source U S. Department of Commerce, Bureau of the Census

Cochran, P H 1979A. Gross Yield for Even-aged Stands of Douglas-fir and White or Grand Fir East of the Cascades in Oregon and Washington. USDA Forest Service Res Paper PNW-263. 17 pp

Cochran, P. H. 1979B Site Index and Height Growth Curves for Managed, Even-aged Stands of Douglas-fir East of the Cascades in Oregon and Washington. USDA Forest Service Res Paper PNW-251. 6 pp

Cochran, P. H. 1979C Site Index and Height Growth Curves for Managed, Even-aged Stands of White or Grand Fir East of the Cascades in Oregon and Washington. USDA Forest Service Res. Paper PNW-252 13 pp

Collard, Ernest B 1981. Evaluation of Two Yield Project Methods for Uneven-Aged Forest Management on the Wallowa-Whitman National Forest Baker City, OR

Dahms, Walter G 1964. Gross and Net Yield Tables for Lodgepole Pine. USDA Forest Service Res Paper PNW-8 14 pp.

Del Rio, Ernest, Alan B Berg 1979 Growth of Douglas-fir Reproduction in the Shade of a Managed Forest Oregon State University Res. Paper 40 14 pp.

Dunn and Bradstreet Corporation. Employment Data (Computer Tapes) 1977

Eastern Oregon Community Development Council. (EOCDC) The Other Side of the Mountains. La Grande, Oregon· EOCDC; 1975

Fisch, O and S Gordon. An Evaluation of Three Approaches to Input- Output: The Economic Submodels of Fruk, Jameson, and Northrup in NSF--RANN Funded Regional Environmental Systems Projects Report to the National Science Foundation. 1978.

Ford-Robertson, F. C (ed) 1971. Terminology of Forest Science, Technology, Practice, and Products Society of American Foresters, Washington, D. C., 349 pp

Franklin, Jerry F and others Ecological Characteristics of Old-Growth Douglas-fir Forests. Gen. Tech Rep. PNW-118. USDA Forest Service Pacific Northwest Forest and Range Experiment Station. 1981.

Gordon, Donald T. 1973 Released Advance Reproduction of White and Red Fir... Growth, Damage, Mortality USDA Forest Service Res Paper PSW-95. 12 pp

Hall, Fred C. 1973. Plant Communities of the Blue Mountains of Eastern Oregon and Southeastern Washington. USDA Forest Service, PNW Region, R-6 Area Guide 3-1. 62 pp.

Knapp, Walter H. 1974 Area Analysis· Stand Models and Yield Tables. Unpublished document supporting the Ochoco National Forest Timber Management Plan

Ledig, F. T , and D. M Smith 1980. The Influence of Silvicultural Practices on Genetic Improvement. Height Growth and Weevil Resistance in Eastern White Pine. School of Forestry and Environmental Studies, Yale University, New Haven, CT, revision.

Loomis, John and Cindy Sorg. A Critical Summary of Empirical Estimates of the Values of Wildlife, Wilderness, and General Recreation Related to National Forest Regions Rocky Mountain Forest and Range Experiment Station, USDA Forest Service, 1982.

Marquis, David A. 1976 Combined Proceedings of two in-Service workshops held in Morgantown, WV, July 15-7, 1975 and in Redding, CA, October 19-22, 1976. Principle Research Silviculturist, Northeastern Forest Experiment Station

Mason, Bob. 1979 Annual Economic Report for Baker County. State of Oregon Employment Division, Department of Human Resources. 1979a

Mason, Bob. 1979 Annual Economic Report for Union County. State of Oregon Employment Division, Department of Human Resources. 1979b.

Mason, Bob. 1979 Annual Economic Report for Wallowa County State of Oregon Employment Division, Department of Human Resources. 1979c.

McMenamin, D. G. and J. E Harring. An Appraisal of Non-Survey Techniques for Estimating Regional Input-Output Models. Journal of Regional Science 14(2).

Meyers, Walter H. 1961 Yield of Even-Aged Stands of Ponderosa Pine. USDA Tech. Bull. No 630, 59 pp.

Miernyk, W. H. The Elements of Input-Output Analyses Random House, New York. 1965

Myers, Walter H. 1934 Growth in Selectively Cut Ponderosa Pine Forests of the Pacific Northwest USDA Tech. Bull No. 4076, 64 pp

Palmer, Charles J I-O Study Team Contributions. 1976.

Pekar, Dale J. A Social Appraisal of Oregon's Northeast Counties. USDA Forest Service, Wallowa-Whitman National Forest Baker City, Oregon. 1981

Polenski, K. A Multiregional Input-Output Model for the U S Report No 21. Economic Development Administration, U. S. Department of Commerce. Washington, D. C 1970.

Richardson, H. W Input-Output and Regional Economics John Wiley and Sons, New York 1972

Roesler, T. W., F. C Lamphear, and M. E. Beveridge. The Economic Impact of Irrigated Agriculture on the Economy of Nebraska. Nebraska Economic and Business Reports Number Four. Bureau of Business Research, University of Nebraska Lincoln, Nebraska 1968

Rosenthal, Donald H. and Thomas C Brown Comparability of Market Prices and Consumer Surplus for Resource Allocation Decisions. Journal of Forestry. 1985 March· 105-109

Row, Clark, H. Fred Kaiser, and John Sessions. Discount Rate for Long-Term Forest Service Investments 1981.

Schaffer, W. A. and K Chu Nonsurvey Techniques for Constructing Regional Interindustry Models Papers of the Regional Science Association 23:83--101. 1969

Sidel, Ken In USDA Forest Service 1973 Silvicultural Systems for the Major Forest Types of the United States. U. S. Department of Agriculture Handbook 445, 124 pp.

Siverts, Eric Personal Communication with Dale Pekar, January 28, 1985.

Smith, D. M. 1962 The Practice of Silviculture. 7th edition Wiley and Sons, NY, 578 pp.

Stage, Albert R. 1973 Prognosis Model for Stand Development USDA Forest Service Res Pap INT-137, 32 pp

Stone, R and G Brown. Behavioral and Technical Change in Economic Models. Papers of the Second Congress of the International Economic Association Vienna 1962

Street, Bill. Economic Survey Analyses. State of Oregon Employment Division, Department of Human Resources 1984.

Thomas, Jack Ward, ed. 1979 Wildlife Habitats in Managed Forests - the Blue Mountains of Oregon and Washington. USDA For Serv , Agric. Handb. 553, 512 p.

U S. Department of Agriculture. Agriculture Statistics. Washington, D. C. 1979b.

U S Department of Commerce, Bureau of Census. Census of Agriculture, 1977. Washington, D. C 1977a.

U S Department of Commerce, Bureau of the Census Census of Governments, 1977 Washington, D C 1977d.

U S Department of Commerce, Bureau of Census. Census of Housing, 1970 Washington, D. C. 1970

U. S Department of Commerce, Bureau of the Census County Business Patterns, Payroll and Employment Data, 1977 (Computer Tapes). Washington, D. C 1977c

U S Department of Commerce, Bureau of Economic Analysis The Detailed Input-Output Structure of the U S Economy Vols I and II Washington, D C 1979a

U. S Department of Commerce, Bureau of Economic Analysis. National Income and Product Accounts 59(7). Washington, D. C. 1979b.

USDA Forest Service. 1983 Silvicultural Systems for the Major Forest Types of the United States Agricultural Handbook No. 445, 114 pp.

USDA Forest Service. 1984. Regional guide for the Pacific Northwest Region. PNW Region, Portland, OR.

Valde, Gary. Baker County Resource Atlas 1973. Corvallis, Oregon: Oregon State University; 1973a.

Valde, Gary. Union County Resource Atlas 1973 Corvallis, Oregon: Oregon State University; 1973b.

Valde, Gary. Wallowa County Resource Atlas 1973 Corvallis, Oregon: Oregon State University; 1973c.

Wood, Donald C. 1979. Timber Yield Projection for Regeneration Areas on the Ochoco National Forest. Prineville, OR

Wykoff, W. R., N L. Crookston, and A R. Stage 1981. Users Guide to the Stand Prognosis Model. USDA Forest Service Gen. Tech Report INT Review Draft.

APPENDIX C

Undeveloped Areas

APPENDIX C

UNDEVELOPED AREAS

BACKGROUND

During the first Roadless Area Review and Evaluation (RARE, FEIS October 1973) 14 roadless areas were identified on the Wallowa-Whitman National Forest. One, the Lower Minam, was selected for wilderness study. (Public Law 92-521, 1972, had already directed that the Lower Minam be studied for wilderness designation RARE recognized this direction)

Five areas were studied for wilderness designation through the Wallowa Valley Unit Planning effort (FEIS November 1975) All were recommended for nonwilderness uses and were eliminated from the RARE inventory.

With the change in the federal administration in 1976 roadless area inventory criteria received less rigid interpretation and RARE II was initiated. This resulted in many new areas on the Forest being identified and several being combined.

Five areas were studied during the Grande Ronde Unit Planning Process (FEIS April 1978) All were allocated to nonwilderness uses and eliminated from the RARE II inventory.

The final RARE II inventory showed 43 areas, all of which are wholly or partially within the Wallowa-Whitman administrative area This included two on the Nez Perce National Forest within the Hells Canyon National Recreation Area (HCNRA)

RARE II (FEIS January 1979) left 5 areas, all within the HCNRA, to be resolved through the HCNRA planning process. The HCNRA decision (FEIS April 1982) recommended two areas for wilderness in their entirety, part of another for wilderness, one for further planning, and the remainder for nonwilderness uses The further planning area (Homestead) lies partially on land administered by the USDI, Bureau of Land Management (BLM) and that agency is taking the lead in conducting that study

The Oregon Wilderness Act of 1984 designated the same three HCNRA areas (Westside Reservoir Face, McGraw Creek, and part of Lick Creek) for wilderness. It also designated the Park and Lower Minam areas for wilderness in their entirety, thus eliminating them from the inventory. Many other areas from other parts of the Forest were partially included in the Wilderness Act.

In reference to the Oregon Wilderness Act and the Hells Canyon NRA Wilderness additions, the Senate Committee on Energy and Natural Resources (May 14, 1984) provided the following direction:

"The Committee notes that the designation of these areas as wilderness satisfies the requirements of wilderness study as directed by P. L. 94-199. The Committee also expects the management of all other roadless areas included in P L. 94-199 to be managed according to the direction provided within the Hells Canyon Natural Recreation Area Comprehensive Management Plan."

The Oregon Wilderness Act, P L 98-328, Sec. 7(b)(2) makes it clear that RARE II areas are released from consideration for wilderness until Forest Plans are revised. The only exceptions are those areas

designated for further planning The Homestead roadless area is the only area designated for further planning on the Wallowa-Whitman

Two areas have recently been eliminated from the roadless area inventory because of timber harvesting and associated development. These are the Owsley and a small remnant of the North Fork John Day Roadless Area that was not placed in wilderness by the Oregon Wilderness Bill of 1984 In 1984 the small Dunns Bluff area (1,013 acres) was identified and added to the roadless area inventory. Since it was inventoried after RARE II and was not considered by Congress in the deliberations leading to the Oregon Wilderness Bill of 1984, it is eligible for wilderness recommendation through the current Forest planning process

There are now 38 roadless areas on the Forest and this appendix deals with these areas Six, however, are shared with the Umatilla National Forest which in each case has the largest portion Although included in the data in this appendix, the Forest Land and Resource Management Plan EIS for the Umatilla National Forest will provide more detail on each of these six areas.

Roadless area review within the Hells Canyon NRA was completed during development of the Hells Canyon National Recreation Area Comprehensive Management Plan and Environmental Impact Statement, 4/30/82 McGraw Creek and Westside Reservoir Face were entirely allocated to wilderness.

The bottom of Table C-3 shows the numbers and acres of roadless areas that will remain in an undeveloped condition by alternative within the HCNRA For a more detailed description and wilderness evaluations, see the Hells Canyon FEIS, Appendix D.

The following tables and other information deal primarily with those roadless areas that lie outside the Hells Canyon NRA, i.e., those that are affected by the alternatives described in this EIS

1 Table C-1 showing the roadless area status with changes that have occurred and the reason for change.

2 Table C-2 showing roadless areas that no longer meet minimum requirements for wilderness consideration

3 Table C-3 which shows the numbers, acres, and percentage of numbers and acres of roadless areas that are in an undeveloped condition by alternative

4 Table C-4 which shows the potential annual timber volume, standing volume, and lands suitable for timber production by roadless area

5. Table C-5 which shows the acres by recreation opportunity spectrum classes for the current situation

6 Descriptions of roadless areas including discussions of capability, availability, and need for wilderness Also included are one-half inch per mile maps of each area.

Table C-1
ROADLESS AREA STATUS (FEDERAL LANDS)

Roadless Areas Outside the HCNRA

NAME	RARE NUMBER	ORIGINAL ACRES	CURRENT ACRES	REASON FOR CHANGE
Beaver Creek	276	22,976	12,470	Timber harvest
Boulder Park	282	13,040	12,311	Wilderness addition
Castle Ridge	278	9,065	8,300	More accurate mapping
Deadhorse	GO8	10,520	10,451	More accurate mapping
Dunns Bluff	WW1	1,013	1,013	New roadless area
Grande Ronde 1/	267	5,100	4,890	More accurate mapping
Greenhorn 2/	252	160	161	*More accurate mapping*
Hellhole 1/	261	200	513	More accurate mapping
Huckleberry	289	21,800	10,107	Wilderness addition, Timber harvest
Hurricane Creek	288	6,200	1,623	Wilderness addition
Joseph Canyon	GO4	28,060	23,602	Timber harvest
Little Creek	280	2,080	2,907	More accurate mapping
Little Eagle Meadows	283	8,080	7,140	*Wilderness addition*
Little Sheep	286	6,360	5,278	Wilderness addition
Lower Minam	279	32,884	0	Wilderness addition
Marble Point	271	7,170	7,135	More accurate mapping
Monument Rock 3/	240	12,300	5,958	New wilderness
Mount Emily	277	10,560	8,822	More accurate mapping, Timber harvest
North Mount Emily 1/	262	660	772	*More accurate mapping*
Park	287	640	0	Wilderness addition
Reservoir	284	11,360	13,595	More accurate mapping
Squaw 1/	601	5400	3,220	Timber harvest
Tope Creek	GO3	7,000	8,674	More accurate mapping
Tower 1/	256	100	85	More accurate mapping
Twin Mountain	273	72,820	60,903	New wilderness
Upper Catherine Creek	281	15,260	6,844	Wilderness addition, Timber harvest
Upper Grande Ronde	275	15,290	11,810	Timber harvest

Roadless Areas Within (or partially within) the HCNRA

Big Canyon (Idaho)	853	16,500	14,236	More accurate mapping
Buckhorn	297	16,318	16,022	More accurate mapping
Cook Ridge	299	19,900	19,422	More accurate mapping
Klopton Creek-Corral Creek (Idaho)	854	23,520	20,325	More accurate mapping
Homestead 4/	291	6,260	5,733	More accurate mapping
Imnaha Face	294	28,710	28,716	More accurate mapping
Lake Fork	290	20,555	17,663	More accurate mapping HCNRA land allocation
Lick Creek	285	5,880	2,143	Wilderness addition
Lord Flat Somers Point	295	74,700	68,295	More accurate mapping
McGraw Creek	292	5,900	0	Wilderness addition
Mountain Sheep	298	14,700	16,777	More accurate mapping
Sheep Divide	602	15,700	16,178	More accurate mapping
Snake River	296	33,595	29,933	More accurate mapping
Westside Reservoir Face	293	14,100	0	Wilderness addition
Wildhorse	300	20,800	19,868	More accurate mapping

1/ Portions also lie within Umatilla National Forest
2/ Portions also lie within Malheur and Umatilla National Forests
3/ Portions also lie within Malheur National Forest
4/ Portions also lie within lands administered by USDI Bureau of Land Management

Table C-2
ROADLESS AREAS NO LONGER MEETING MINIMUM
REQUIREMENTS FOR WILDERNESS CONSIDERATION

NAME	RARE #	REASON FOR CHANGE
North Fork John Day 1/	253	Timber sales, wilderness addition
Owsley 1/	259	Less than 5,000 acres

1/ Portions also lie within Umatilla National Forest.

7 A discussion of environmental consequences of the roadless areas remaining roadless as well as the consequence of developing of them for nonwilderness uses

8. Table C-6 which shows the roadless area designation by management strategy by alternative.

9. Table C-7 which shows the approximate annual timber harvest by alternative by roadless area.

10. Table C-8 which shows the recreation opportunity spectrum by alternative by roadless area.

11. Table C-9 which shows the road miles by alternative by roadless area for decades one through three.

The reader is also referred to Chapters III and IV for additional information on roadless areas

Table C-3
NONDEVELOPMENT MANAGEMENT AREAS
(Acres by Alternative)

ROADLESS AREA NAME	RARE#	A&NC	B&Bd	C	Cd&H	D	E	F	G
Beaver Creek	276						12,470		
Boulder Park	282	10460	2226	11211	5836	5836	12311	12311	2226
Castle Ridge	278	6806	974	4215	4215	4215	8300	8300	974
Deadhorse	GO8						10451		
Dunns Bluff	WW1	305		966	966	966	1013	1013	
Grande Ronde	267	4890	1864	4890	4890	4890	4890	4890	1864
Greenhorn	252	161					161		
Hellhole	261						513		
Homestead*	291	5733	5733	5733	5733	5733	5733	5733	5733
Huckleberry	289	2186		1951	1951	1951	10107	10107	
Hurricane Creek	288	1623		1504	1504	1504	1623	1623	
Joseph Canyon	GO4	2752	2752	2752	2752	2752	23602	2752	2752
Lake Fork*	290	2815	2765	8849	2765	2765	17663	2765	17663
Little Creek	280						2907	2907	
Little Eagle Meadows	283	6277	1561	6652	2792	2792	7140	7140	1561
Little Sheep	286	2124		4738	4738	4738	5278	5278	
Marble Point	271		2150	2297	2297	2297	7135	2141	2150
Monument Rock	240			2097	2097		5958	2125	
Mount Emily	277	8143					8822	8822	
North Mount Emily	262						772		
Reservoir	284	12616	6462	11743	11743	11743	13595	13595	6462
Squaw	601						3220		
Tope Creek	GO3						8674		
Tower	256						85		
Twin Mountain	273	44457	39259	49801	48007	46625	60903	48014	39259
Upper Catherine Creek	281	121		2071	2071	2071	6844	6844	
Upper Grande Ronde	275						11810		
NUMBERS W/O NRA	27	16	10	16	16	15	27	18	10
ACRES W/O NRA		111469	65746	121470	104357	100878	251980	146360	80644
% NUMBER W/O NRA		59	37	59	59	56	100	67	37
% ACRES W/O NRA		44	26	48	41	40	100	58	32
Big Canyon (Idaho)	853	14236	14236	14236	14236	14236	14236	14236	14236
Buckhorn	297	15466	15466	15466	15466	15466	15466	15466	15466
Cook Ridge	299	16149	16149	16149	16149	16149	16149	16149	16149
Corral Creek (Idaho)	854	19180	19180	19180	19180	19180	19180	19180	19180
Imnaha Face	294	25812	25812	25812	25812	25812	25812	25812	25812
Lick Creek	285	218	218	218	218	218	218	218	218
Lord Flat Somers Point	295	63912	63912	63912	63912	63912	63912	63912	63912
Mountain Sheep	298	16777	16777	16777	16777	16777	16777	16777	16777
Sheep Divide	602	16178	16178	16178	16178	16178	16178	16178	16178
Snake River	296	29933	29933	29933	29933	29933	29933	29933	29933
Wildhorse	300	14602	14602	14602	14602	14602	14602	14602	14602
NUMBER NRA	11	11	11	11	11	11	11	11	11
ACRES NRA		232463	232463	232463	232463	232463	232463	232463	232463
NUMBER WITH NRA	38	27	21	27	27	26	38	29	21
ACRES WITH NRA		343932	298209	353933	336820	333341	484443	378823	313107
% NUMBER WITH NRA		71	55	71	71	68	100	76	55
% ACRES WITH NRA		71	62	73	70	69	100	78	65

* Area lies partially within Hells Canyon National Recreation Area

Table C-4
TIMBER VOLUME & ACRES

Date 08/21/85 Roadless Area Name	Rare#	National Forest Acres	Forested Acres 2/	Unsuit Acres	Tent Suit Land Acres 3/	Annual Timber MMBF	Standing Volume MMBF
Beaver Creek	276	12,470	11,636	147	11,489	1 130	90 411
Boulder Park	282	12,311	7,443	2,888	4,555	726	58 115
Castle Ridge	278	8,300	7,287	172	7,115	829	66 358
Deadhorse	GO8	10,451	1,623	241	1,382	143	11 467
Dunns Bluff	WW1	1,013	850	18	832	070	5 568
Grande Ronde 1/	267	4,890	2,080	78	2,002	240	19 190
Greenhorn 1/	252	161	146	0	146	023	1 868
Hellhole 1/	261	513	361	0	361	071	5 681
Homestead	291	5,733	1,197	161	1,036	101	8 042
Huckleberry	289	10,107	7,970	741	7,229	779	62 331
Hurricane Creek	288	1,623	1,450	51	1,399	142	11 381
Joseph Canyon	GO4	23,602	7,911	803	7,108	775	61 981
Lake Fork	290	14,898	11,127	275	10,852	1 799	143 904
Little Creek	280	2,907	2,728	106	2,622	232	18 575
Little Eagle Meadows	283	7,140	4,649	1,124	3,525	531	42 475
Little Sheep	286	5,278	4,456	94	4,362	520	41 565
Marble Point	271	7,135	4,984	54	4,930	736	58 899
Monument Rock	240	5,958	3,315	532	2,783	317	25 365
Mount Emily	277	8,822	5,612	531	5,018	817	65 429
North Mount Emily 1/	262	772	516	66	450	086	6 841
Reservoir	284	13,595	5,756	911	4,845	807	64 530
Squaw 1/	601	3,220	3,097	0	3,097	310	24 832
Tope Creek	GO3	8,674	2,091	271	1,820	166	13 258
Tower 1/	256	85	85	0	85	008	622
Twin Mountain	273	60,903	32,391	9,616	22,775	3 359	268 704
Upper Catherine Creek	281	6,844	6,126	599	5,527	644	51 544
Upper Grande Ronde	275	11,810	11,273	298	10,975	1 214	97 143
TOTAL		249,215	148,160	19,777	128,320	16 575	1,326 079
1/ Shared with Umatilla NF		9,641	6,285	144	6,141	738	59 034

2/ Total forested land
3/ Tentatively suitable for timber production

Table C-5
RECREATION OPPORTUNITY SPECTRUM*
Current Situation (Acres)

Date 06/17/85 Roadless Area Name	Rare#	Rural	Road M	SPM	SPNM	Prim	Totals
Beaver Creek	276	0	3,494	0	8,976		12,470
Boulder Park	282	0	3,422	5,699	3,190	0	12,311
Castle Ridge	278	0	1,520	6,780	0	0	8,300
Deadhorse	GO8	0	244	4,090	6,117	0	10,451
Dunns Bluff	WW1	0	0	1,013	0	0	1,013
Grande Ronde	267	0	0	0	4,890	0	4,890
Greenhorn	252	0	161	0	0	0	161
Hellhole	261	0	513	0	0	0	513
Homestead	291	0	3,503	0	2,230	0	5,733
Huckleberry	289	0	2,155	1,690	6,262	0	10,107
Hurricane Creek	288	0	0	376	1,247	0	1,623
Joseph Canyon	GO4	0	1,606	12,597	9,399	0	23,602
Lake Fork	290	0	1,830	13,068	0	0	14,898
Little Creek	280	0	1,115	160	1,632	0	2,907
Little Eagle Meadows	283	0	1,450	3,530	2,160	0	7,140
Little Sheep	286	62	578	0	4,638	0	5,278
Marble Point	271	0	1,136	5,999	0	0	7,135
Monument Rock	240	0	1,537	2,003	2,418	0	5,958
Mount Emily	277	0	3,385	5,437	0	0	8,822
North Mount Emily	262	0	772	0	0	0	772
Reservoir	284	0	167	13,428	0	0	13,595
Squaw	601	0	3,220	0	0	0	3,220
Tope Creek	GO3	0	549	0	8,125	0	8,674
Tower	256	0	85	0	0	0	85
Twin Mountain	273	0	9,157	30,845	20,901	0	60,903
Upper Catherine Creek	281	0	2,013	3,681	1,150	0	6,844
Upper Grande Ronde	275	0	2,500	5,308	4,002	0	11,810
TOTAL		62	46,112	115,704	87,337	0	249,215

* Road M Roaded Natural/Modified
SPM Semiprimitive Motorized
SPNM Semiprimitive Nonmotorized
PRIM Primitive
(See glossary for definitions of terms)

ROADLESS AREA DESCRIPTIONS

Maps accompanying the following descriptions show the approximate roadless area boundaries The actual boundary is the line of demarkation between those areas which have been disturbed by human activity (such as timber harvesting and road building) and those which have not Lands undisturbed by human activity remain suitable for wilderness consideration

Boulder Park (6282) and Little Eagle Meadows (6283) Roadless Areas 12,311 Acres and 7,140 Acres

Description. The Boulder Park and Little Eagle Meadows areas border the Eagle Cap Wilderness on the south and southwest They lie about ten miles northwest of the town of Halfway, Oregon. Due to the 1984 additions to the Eagle Cap Wilderness, the remaining roadless areas consist of three segments in Boulder Park of approximately 9,600 acres, 700 acres, 2,000 acres, as well as the 7,100 acres in Little Eagle Meadows (see maps)

The largest (9,600-acre) portion contains Bennet Peak, Two Color Lake and the headwater areas tributary to Eagle Creek The area ranges from 4,400 feet elevation near the east fork of Eagle Creek to over 7,000 feet at Bennet Peak and is accessed from Forest Roads 7745 and 7755 A number of wheel track roads and roads to mines are along the boundaries of these areas The 2,000-acre segment is located near West Eagle Meadow at the headwaters of West Eagle Creek and includes portions of Fake Creek, at an elevation of about 5,600 feet. The smallest segment, about 700 acres, is next to Two Color Campground and near Cougar Meadow

These segments of the original Boulder Park Roadless Area are at lower elevation and are more heavily timbered than the 729 acres added to the Eagle Cap Wilderness They were not included in the original RARE study, but were a part of RARE II study Little Eagle Meadows was also not in the original RARE study, but was included in RARE II

The 7,100 acres in the Little Eagle Meadows area are mixed conifer forest land, grassland, and some rock outcrops. Portions of Kettle Creek, Twin Canyon Creek, and Sullivan Creek are in this vicinity. Elevations range from 4,400 feet near the east fork of Eagle Creek to 7,500 feet near the headwaters of Sullivan Creek

Soils are predominantly of granitic origin. No fish-bearing streams exist within these roadless areas, but water quality in the streams significantly affects the overall quality of main Eagle Creek, a heavy producer of rainbow trout No threatened and endangered plants or animals are known in these areas Several range allotments cover these roadless areas, providing late summer forage for domestic livestock All portions under discussion are outside the winter big-game range.

Recreation use is estimated at around 3,000 visitor days per year, mostly in association with fall big-game hunting Other use includes snowmobiling, hiking, and backpacking. The area is adjacent to Two Color Campground and Boulder Park Resort in the central portions, and established mining areas on the south and east

Approximately 3,400 acres of Boulder Park are within the roaded natural component of the recreation opportunity spectrum (ROS) while 5,700 acres are considered semiprimitive motorized and 3,200 are in the semiprimitive nonmotorized component Within Little Eagle Meadows, approximately 1,400 acres are roaded natural, while 3,500 acres are considered semiprimitive motorized and 2,200 acres are considered semiprimitive nonmotorized

WILDERNESS POTENTIAL

Capability. The boundaries of these parcels of the roadless areas are varied some on elevation lines, some on topographic features Some portions are close to roads and a campground, some isolated --- providing feelings of solitude to the user They are generally surrounded by National Forest System lands, with the exception of patented mining claims, private land and a resort along Eagle Creek and the east fork of Eagle Creek.

Recreational opportunities include hiking, horseback riding, backpacking, big-game hunting, snow-mobiling, cross-country skiing. Some opportunities exist for mountain climbing Open meadow areas, interspersed with forested land, offer opportunities for scenic vistas

Availability About 3,200 acres of the larger segment of the Boulder Park roadless area have been included in the boundaries of the Gold King timber sale, planned for FY 1989. The contract for the West Eagle Timber Sale, part of which extends into 40 acres of the smallest segment of the Boulder Park area on the west, was awarded in 1984. The northern boundaries of the Gold Eagle and Little Eagle Basin Timber Sales abut the Little Eagle Meadows area on the south. About 3,500 acres of the southwest portion of Little Eagle Meadows roadless area are included in the Sullivan Timber Sale, planned for FY 1989.

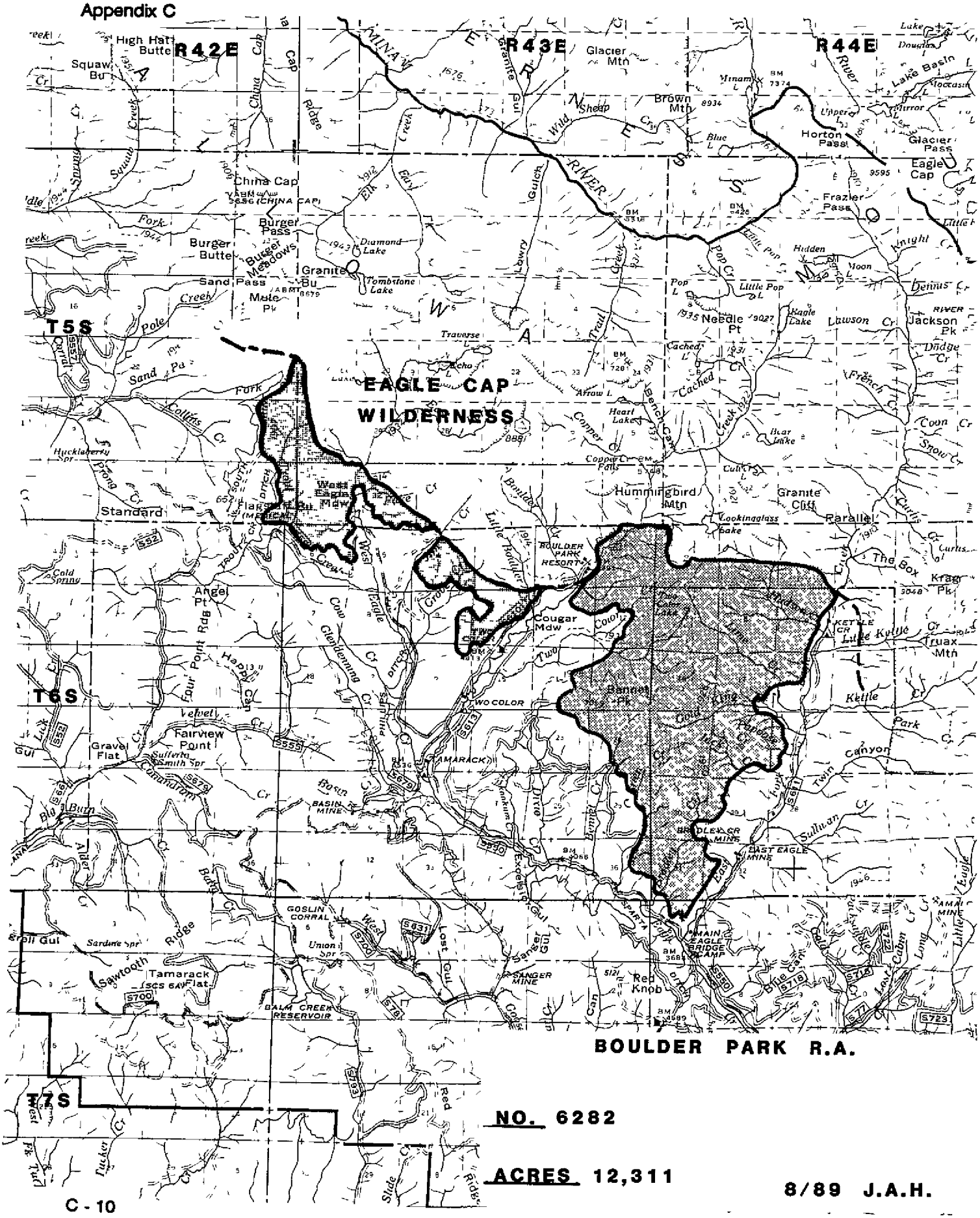
With the exception of the above mentioned timber sales, most of these lands have been managed under the Burnt Powder Unit Land Management Plan for preservation and enhancement of dispersed recreation opportunities.

The areas are mineralized, adjacent to a number of patented placer mines along Eagle Creek and include a number of unpatented lode claims in the interior Gold King area Structures associated with mining claims are scattered through the larger portion of Boulder Park and throughout the Little Eagle Meadows The Cornucopia Mining District, containing the largest gold-producing mine in Oregon, lies about six miles east of the eastern boundary of Boulder Park and is immediately adjacent to the eastern boundary of Little Eagle Meadows

Boulder Park contains 4,555 acres of productive forest land, containing 58 MMBF of standing timber. It has the potential to contribute 7 MMBF to the annual timber harvest Little Eagle Meadows contains 3,525 acres of productive forest land, containing 42 MMBF of standing timber and could contribute .5 MMBF to the annual timber harvest

Need. These roadless areas are remnants of larger areas that were added to the Eagle Cap Wilderness through the Oregon Wilderness Act of 1984. The portions added to the wilderness were relatively conflict-free. The remaining areas, as previously noted, contain timber and mineral values. The ecosystems represented in the remaining roadless portions are found in abundance in the existing adjoining wilderness. There appears to be no reason to consider retaining the areas for later wilderness consideration unless the purpose is only to add wilderness acres.

Appendix C

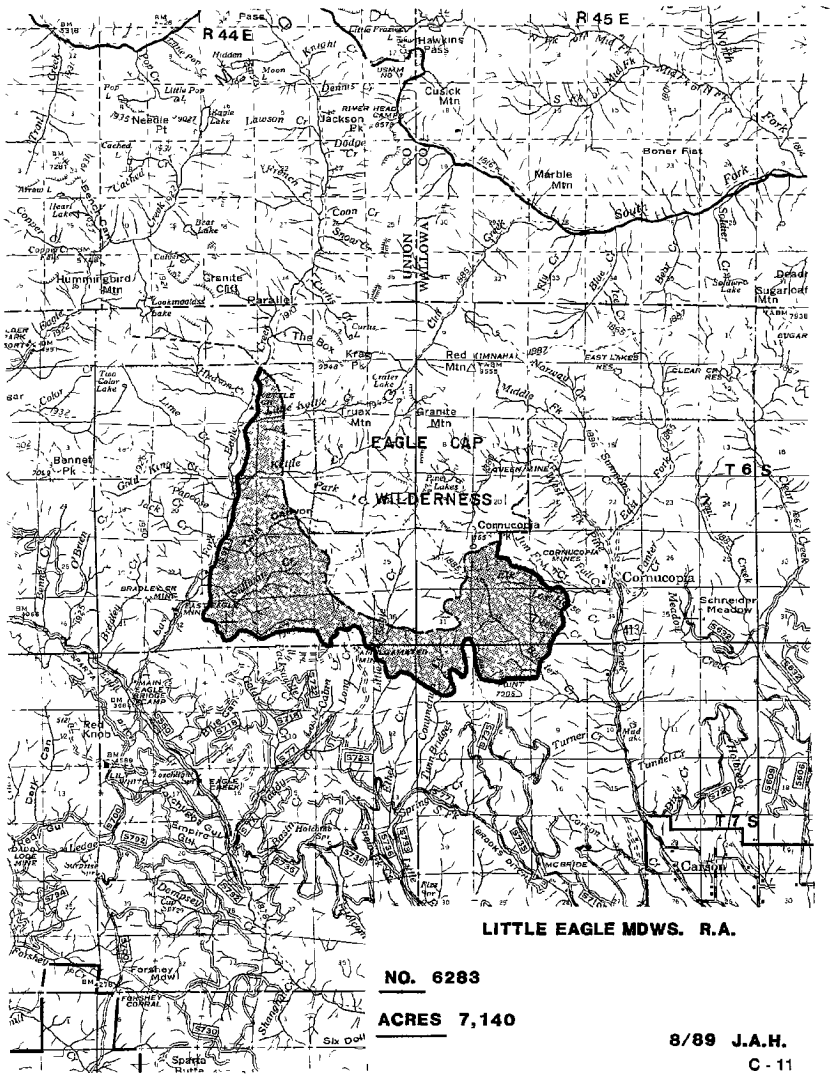


NO. 6282

ACRES 12,311

8/89 J.A.H.

C - 10



LITTLE EAGLE MDWS. R.A.

NO. 6283

ACRES 7,140

8/89 J.A.H.

C - 11

Castle Ridge Roadless Area (6278)
8,300 Acres

Description. This area was inventoried during the second Roadless Area Review and Evaluation (RARE II) but was eliminated from the inventory through the decision to implement the Grande Ronde Planning Unit Final Environmental Impact Statement The area was allocated to nonwilderness uses in the unit plan

Lying some four miles northeast of the town of Cove, this area contains the upper reaches of the Indian Creek, Camp Creek, and Warm Creek drainages Topography is gentle and rolling. Elevations range from 5,100 feet to over 7,000 feet The area slopes gradually to the north The northern third of the area (lower elevation) is considered a good timber growing site and contains stands of Douglas-fir, white fir, lodgepole pine, Engelmann spruce, and western larch. The southern two-thirds is high in elevation and is dominated by dense stands of lodgepole pine, much of which is stunted and of poor or noncommercial quality Soils originated from basalt

The southeast corner of the area contains the only Research Natural Area (RNA) on the Forest. It contains 974 acres of the roadless area The RNA has been established to preserve a mountain hemlock and associated species plant community

The area is natural in appearance but its topography and dense, continuous lodgepole stands are somewhat monotonous and make cross-country travel difficult

Scattered throughout the area are large rock outcrops referred to as monadnocks which rise above the surrounding timber stands These formations provide a degree of variety in an area that otherwise is relatively lacking in scenic or geologic features

Current recreation use is nearly all related to big-game hunting during the fall, bringing the total annual use to approximately 2,000 recreation visitor days Approximately 82 percent of the area is in the semiprimitive motorized component of the recreation opportunity spectrum while the remainder is considered roaded natural. The roaded natural component results from the influence of the roads along the perimeter of the area

WILDERNESS POTENTIAL

Capability. Because of its compact shape and easily defined boundaries, management of the area as wilderness would not be particularly difficult Forest roads provide ready access from the Grande Ronde Valley. The area is separated from the Eagle Cap Wilderness on the east by an unobtrusive road and the Dunns Bluff Roadless Area, a one-fourth mile wide undeveloped strip. (See Dunns Bluff description in this section)

The area is natural appearing throughout The evidence of foot and horse use on trails are the only noticeable imprints of human activities There are ample opportunities for solitude and unconfined recreation activities, and the dense, extensive tree canopy would provide a certain navigation challenge.

No threatened and endangered species of plants or animal species are known to be in the roadless area, nor are there known opportunities for historical or archaeological study. The Indian Creek RNA provides opportunities for scientific study, this would be available regardless of wilderness classification

Availability. The area has low potential for recreational use as evidenced by the low level of interest in the area at present The area has a high potential for limited forms of recreation use but the lack of variety indicates use would remain low Wildlife provide the primary recreation attraction, especially deer and elk which are found throughout the area during spring, summer, and fall seasons. Fish are limited to small native trout species and are utilized very little.

There are no power withdrawals, proposed impoundments, or other encumbrances, water-related or otherwise

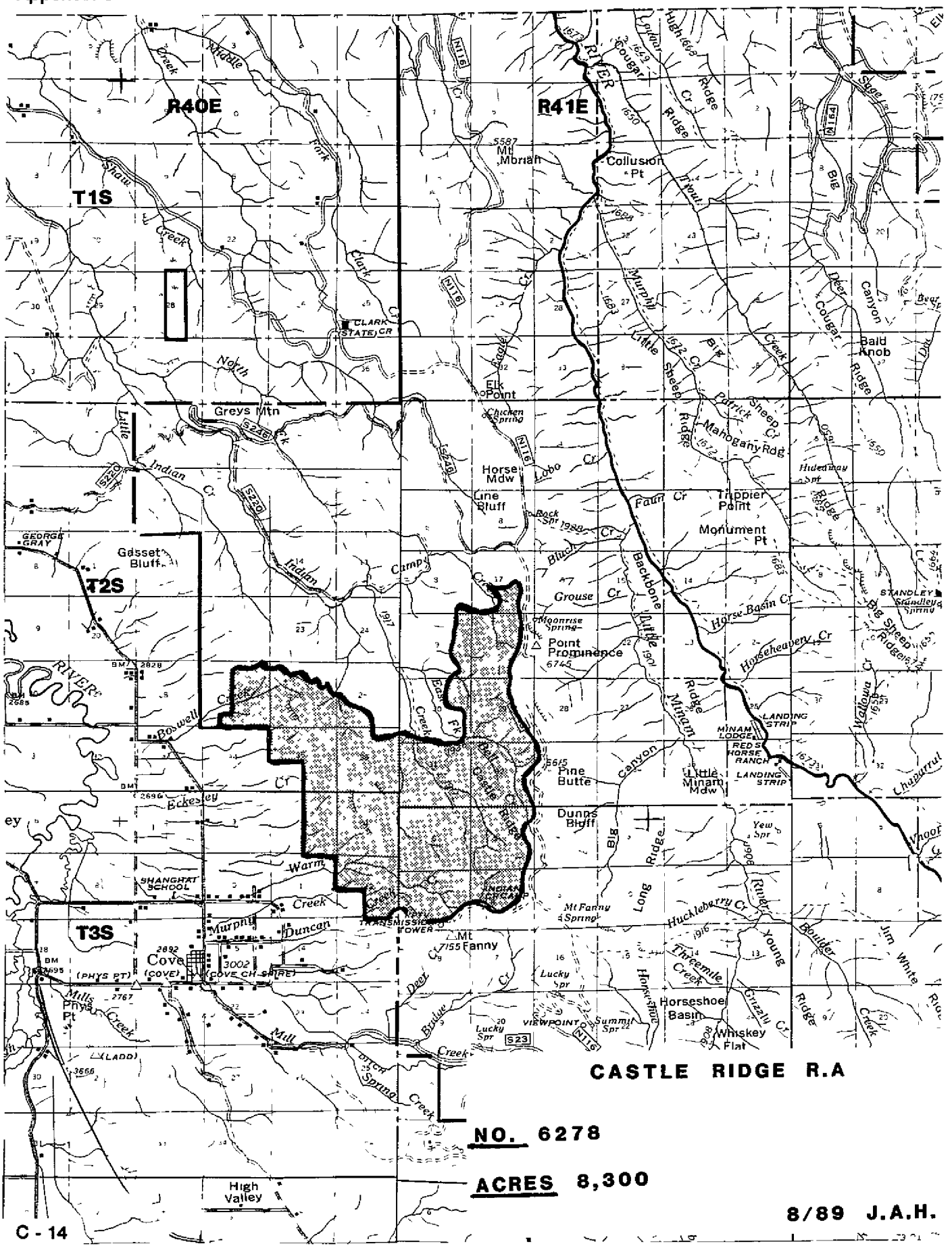
The area is within a cattle grazing allotment but dense timber and lack of forage preclude significant livestock use. It is not believed to be mineralized and there are no gas or oil leases.

The area has 7,115 acres of productive forest land, contains some 66 MMBF of timber and has an annual harvest potential of 0 8 MMBF

There is no private land within the area, the Forest boundary forms the western edge of the roadless area and abuts private land This would appear to present no particular problem in the event of wilderness classification.

Need. The Eagle Cap Wilderness lies virtually across the road from the Castle Ridge Roadless Area Within the Eagle Cap Wilderness the features and attractions found in the Castle Ridge area are more notable and more abundant

Interest in designating the area as wilderness has been low -- generally limited to those who suggest that all roadless areas be designated wilderness. The area was not included in either Senate or House of Representatives 1984 wilderness proposals


R40E
R41E
T1S
T2S
T3S
RIVER
Greys Mtn
Gasset Bluff
Elk Point
Horse Mdw
Line Bluff
Trapper Point
Monument Pt
Point Prominence
Pine Butte
Little Minam Mdw
Dunns Bluff
Mt Fanny
Cove
Horseshoe Basin
Whiskey Flat
High Valley
Mt Moriah
Collusion Pt
Bald Knob
Mahogany Rdg
Backbone Ridge
Big Ridge
Long Ridge
Minam Ridge
Sheep Ridge
Cougar Ridge
Deer Canyon
Pine Butte Canyon
Indian Cr
Grouse Cr
Horse Basin Cr
Huckleberry Cr
Mill Creek
Deer Creek
Warm Creek
Duncan Creek
Mills Phys Pt
Shanghai School
Minam Lodge
Reds Horse Ranch
Landing Strip
Viewpoint
Summit Spr
Lucky Spr
Mt Fanny Spring
Moonrise Spring
Chicken Spring
Back Spr
Hideaway Spr
Yew Spr
Standley Spring
Transmission Tower
Indian Cpgd
Clark (State) Cr
CASTLE RIDGE R.A
NO. 6278
ACRES 8,300
8/89 J.A.H.

Deadhorse Roadless Area (G08)
10,451 Acres

Description. This area was inventoried during the Roadless Area Review and Evaluation (RARE) It was allocated to nonwilderness uses through the Wallowa Valley Planning Unit Environmental Impact Statement (land management plan) of November 3, 1975. The potential wilderness character remains unchanged since that time It lies some 20 miles east of Enterprise in the Imnaha River drainage The vicinity of the area can be reached by traveling a two-lane paved road from Joseph. Jeep trails then provide access to several points in the roadless area

The area is dominated by steep, nontimbered, grass-covered ridges interspersed with basalt rimrocks. Elevations range from 2,500 feet on the northeast boundary near Big Sheep Creek to 5,500 feet on Deadhorse Ridge. The area is approximately evenly split between the semiprimitive motorized and semiprimitive nonmotorized recreation opportunity spectrum classes. Recreation use is limited to big-game hunting and bird hunting but use is low, estimated to be no more than 200 recreation visitor days per year Other than hunting attractions, the area offers interesting views of the deep canyon country of which it is a part and has some hiking and horseback riding potential The entire area is considered to be elk and deer winter range

WILDERNESS POTENTIAL

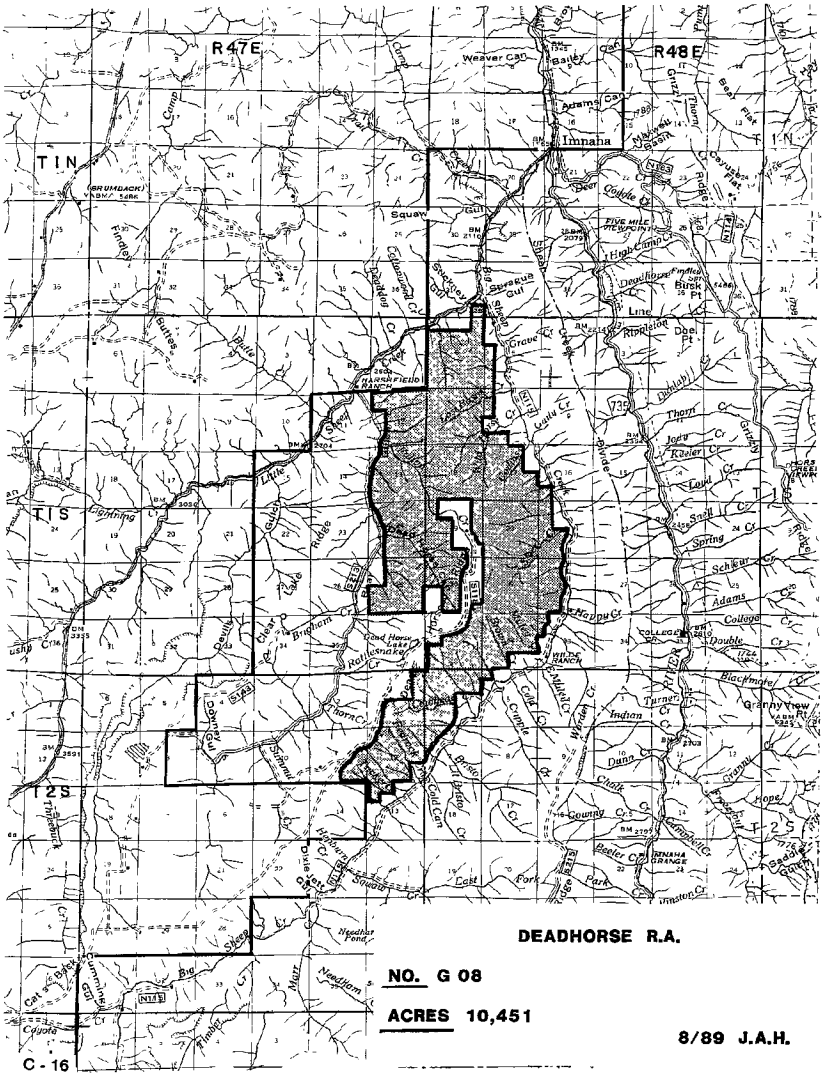
Capability. The area is bounded on three sides by private land containing roads and scattered structures that are visible from the interior of the roadless area Because of its narrow, irregular configuration, and many miles of boundary, manageability of the area as wilderness could be difficult. There is virtually no way the boundary of the area could be adjusted to effectively shield a sizeable area from the sites and sounds of human activity Because of its shape, a visitor can perceive the extent of the entire area from ridgetop views Since one only has to go downhill in any direction to find a road, the sense of solitude and spirit of adventure and self-reliance are low

The interior of the area remains natural appearing except for fences, livestock water facilities, and livestock trails There are no special features or notable opportunities for scientific, historical, or archaeological study, nor are there threatened or endangered species of plants or animals

Availability. Recreation opportunities, and probable use, would remain essentially unchanged by wilderness classification The current recreation opportunity spectrum classes would be unchanged. The area provides 3,000 animal unit months of livestock grazing annually. There is no evidence of mineralization Private lands are immediately adjacent to much of the boundary and scattered parcels lie within the area

The area contains 1,382 acres of productive timbered land with 11 MMBF of standing timber and has the potential to contribute 1 MMBF to the annual timber harvest for the forest.

Need. The Eagle Cap Wilderness lies 15 miles to the southwest of the area and the Hells Canyon Wilderness is 7 miles to the east These two large wilderness areas provide the ecosystems that are found in the Deadhorse Roadless Area and in much greater amount The area was scrutinized by the public during RARE and during unit planning (Wallowa Valley Planning Unit). Interest in the area for wilderness has been virtually nonexistent; the only expressions favoring wilderness coming from those who suggested that all roadless areas be placed in wilderness.


R47E
R48E
T1N
T1S
T2S
Imnaha
DEADHORSE R.A.
NO. G 08
ACRES 10,451
8/89 J.A.H.

Dunns Bluff Roadless Area (WW1)
1,013 Acres

Description. Located seven miles northeast of the community of Cove, this roadless area is a sliver of undeveloped land lying between the western edge of the established Eagle Cap Wilderness and a National Forest System road which parallels the boundary. The area is three-quarters of a mile wide at its widest point and averages approximately one-quarter mile in width.

This area was not inventoried until March 1984 during development of the Forest Land and Resource Management Plan To the present time, it has been managed no differently than if it were a part of the wilderness, and only by careful examination of the wilderness boundary description does one discover that this nonwilderness sliver exists. Most of the area is relatively flat, sloping gently to the west Elevations range from 6,400 to 7,000 feet elevation. Soils are derived from basalt bedrock and volcanic ash. The area is heavily timbered with lodgepole pine, subalpine fir, and spruce, much of which is of noncommercial size

The area is natural appearing, but there are no special recreation attractions such as lakes, streams, or geologic features Current recreation use is almost exclusively by deer and elk hunters during fall hunting season Mt Emily Spring, within the area, is a popular spot for hunting camps Because of the gentle terrain, vehicles can be driven cross-country to many locations within the area.

All of the area is within the semiprimitive motorized component of the recreation opportunity spectrum (ROS)

WILDERNESS POTENTIAL

Capability. There are no private lands within or along the perimeter of the area. Because it lies adjacent to existing wilderness, the size of the area is irrelevant If it were added to the wilderness, a satisfactory boundary, which would parallel the road along the western edge of the area, could be established The new boundary would be more difficult to manage since the relatively flat ground would allow vehicles to drive into the wilderness at many points

Opportunities for solitude, primitive recreation, and challenging recreation experience are the same as those of the Eagle Cap Wilderness of which the area is an integral part.

There are no known threatened or endangered species of plants or animals within the area. There are no known opportunities for historic or scientific study, nor are there known significant cultural resources

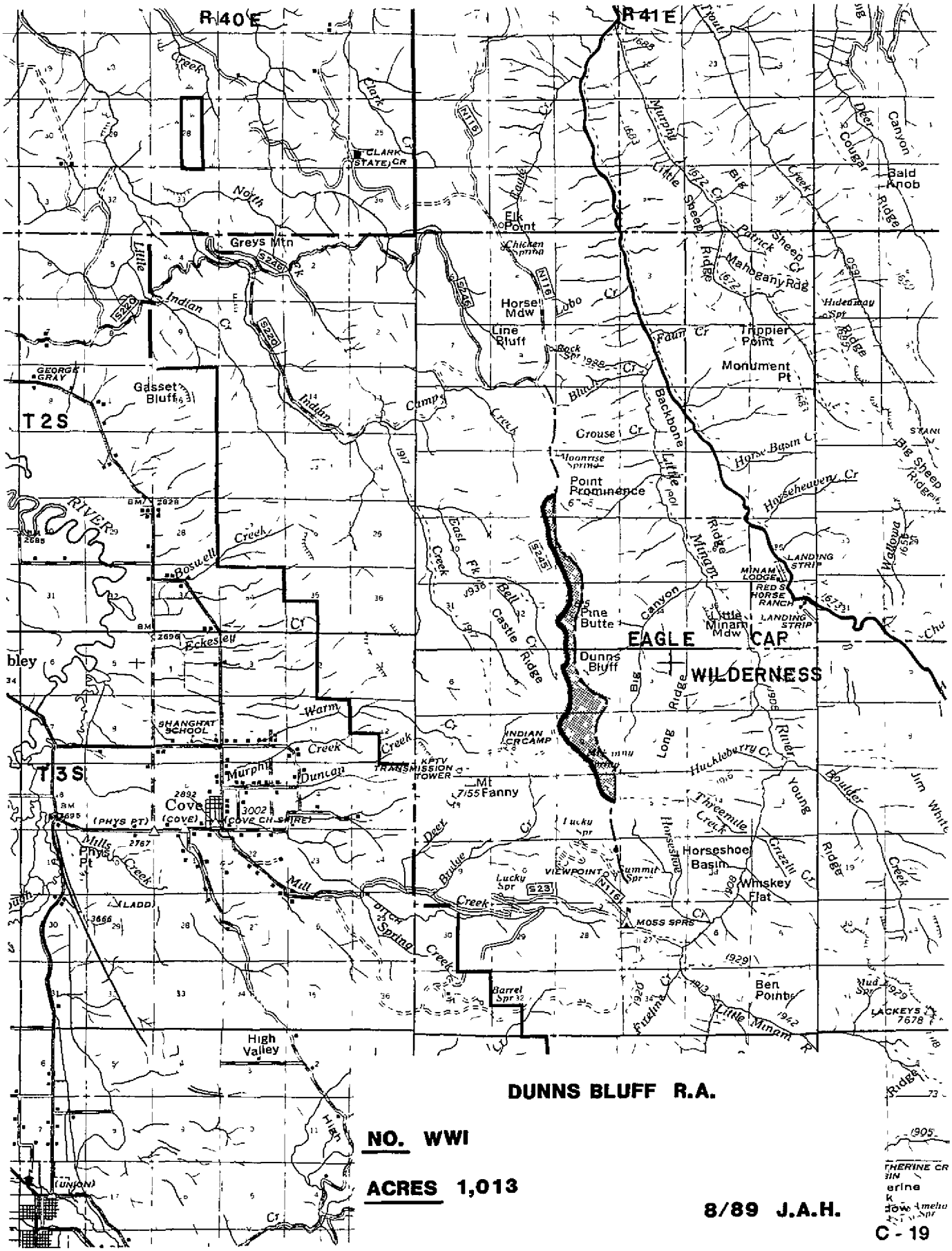
Availability. With wilderness classification, the current types or amount of wilderness use would be unlikely to change. Fall hunting would continue to be the primary use. Current off-road vehicle use would of course be curtailed

The area is not used for livestock grazing There are no known mineral deposits or gas or oil leases, nor are there any permits for special land uses

The area contains 832 acres of productive forest land with a standing volume of approximately 6 MMBF It has the potential to contribute 07 MMBF to the annual timber harvest for the Forest Much of the lodgepole pine was recently killed by mountain pine beetles There are no timber sales planned for the foreseeable future Some wood cutting for domestic use occurs along the road which forms the western edge of the roadless area

Need. There are no ecosystems or features of interest found in the area that are not found more abundantly within the Eagle Cap Wilderness It does, however, represent a piece of land with relatively low resource values that could be added to the wilderness if expansion were deemed desirable. At present, the roadless area serves to buffer sights and sounds of human activities from the interior of the present wilderness

There has been no public interest in the area to date. This could be attributable to its not having been inventoried However, during several efforts within the past ten years to have public help in identifying roadless areas, it was never recognized, although other areas along the perimeter of the Eagle Cap Wilderness were pointed out



DUNNS BLUFF R.A.

NO. WWI

ACRES 1,013

8/89 J.A.H.

Grande Ronde Roadless Area (6267)
4,890 Acres (Wallowa-Whitman Portion)

Description. At this location the Grande Ronde River dissects the roadless area and also forms the boundary between the Umatilla and Wallowa-Whitman National Forests. Approximately 75 percent of the area lies on the Umatilla National Forest and that Forest Plan should be consulted for an evaluation of the area as a whole

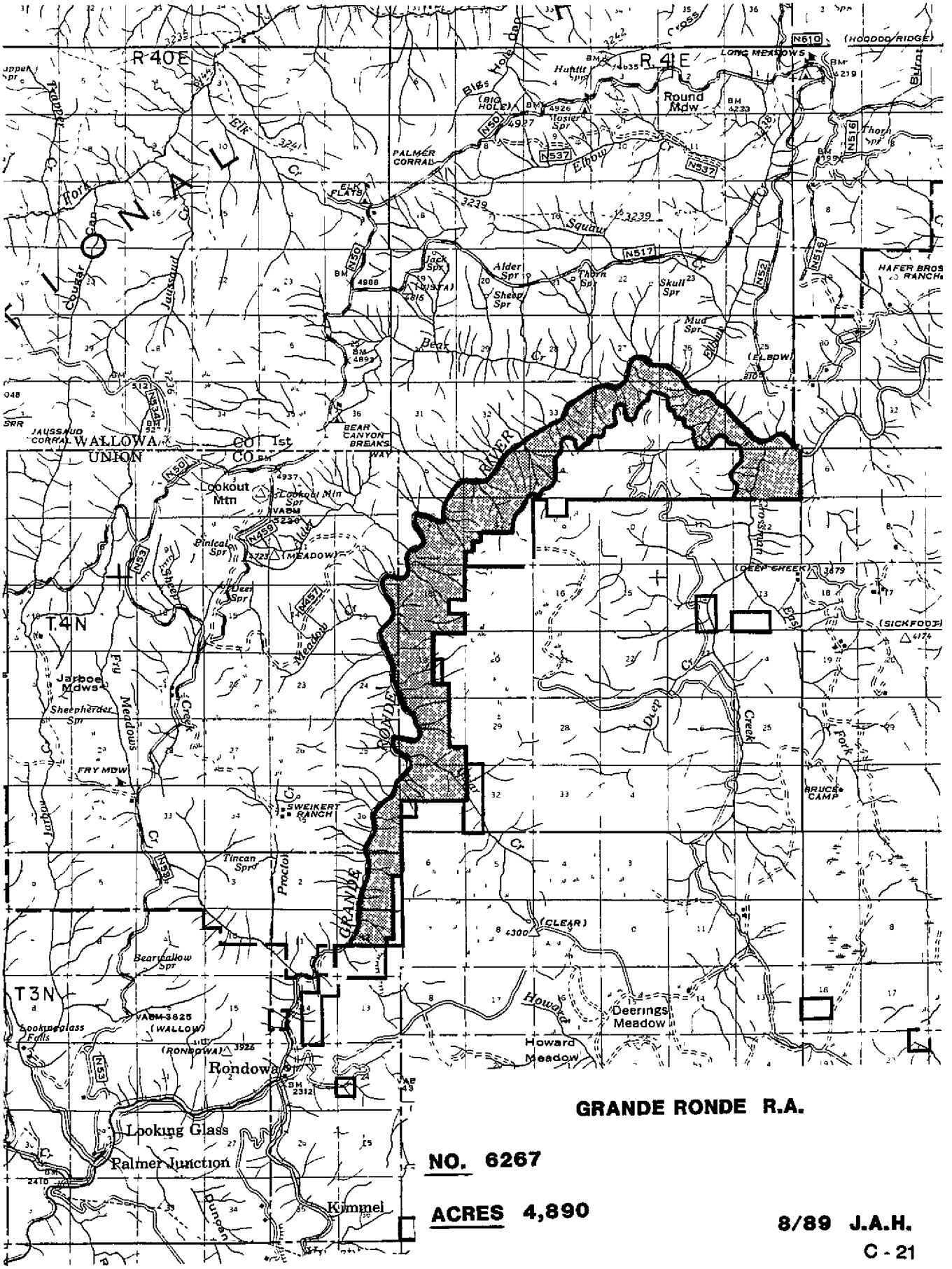
The Wallowa-Whitman portion of the area consists of the immediate east and north-facing slopes of the Grande Ronde River, ranging in width from less than one-fourth mile to one mile, and extending some 12 air miles. Topography is rugged with many steep draws leading toward the river below. North slopes are timbered with ponderosa pine and Douglas-fir while south slopes are open grassland, forming the alternating pattern common to much of the canyon country in northeast Oregon Elevations range from 2,000 feet at river level where the river leaves the National Forest to over 4,000 feet along the canyon rim

Soils are of basalt origin and there are no recognized locatable mineral values. The area is considered prospectively valuable for oil and gas by the U S Geological Survey and it surrounds and includes a small portion of the Grande Ronde lignite field The area contains about 2,000 acres of productive forest land and has approximately 19 MMBF standing volume The area could potentially contribute 2 MMBF to the allowable harvest for the Forest

The Wallowa-Whitman portion of this area lies within the semiprimitive nonmotorized component of the recreation opportunity spectrum (ROS).

In 1988, the entire length of the Grande Ronde River within the roadless area was placed in Wild River status by the Omnibus Oregon Wild and Scenic Rivers Act. A management plan for the river is currently being developed with the Bureau of Land Management taking the lead Approximately 1,900 acres will therefore be within the wild river corridor when planning is completed.

For details on capability, availability and need, see the Environmental Impact Statement for the Forest Land and Resource Management Plan of the Umatilla National Forest



GRANDE RONDE R.A.

NO. 6267

ACRES 4,890

8/89 J.A.H.

C - 21

Huckleberry Roadless Area (6289)
10,107 Acres

Description. This is the portion of the Huckleberry Roadless Area that remains after more than half of the area was placed in the Eagle Cap Wilderness by the Oregon Wilderness Bill of 1984. The remaining area is, for the most part, heavily timbered and includes major portions of the Bear Creek, Little Bear Creek, Big Creek and Deer Creek drainages. Elevations range from 5,000 to over 7,000 feet at Huckleberry Mountain and Fox Point The area lies on the north flanks of the Wallowa Mountains, some 8 miles south of the town of Wallowa It was included in RARE II and was considered by Congress in adjusting the Eagle Cap Wilderness boundary in 1972 and again in 1984 During each adjustment acres were added to the Eagle Cap Wilderness

The area is characterized by ridges and canyons but is much less rugged than the lower Minam area to the west and the existing wilderness to the south. Recreation use is dominated by elk and deer hunting, but the area also provides berrypicking, hiking and horseback riding.

Approximately 2,100 acres of the area is within the roaded natural component of the recreation opportunity spectrum (ROS), while 1,700 acres are considered semiprimitive motorized and 6,300 acres are in the semiprimitive nonmotorized component

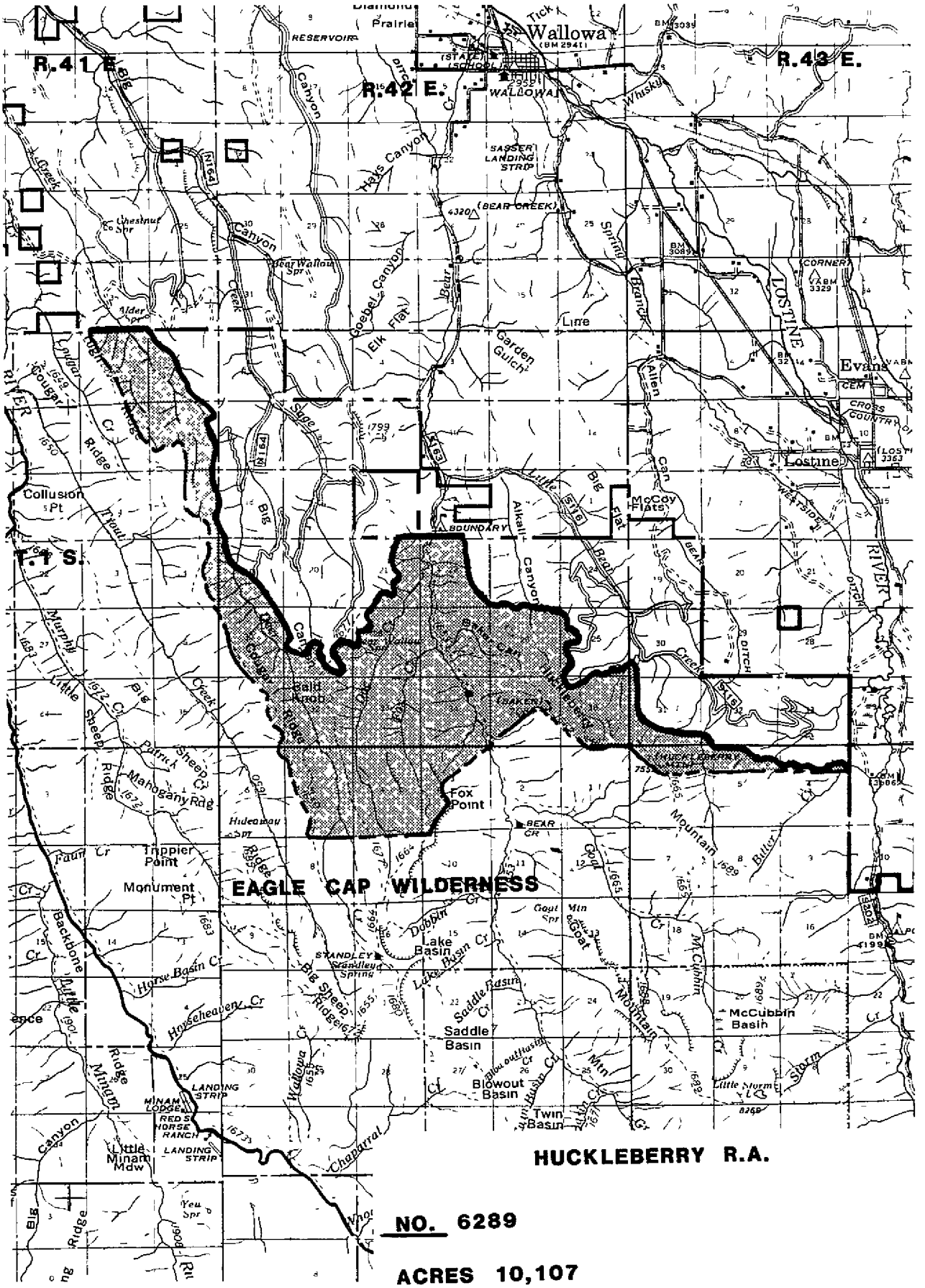
WILDERNESS POTENTIAL

Capability. There are opportunities for solitude and for primitive and challenging recreation activities although not of the caliber that exists in the present wilderness There are no known threatened or endangered species nor are there opportunities for historic or scientific study. There are no known cultural resources of special significance

Availability. Eventual wilderness classification would not be likely to alter the present recreational use of the area.

Portions of the area are grazed by domestic sheep and it provides approximately 700 sheep animal unit months of grazing each year There are no known mineral deposits, gas or oil leases, nor are there any permits for special land uses The area contains 7,200 acres of productive forest land with a standing volume of 62 MMBF The area has the potential to contribute 8 MMBF to the annual allowable harvest for the Forest

Need. There are no ecosystems or features of interest found in the area that are not found more abundantly within the Eagle Cap Wilderness The wilderness additions of 1972 and 1984 have reduced the area to less than 30 percent of its original size. There appears to be no reason to retain the character of the area for future wilderness consideration unless the sole purpose is to expand the size of the existing Eagle Cap Wilderness.



NO. 6289

ACRES 10,107

7/89 J.A.H.

Hurricane Creek Roadless Area (6288)
1,623 Acres

Description. This former RARE II area now consists of five separate parcels, ranging in size from 40 to 450 acres They are what remain of the former 6,200-acre roadless area after most of it was added to the Eagle Cap Wilderness by the Oregon Wilderness Bill of 1984. These remnant areas result from the attempt to establish the new wilderness boundary along less irregular, more easily managed lines

The areas lie at 6000 feet elevation within the mid to upper reaches of Reavis, Murray, Alder and Scotch Creeks and are perched on the steep, north-facing upper Forest slopes overlooking the Wallowa Valley southwest of Enterprise. Subalpine fir is the dominant timber species. All but approximately 200 acres are timbered

Because the area forms part of the scenic backdrop for the town of Enterprise, primary use of the area is viewing (being viewed) However, primary on-site use is big-game hunting which is limited by the difficult access and dense vegetation

Approximately 400 acres of the area are within the semiprimitive motorized component of the recreation opportunity spectrum (ROS) while the remaining 1,200 acres are within the semiprimitive nonmotorized component.

WILDERNESS POTENTIAL

Capability. Sights and sounds from the valley below would be apparent from any of the five pieces of land There would be little sense of solitude and low sense of self-reliance because of the proximity to fields and roads below. If the areas were added to the wilderness, they would create an irregular boundary which would tend to mix wilderness lands with off-Forest lands which contain uses that would not conform to wilderness standards.

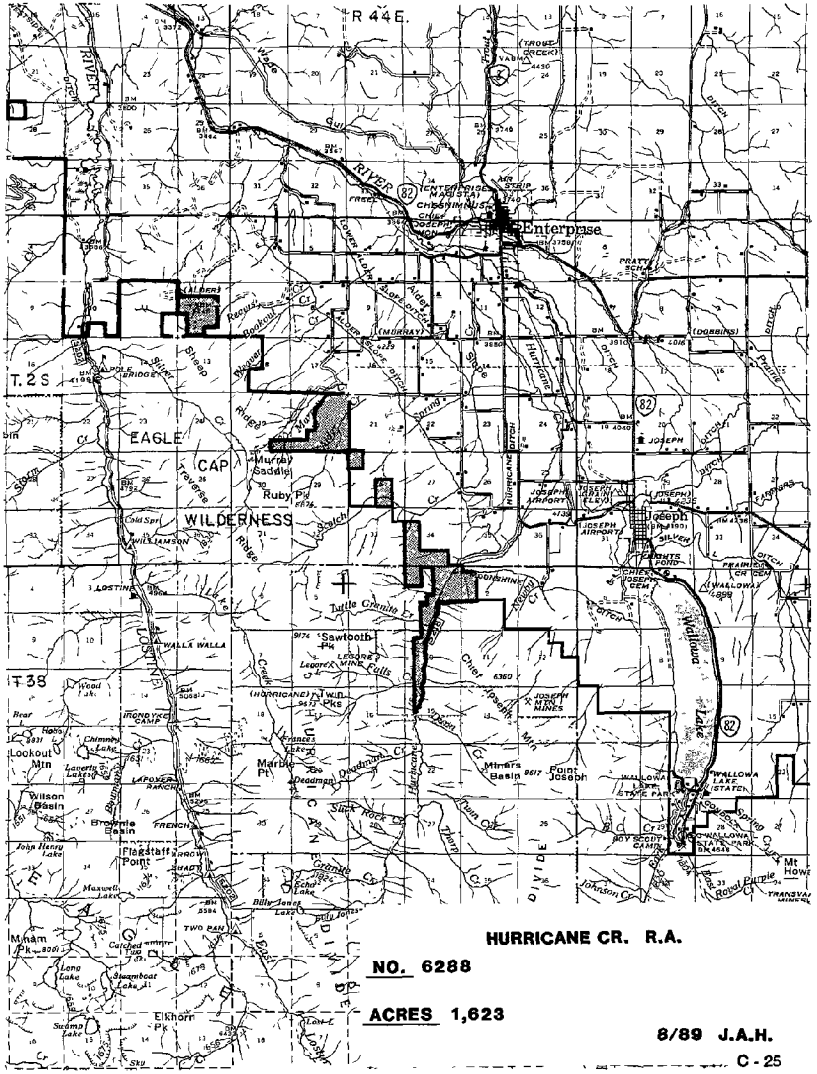
The areas are natural appearing with no man-made features There are no special features or notable opportunities for scientific, archaeological, or historical study, nor are there known threatened or endangered species of plants or animals.

Availability. Recreation opportunity and use would be unchanged by wilderness classification.

The areas are not grazed by domestic livestock, and the potential to do so is low

The area contains 1,399 acres of productive forest land with 11 3 MMBF of standing timber. It has the potential to contribute 1 MMBF to the annual allowable harvest for the Forest.

Need. There are no ecotypes or other features found on these areas that are not found abundantly on the adjoining Eagle Cap Wilderness. There has been no expression of public sentiment for placing these pieces of land in the wilderness system since the bulk of the area was made part of the Eagle Cap Wilderness by the Oregon Wilderness Act of 1984


R 44 E.
T. 2 S.
T. 3 S.
Enterprise
Joseph
EAGLE CAP WILDERNESS
Wallowa Lake
Lostine
Wallowa
Elkhorn Pk.
Mt. Howe
Lookout Mtn.
Flagstaff Point
Mt. Nebo
Sawtooth Pk.
Ruby Pk.
Murray Saddle
Point Joseph
Miners Basin
Hurricane Cr.
Prairie Cr.
Lostine R.
Wallowa R.
Grande Ronde R.
Wallowa Lake State Park
Joseph Airport
Chief Joseph Cem.
Wallowa Lake Estates
Boy Scout Camp
Girl Scout Camp
Wallowa Lake Yacht Club
Wallowa Lake Tramway
Wallowa Lake Station
Lostine Guard Station
Lostine Ranger Station
Lostine Campground
Lostine Airport
Lostine Cemetery
Wallowa Cemetery
Prairie Creek Cemetery
Joseph Cemetery
Joseph Mtn. Mines
Joseph Mtn. Lookout
Joseph Mtn. Trail
Joseph Mtn. Pks
Joseph Mtn. Wild. Pks
Joseph Mtn. Wild. Pks (Hurricane)
Joseph Mtn. Wild. Pks (Hurricane) Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572
Joseph Mtn. Wild. Pks (Hurricane) Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk 9572 Pk

Joseph Canyon Roadless Area (G04)
23,602 Acres

Description. This roadless area lies adjacent to State Highway 3 on the northern boundary of the Forest, 20 miles north of Enterprise It contains the upper reaches of the Joseph Creek drainage, including the tributaries Swamp Creek, Peavine Creek, Rush Creek, and Davis Creek. Joseph Creek continues in a northerly direction and empties into the Grande Ronde River some 15 miles north of the roadless area The roadless area was inventoried during the first Roadless Area Review and Evaluation and allocated to nonwilderness uses through the Wallowa Valley Planning Unit EIS (Land Management Plan), dated November 3, 1975 In this plan the commitment was made to retain the essentially roadless character of the area

The area has had timber harvest entries at several points which have reduced the size of the area from its original 28,300 acres to its present size Two additional sales have been awarded which occupy 11,000 acres of the area Harvesting on these two sales has not yet been initiated. These sales, as well as those on which logging has occurred, are to have the timber removed by helicopter; therefore, the area remains essentially unroaded and will remain unroaded if and when harvesting is accomplished on the two awarded sales.

The area is noted as an example of the rugged topography in northeast Oregon, characterized by deep canyons with very steep, grass-covered sideslopes interspersed with numerous exposed basalt layers It is well known, largely because of its proximity to State Highway 3 and a popular roadside viewpoint which overlooks the 2,000-foot depths of Joseph Canyon Elevations range from 2,600 feet in the northern part of the area to near 5,000 feet on some of the southern ridges

Soils are of basalt origin. The southern part of the area is considered prospectively valuable for oil and gas by the U. S Geological Survey. Typical of the region, southern and western slopes are nontimbered with native bunchgrass ecosystems, while many northern and eastern slopes are heavily forested with Douglas-fir and ponderosa pine being the dominant tree species

Approximately 1,600 acres of the area is within the roaded natural component of the recreation opportunity spectrum (ROS) while 12,600 acres are considered semiprimitive-motorized and 9,400 acres are in the semiprimitive nonmotorized component Primary recreation activities are big-game hunting and scenic viewing, but some hiking and camping by individuals and organized groups occur. Joseph, Davis, and Peavine Creeks provide trout fishing Total recreation use amounts to an estimated 4,000 RVD's per year.

All the streams in the area are used by anadromous fish, providing spawning habitat for salmon and steelhead Plans are currently underway to restore the conditions of several of the streams which have deteriorated because of past timber harvesting and livestock grazing practices.

In 1988, the northernmost 8 6 miles of Joseph Creek (within the roadless area) was added to the National Rivers System as Wild River by the Omnibus Oregon Wild and Scenic Rivers Act Some 2,800 acres will be within the Wild River Corridor A special plan for that corridor is being prepared.

WILDERNESS POTENTIAL

Capability. The area is bounded on the west, south, and east by National Forest land and on the north by private land and Bureau of Land Management-administered land. Many of the more picturesque portions of the canyon lie on private lands north of the inventoried roadless area and outside the National Forest.

Because of its relatively small size, irregular configuration and many miles of boundary, manageability as wilderness would be difficult Adjustment of the boundary to shield a sizable portion of the area from the sounds of vehicles on State Highway 3 would not appear to be possible Because of its shape a visitor can perceive the entire size of the area from several points, including the State Highway viewpoint. The depths of the canyons provide opportunities for solitude; hiking the rugged terrain would contribute to a sense of reliance. This would be diminished, however, by the knowledge that roads would always be within a relatively short distance Because of the steep sideslopes and deep canyons, the area provides opportunity for physically challenging experiences of hiking into and out of the area.

In addition to evidence of timber harvest, there are scattered examples of human evidence. These include abandoned fields and remains of buildings within the isolated private land parcels along Joseph Creek. Old railroad grades, and skid trails in the lower reaches of Davis and Swamp Creeks witness logging activities that occurred in the 1920's and 1930's. Some 50 livestock watering facilities, 30 miles of fence, and 6 miles of jeep road are found within the area.

In 1986, a fire swept through most of the roadless area A salvage sale shortly thereafter resulted in more than 30 MMBF of timber being removed Logging was by means of helicopter, so the primary effect on the roadless areas are the many new stumps

Availability. Wilderness classification would not result in a change in the recreation opportunity spectrum classes but because the area is readily accessible, the publicity associated with classification would increase use, especially for hiking and viewing If the area were administratively allocated for nonwilderness uses which emphasize primitive and semiprimitive forms of nonmotorized recreation, use would not be expected to increase appreciably over present levels.

Wildlife species include virtually all species that inhabit northeast Oregon. Sightings of peregrine falcon and bald eagle are reported, but no known threatened and endangered plants are reported within the area Most of this land is used by elk and deer for winter range The major streams are used by anadromous and resident fish

The area provides over 4,000 animal unit months of livestock grazing annually from the five range allotments that lie all or partially within its boundaries.

Although power site withdrawals exist within the roadless area on Joseph Creek, there are no active plans to develop the site. The site was not recommended for further study by the Corp of Engineers in its recently completed national hydroelectric power resources study. There are no other existing or planned impoundments on any of the streams within the area There are no other energy withdrawals such as pipelines, powerlines, or electronic sites.

The area includes an estimated 62 MMBF of standing timber and would contribute .8 MMBF to the annual allowable harvest of the Forest

There is no evidence of mineralization within the area.

Nez Perce Indians used the area as evidenced by stone implements and examples of lithic scatter. The primary canyon and creek were named for Joseph, who was Chief at the time of settlement of the Wallowa Valley and surrounding area by non-Indians There is speculation by some that Chief Joseph was born within what is now the roadless area, but this has not been verified If the canyon is his birthplace, it is more likely that he was born in one of several caves near the mouth of Joseph Creek, well north of the roadless area in the State of Washington.*

*USDI, Bureau of Land Management, *History and Pre-history of the Grande Ronde Unit,* Oman, Mary N D

Regardless of Chief Joseph's birth place, the roadless area does have potential archaeological significance. This was recognized by the Senate Committee on Energy and Natural Resources in a May 18, 1984 report which accompanied the Oregon Wilderness Act of 1984 (HR-1149) directing the Forest Service to " inventory all archaeological and historic sites in the drainage and determine their eligibility for the National Register of Historic Places Prior to activities that may affect such prehistoric, historic or cultural sites, the Forest Service shall follow the procedures in 36 CFR 800 which implement the Natural Historic Preservation Act, as amended, in order to fully consider and protect the important values of such sites "

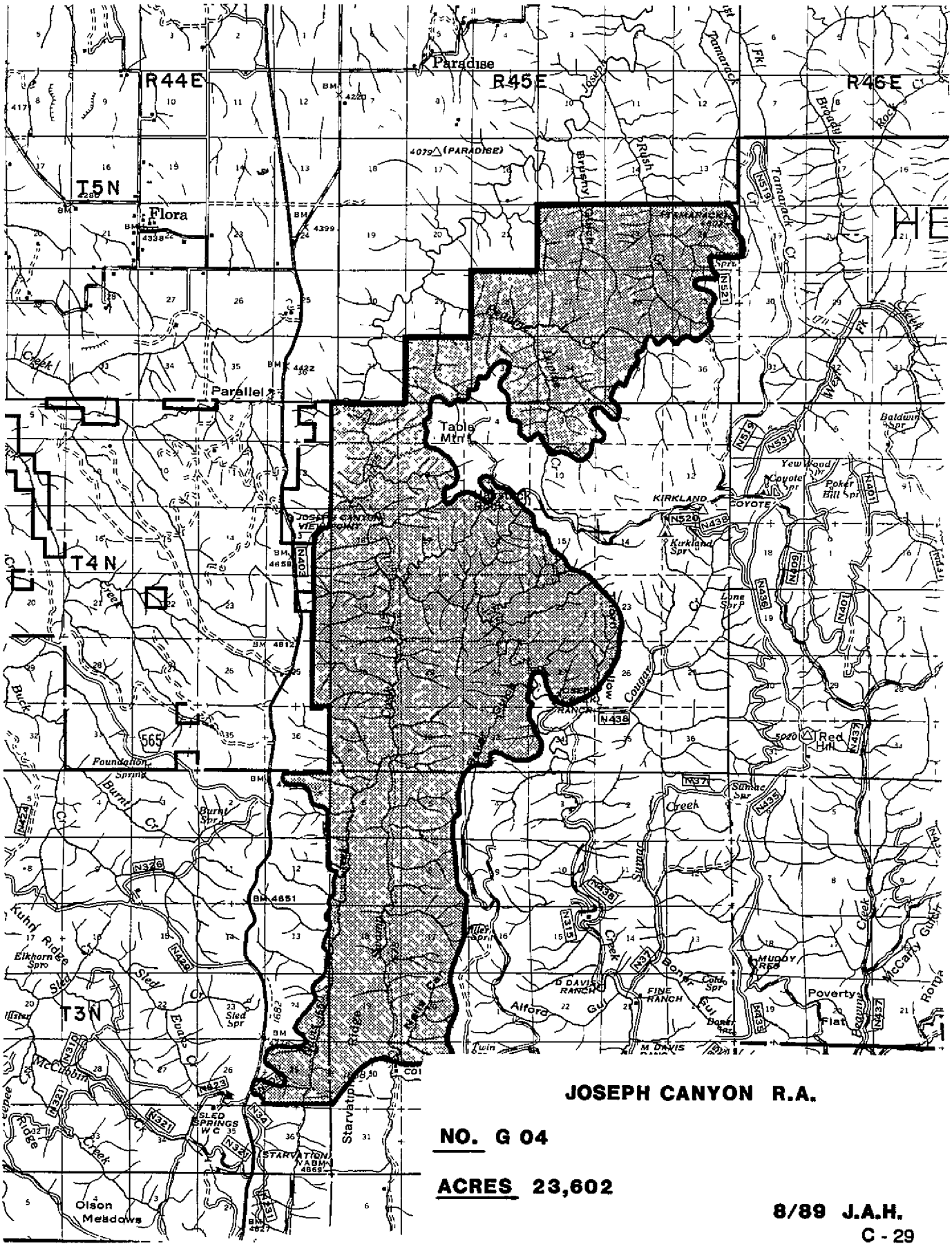
At the present time Nez Perce Indians occasionally exercise their treaty rights to hunt and fish in the area, but use is thought to be low since there is an abundance of more accessible land within the vicinity

There are two small parcels of private land within the area, totalling 401 acres These parcels lie within the heart of the area, immediately below the Joseph Canyon viewpoint on the State Highway (see map) The lands are not occupied and are used for grazing purposes They are accessed by jeep trail

Need. The Wenaha-Tucannon Wilderness lies 15 miles to the north of the roadless area, Hells Canyon Wilderness is 24 miles to the east, and the Eagle Cap Wilderness lies 25 miles to the south. These three large wildernesses contain the same ecosystems, land forms, and features of the Joseph Canyon Roadless Area and in greater amounts

The area is 300 miles from Portland and 200 miles from Spokane The Lewiston-Clarkston area is 70 miles to the north

There has been interest in the roadless area, both for and against wilderness, since RARE was initiated. It generated a great deal of interest during development of the Wallowa Valley Unit Plan and its not being recommended for wilderness study was a basis for appeal of the plan by local conservation groups Timber sales within the area have been appealed, but the appeals have not resulted in withdrawing the sales Efforts to gain the interest of U S Congressmen were successful in 1983 when the area was included as a part of HB 1149, a wilderness bill sponsored by Congressmen Weaver, Wyden, and AuCoin. It was not, however, included in the Senate version of the wilderness bill sponsored by Senator Hatfield.



JOSEPH CANYON R.A.

NO. G 04

ACRES 23,602

8/89 J.A.H.

C - 29

Lake Fork Roadless Area (6290)
14,898 acres

Description. This area lies partially within the Hells Canyon National Recreation Area (HCNRA) and partially within the Burnt Powder Planning Unit The HCNRA decision (FEIS 5/81) allocated 2,765 acres to Management Strategy 10, and 2,681 acres to Management Strategy 11. The remaining 14,898 acres will be analyzed as part of this plan The northwest boundary lies about half a mile from the 1984 Lick Creek addition to the Eagle Cap Wilderness. Hells Canyon Wilderness is about six miles to the northeast. The boundary of Homestead Further Planning Area is a mile to the southeast. Lake Fork contains numerous tributaries to the Pine Creek system, and is immediately to the east of Fish Lake and Fish Lake campground

This roadless area was inventoried during the original Roadless Area Review and Evaluation (RARE) process, as well as during RARE II, and was allocated to nonwilderness uses through the HCNRA Comprehensive Management Plan (FEIS, 1981).

The area ranges in elevation from around 2,600 feet at the mouth of Little Elk Creek on the southeast, to over 7,000 feet in the northern portion. Topography in the lower third is rough and steep. The middle third is more gentle, with the remainder in gentle slopes of 10 to 30 percent

The area is typical of land on the southeast of the Wallowa Mountains which slopes to the Snake River, in that it includes varied forest ecosystems, with grass slopes and meadows intermixed. Lower elevation lands consist mainly of Columbia River basalts Mid-elevation soils have developed from a mixture of basalt and windblown ash Deeper ash deposits are evident in the north portion

A mineral survey indicates low potential for placer gold or for lode deposits, although the area is only five miles west of Homestead mining area and about ten miles east of gold-producing areas around Cornucopia Nearly the entire length of Duck Creek, near the boundary of the Lake Fork area, has placer mining claims.

Existing habitat conditions provide excellent environment for big game The lower elevations in the southeast portion are suitable big-game winter range. Elk, Lake Fork, and Duck Creeks support resident rainbow and eastern brook trout populations Since construction of Hells Canyon Dam on the Snake River, no anadromous fish use this area Water from these tributaries help sustain the high water quality of the Pine Creek watershed in general Irrigation ditches tapping the upper Lake Fork drainage divert a major part of the normal flow during August and September

Forest Road 66 3, from Fish Lake and Twin Lakes, separates the Lake Fork Roadless Area from the Eagle Cap Wilderness. A number of wheel track roads exist throughout the area Most are closed.

Recreation usage is primarily fall big-game hunting Hiking, cross country skiing, berry picking, and fishing are popular in the Lake Fork area

Approximately 1,800 acres are within the roaded natural component of the recreation opportunity spectrum. The remaining 13,000 acres are within the semiprimitive motorized component.

WILDERNESS POTENTIAL

Capability. Boundaries of this area are defined by roads, by topographic features and by North Pine Creek on the east. The varied forest canopy/ grassland combinations provide good scenic qualities and a sense of solitude Examples of old-growth ponderosa pine stands are numerous in the Lake Fork area. There is no private land within the boundary.

There are no known threatened or endangered plants or animals inhabiting the area. A few scattered cultural resource finds have been made in the Lake Fork area, primarily lithic fragments. Some old range improvements, such as corrals and sheds, are there A water transmission ditch under special use permit runs along Lake Fork Creek within the roadless area.

Availability. Productive forest land suitable for timber management occupies 10,852 acres (73 percent) of the roadless area, with 144 MMBF standing timber volume.

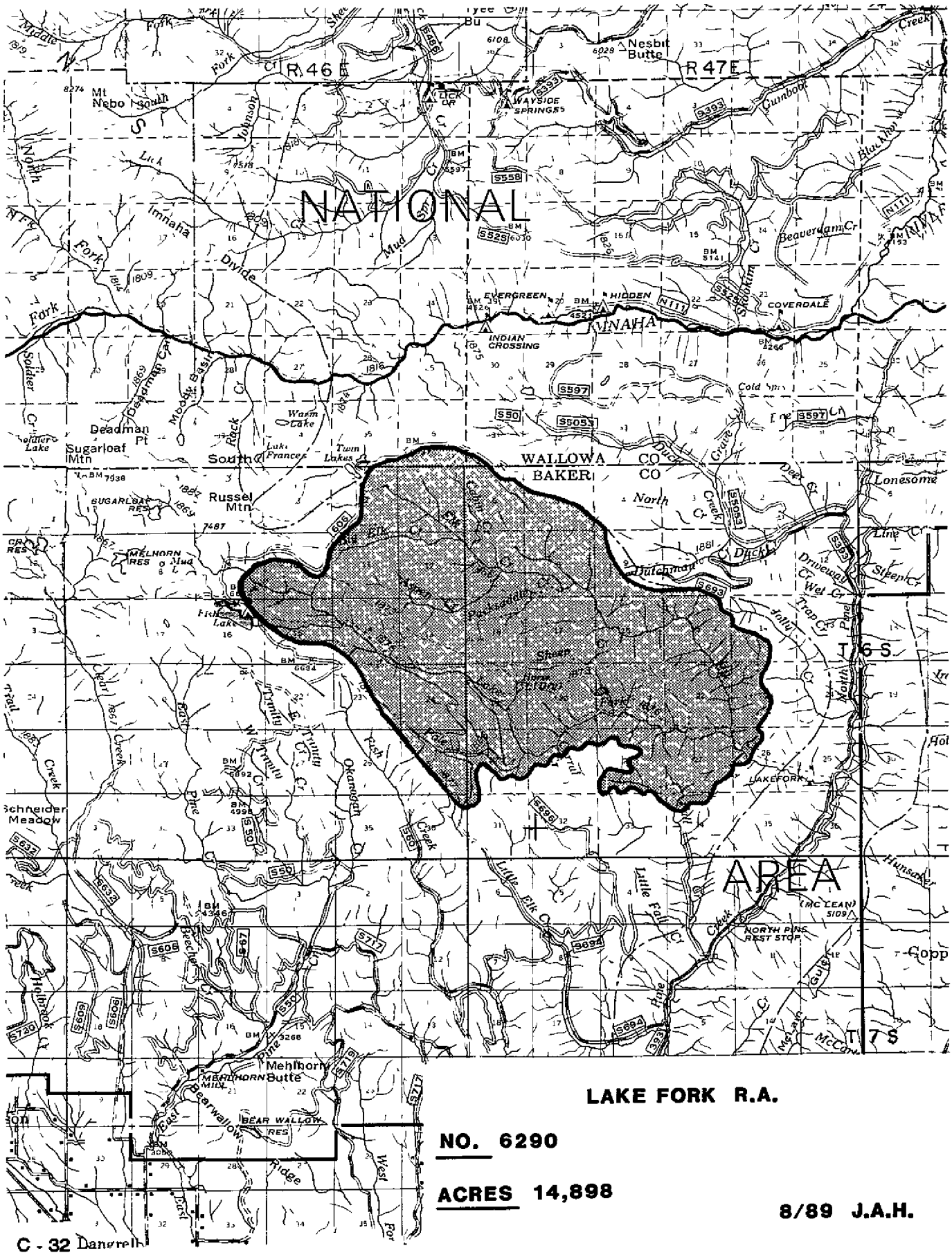
This area could contribute an estimated 1.8 MMBF to the Forest's long-term sustained yield timber supply capacity Under the FEIS of the Burnt Powder Unit Management Plan, a portion of Lake Fork is managed with dispersed recreation emphasis

The area is presently undergoing a serious spruce bark beetle epidemic. Plans for salvaging the dying timber may affect the character of the roadless areas.

Need. There are no apparent geologic features, ecosystems, cultural features, or other special attributes that would only be preserved by retaining the undeveloped character of the area through wilderness classification There has been interest in keeping the area undeveloped for the elk habitat it provides and the hunting experience associated with undeveloped areas. Residents of the local area have mounted an extensive campaign to keep the area undeveloped.

Lake Fork Roadless Area has been twice considered for addition to the wilderness system (by Congress in 1972 and in the 1981 Hells Canyon NRA study) Each time it was determined that the needs of society would be best served if the area were managed as nonwilderness. The high timber values contributed to these determinations as did the fact that the features found within the Lake Fork area are well represented in currently established nearby wildernesses.

Appendix C


NATIONAL
AREA
LAKE FORK R.A.
NO. 6290
ACRES 14,898
8/89 J.A.H.
C - 32 Dangreli
R46E
R47E
T6S
T7S
WALLOWA CO
BAKER CO
Mt Nebo South
Nesbit Butte
WAYSIDE SPRINGS
EVERGREEN
HIDDEN
COVERDALE
INDIAN CROSSING
Deadman Pt
Sugarloaf Mtn
Russel Mtn
South France
Twin Lakes
Warm Lake
Lonesome
LAKEFORK
NORTH PINE REST STOP
Mehlhorn Butte
BEAR WALLOW RES
MELHORN RES
SUGARLOAF RES

Little Creek Roadless Area (6280)
2,907 Acres

Description. The Little Creek Roadless Area lies adjacent to the western edge of the Eagle Cap Wilderness and runs along its boundary for some 3-1/2 miles The area is 19 miles southeast of La Grande, Oregon and 23 miles southwest of Enterprise, Oregon

This area was not a part of the RARE II evaluation. It was considered for further wilderness study during the development of the management plan for the Grande Ronde Planning Unit (FEIS published April 1978). As a result of that analysis, the area was allocated to nonwilderness uses.

Elevations range from 5,800 feet at the Forest boundary to 6,800 feet at Bald Mountain on the wilderness boundary. A dominant feature of the roadless area is its extensive uniform lodgepole pine canopy Scattered, open, grassy ridges and meadows are also found Recreation opportunity is dominantly semiprimitive nonmotorized (80 percent) with the remaining being roaded natural. Recreation use is estimated to be 400 recreation visitor days per year with half being directly associated with big-game hunting The area includes sections of Trail 1920, totalling approximately one mile Soils are dominantly of basalt origin with surface volcanic ash deposits The western half of the area has been identified as big-game winter range.

The area includes Little Creek and numerous tributaries, none of which contain significant fisheries values The area currently provides 50 animal unit months of grazing use annually

Two ditches used for downstream irrigation also lie within the area

WILDERNESS POTENTIAL

Capability. The boundaries of the roadless area, except on the western edge where it reaches the Forest boundary, are generally on distinct topographic features. This tends to simplify management of the area and separates it effectively from the sights and sounds of adjacent developed lands. The area provides a feeling of solitude to the users.

Recreational opportunities are limited to hiking, horseback riding, backpacking, and big-game hunting The area does not have potential for more challenging activities such as mountain climbing or river rafting The relatively flat nature of the area and its nearly continuous tree cover do not provide the scenic views typical of areas with more vegetative or topographical variation No significant change in recreational opportunities would result from designation as wilderness

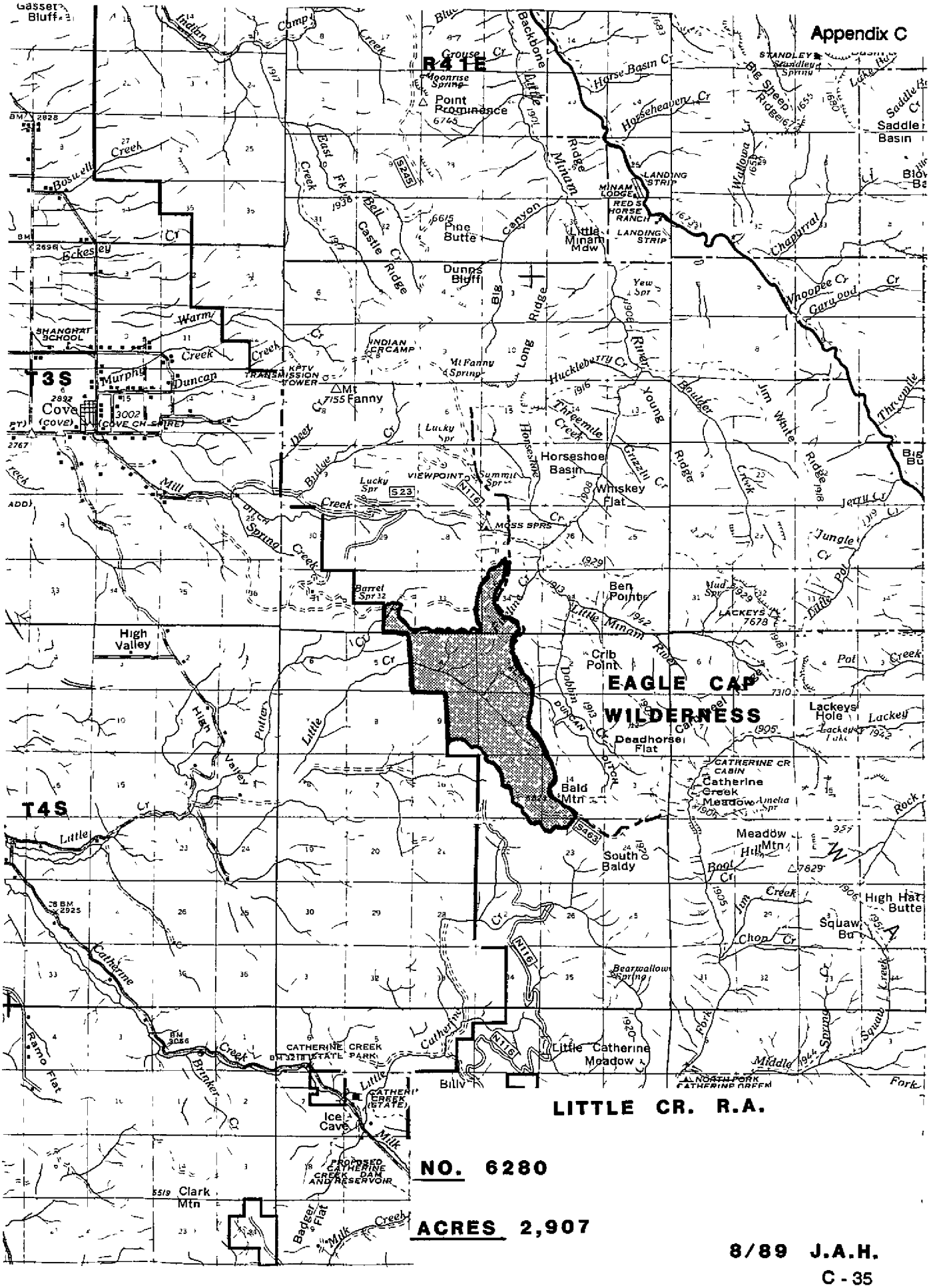
There are no threatened or endangered species known to inhabit the area although numerous wildlife species are found There are no known unusual opportunities for historical or scientific study.

Availability. If the area were managed for wilderness, acreages of the various recreation opportunity spectrum classes would remain essentially unchanged. Development for nonwilderness uses would reduce the acreage of semiprimitive nonmotorized opportunity and increase the acreage of roaded natural opportunity. Use of the area by domestic livestock would not change appreciably regardless of wilderness or nonwilderness classification. Some increase in transitory range would result from timber harvest if the area were developed. The area has no known mineralization of commercial value.

The area includes 2,622 acres of productive forest land dominated by lodgepole pine. The standing volume is 19 MMBF and the area has the potential to contribute 2 MMBF to the annual harvest for the Forest

Need. Because the Little Creek area is adjacent to the existing wilderness and has manageable boundaries, it could be considered a logical wilderness addition. The types of recreation opportunities provided and the ecosystems found there are also found abundantly within the existing classified wilderness Public comments during the development of the Grande Ronde Land Management Plan indicated little interest in the addition of this area to the National Wilderness Preservation System.

Appendix C


R41E
T3S
T4S
EAGLE CAP WILDERNESS
LITTLE CR. R.A.
NO. 6280
ACRES 2,907
8/89 J.A.H.
C - 35

Little Sheep Roadless Area (6286)
5,278 Acres

Description. The area wraps around the northeast corner of the Eagle Cap Wilderness six miles southeast of Joseph, Oregon It was inventoried as part of RARE II, but was allocated to nonwilderness uses It was reconsidered in the Oregon Wilderness Bill of 1984 and approximately one-third of the area was added to the Eagle Cap Wilderness. The portions added included most of the high elevation, relatively open, avalanche-scarred, east-facing slopes of Wing Ridge The remaining roadless area is uniformly steep and is predominantly timbered with elevations ranging from 5,000 to over 8,000 feet near Mt Howard The East Fork of the Wallowa River and McCully, Redmont, Little Sheep, and Cabin Creeks all cross the area and contribute water for irrigation in the Wallowa Valley. Nearly all the area is within the semi-primitive nonmotorized component of the recreation opportunity spectrum (ROS) and forms part of the scenic backdrop from the Wallowa Loop Road, a popular recreational drive Sixty-two acres are classified rural in the ROS system because of its proximity to Wallowa Lake State Park

WILDERNESS POTENTIAL

Capability. The boundary tends to follow contours with indistinct features, but the boundary, were the area in wilderness, would be no more difficult to manage than the current wilderness boundary

The only significant evidences of human activity are those found at the inactive Transvaal Mines, where two caved-in adits and a small pit are visible and near Royal Purple Creek on the edge of the roadless area where remains of adits can be found

Negotiating the rough terrain would offer a challenging hiking experience The sights and sounds from the Wallowa Loop Road, Mount Howard gondola, and the valley below would tend to detract from a sense of self-reliance and solitude

The area contains all the wildlife species that are found in the Wallowa Mountains except those associated with lakes and ponds The area is popular for fall elk and deer hunting, the primary recreational uses

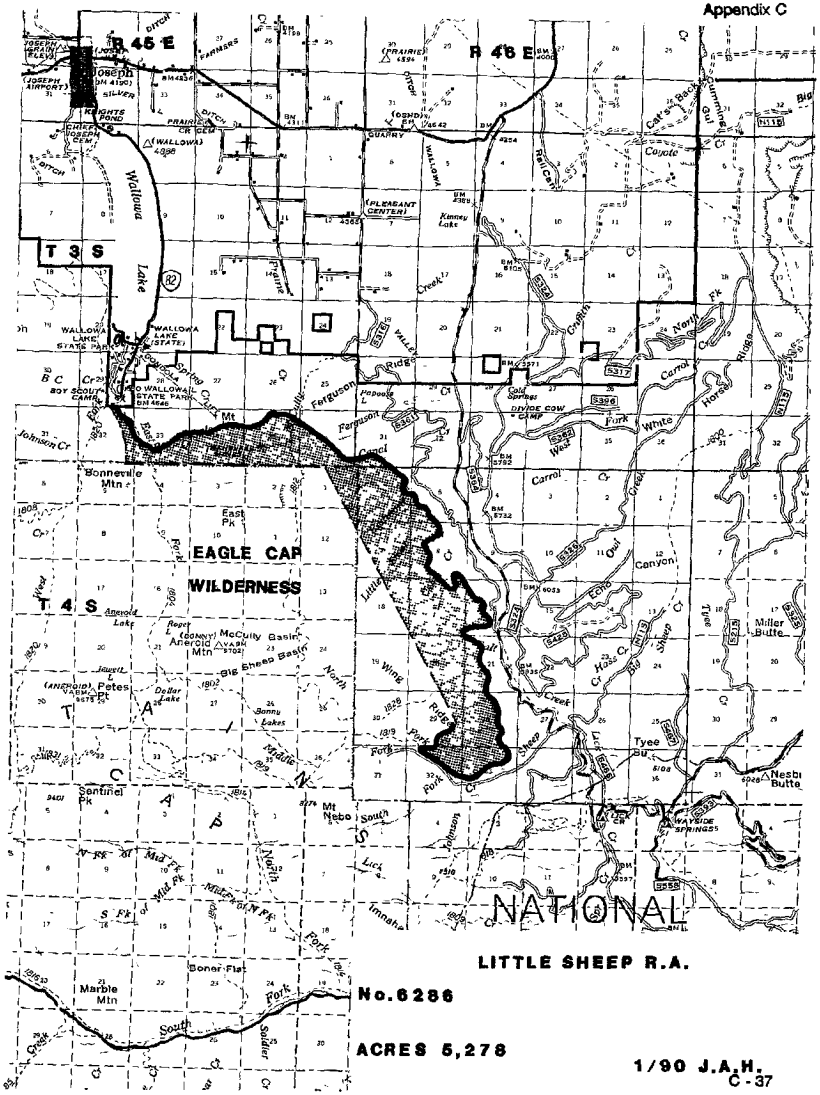
Availability. All the land is in federal ownership There are 4,362 acres of productive timberland with approximately 42 MMBF standing volume. The area has potential to contribute 5 MMBF to the annual allowable harvest for the Forest

Although there is some evidence of silver and molybdenum ore in the Transvaal Mines area, the potential for operable mineral deposits is apparently low Most of the area is unsuitable for livestock grazing due to topography and dense timber.

There is a waterpower withdrawal of 160 acres under FERC Project No. 3834 within the area

Need. There are no ecosystems within the roadless area that are not found more abundantly in the adjacent Eagle Cap Wilderness There are no known special opportunities for scientific or historic study, nor are there significant cultural or geologic features

There is no apparent interest in adding the remainder of the area to wilderness except from those who simply want to add all roadless areas to wilderness Expanding the size of the Eagle Cap would seem to be the only reason for retaining the undeveloped character of the Little Sheep Roadless Area for later wilderness consideration



LITTLE SHEEP R.A.

No.6286

ACRES 5,278

1/90 J.A.H.

C - 37

Marble Point Roadless Area (6271)
7,135 Acres

Description. This area lies eight miles west of Baker on the southern end of the Elkhorn Range and is separated from the Twin Mountain Roadless Area by the Marble Pass Road and a powerline which parallels the road It was not inventoried in RARE but was included in RARE II in which where it was recommended for nonwilderness uses It was unaffected by the Oregon Wilderness Bill of 1984

The eastern flank, two-thirds of the area, is entirely within the Baker City Municipal Watershed This area is mostly timbered The southwestern slopes are largely nontimbered and form a scenic backdrop above Phillips Lake The northeast slopes form a backdrop from the Baker Valley. Marble Creek, Elk Creek, and Salmon Creek all originate in the area. All provide downstream irrigation, Salmon and Marble Creeks contribute to the municipal water supply. Elevations range from 5,000 feet to over 7,900 feet.

Soils have formed from granodiorite riparian material and volcanic ash.

Approximately 1,100 acres of the area are within the roaded natural component of the recreation opportunity spectrum (ROS) with the remaining 6,000 acres within the semiprimitive motorized component

WILDERNESS POTENTIAL

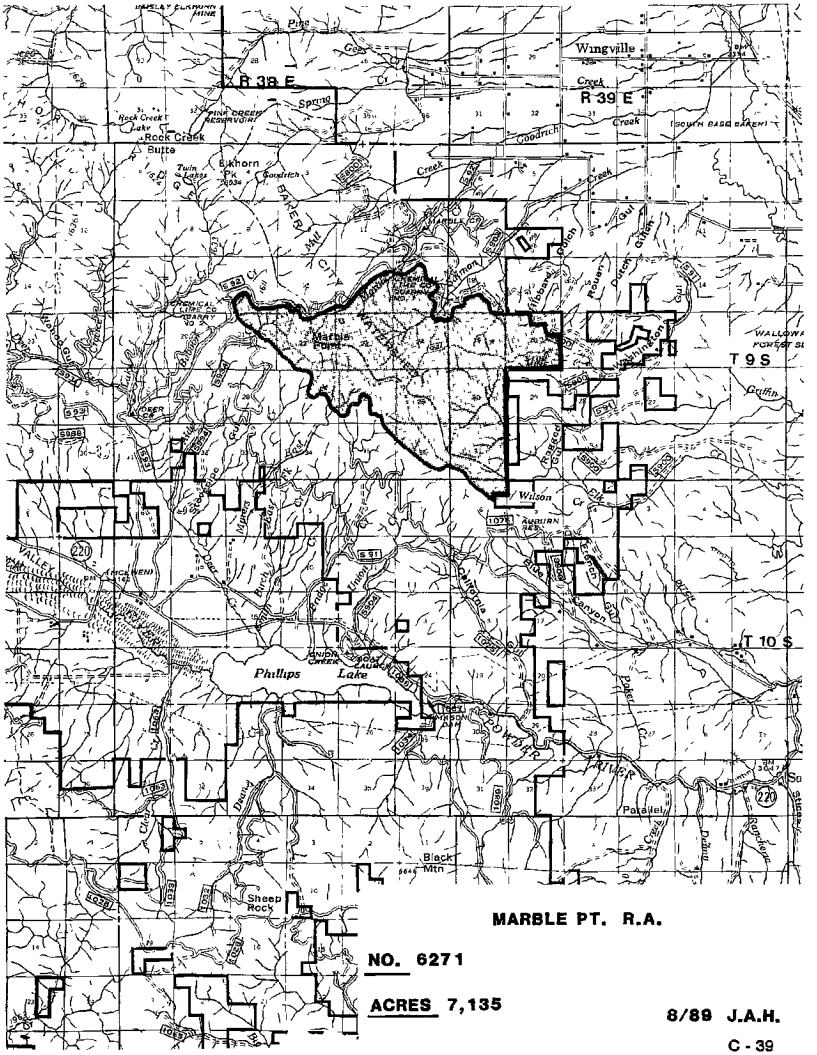
Capability. The area is natural-appearing and is similar in character to the adjacent Twin Mountain Roadless Area However, being on the end of the mountain range it lacks the degree of ruggedness found in the central Elkhorns There are opportunities for solitude but, because the sights and sounds of humans are not far distant, the sense of adventure and self-reliance is less than that found in the Twin Mountain Area or other large roadless areas.

The area is not grazed by livestock due to sensitive soils and lack of forage. The eastern and southwestern margin of this area are mineralized as indicated by the Stub Mine which is within the area and the fact that gold has been found at lower elevations in the old Minersville district near the roadless area boundary The north end of the area contains some limestone deposits

The area is popular for fall big-game hunting. Other recreation activities are discouraged within the watershed portion

Availability. The area contains 168 acres of private land in one parcel The area includes 4,930 acres of productive forest land containing a standing volume of 59 MMBF standing volume The area has the potential to contribute .7 MMBF to the annual allowable harvest for the Forest

Need. The area contains no ecosystems or features of interest that are not found in the nearby North Fork John Day (12 miles), Eagle Cap (40 miles) or Monument Rock (30 miles) wildernesses. As a part of the Elkhorn Range, there has long been interest in the area for wilderness but not because of features specific to the Marble Point Roadless Area. Some interest is likely to remain for many years.



MARBLE PT. R.A.

NO. 6271

ACRES 7,135

8/89 J.A.H.

C - 39

Monument Rock Roadless Area (6240)
5958 Acres

Description. The portion of the Monument Rock Roadless Area that was not declared wilderness in 1984 is located five miles south of Unity, Oregon, and about 24 miles southeast of Prairie City Nearly the entire area is in the Bullrun Creek watershed, with Bullrun Mountain on the southeast and Miners' Ridge on the northwest

This roadless area was evaluated during the RARE II process, and recommended for nonwilderness use as a result of that analysis It was further studied before passage of the 1984 Oregon Wilderness Bill and again recommended for nonwilderness use.

It ranges from 5,200 feet at Bullrun Creek to about 7,300 feet at Bullrun Mountain. Soils are of volcanic origin. The north slopes of the area are mixed conifer tree stands with Douglas-fir predominating; south slopes are grass with scattered stands of ponderosa pine Plant succession in the area has been altered by grazing

Hundreds of lode mining claims exist throughout 3,500 acres of this roadless area. The area has potential for gold, copper and molybdenum deposits. Old mining structures are scattered through the area, as are old wheel tracks. A jeep road, popular with woodcutters, runs along Bullrun Creek Stock control fences are also throughout the area, which is primarily in the Bullrun Range Allotment The area supports 340 AUM's annually

Recreation opportunities consist primarily of fall big-game hunting No extensive fishing opportunities occur here Moderately heavy snowmobile use exists in winter months Table Rock Lookout, adjacent to this area, receives many visitors in summer.

Approximately 1,500 acres of the area are within the roaded natural component of the recreation opportunity spectrum (ROS), 2,000 acres are considered semiprimitive motorized and 2,400 acres are in the semiprimitive nonmotorized component.

The area contains 2,783 acres of productive forest land with 25 MMBF of standing timber volume The area has the potential to contribute 3 MMBF to the annual allowable harvest for the Forest

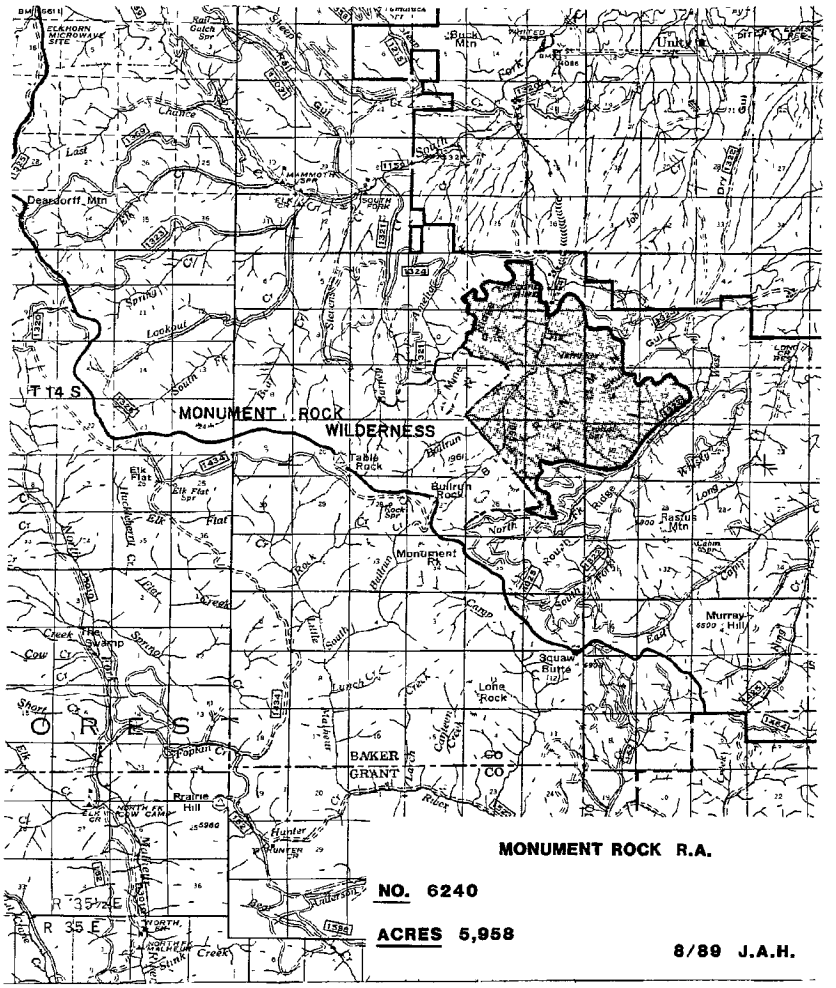
WILDERNESS POTENTIAL

Capability/Availability. This area is surrounded on all sides by National Forest System land, and is about a mile from the Forest boundary to the north and northeast. It abuts the Monument Rock Wilderness on the southwest. The 1969 Rough Ridge Burn, 33,000 acres, is about two miles to the southeast, the 1939 Big Cow Burn is a few miles to the northwest. The lights of the town of Unity are visible at night from many of the high points in the area, with sights and sounds of miners and woodcutters frequent throughout

Extensive horse logging took place in the 1940's immediately to the north of this roadless area, with continuing timber management having taken place since Under the Burnt Powder Unit plan, (FEIS, 1979) the area was allocated for production of wood and forage, while maintaining optimum big game forage-cover relationships It was also managed for conditions favorable for semi-remote big-game hunting opportunities

Cultural resource sites, primarily old mining structures and ditches, are widespread in this area No known threatened or endangered plant or animal species exists there

Need. The area contains no features that are not found in greater abundance in the adjoining Monument Rock Wilderness or other nearby wildernesses It was omitted from wilderness designation in the Oregon Wilderness Act of 1984 because of the potential mineral values present. The area does have "backcountry" recreational value, which can be retained through nonwilderness designations The only apparent need to preserve the wilderness character would be in the event it were deemed desirable to increase the size of the Monument Rock Wilderness in the future.



R 35 E R 36 E R 37 E

Mt. Emily Roadless Area (6277)
8,822 Acres

Description. This area was inventoried in the first Roadless Area Review and Evaluation. Because of local interest in the roadless recreation qualities and the timber resources involved, the Forest Service initiated a special study in 1972 to resolve the potential wilderness question. This study was abandoned in 1973 in order that the area could be studied as a part of the Grande Ronde Planning Unit Through the Grande Ronde Planning Unit Environmental Impact Statement (1978) the area was allocated to nonwilderness uses However, a large part of the area, essentially that part currently being considered, was designated as a special management unit which emphasized retention of the backcountry qualities This portion of the area was removed from the timber harvest base.

The roadless area is six miles north of La Grande and 30 minutes to an hour drive from La Grande, depending on one of several available routes It contains the upper reaches of Five Points Creek, the drainage which dominates the area. This stream runs southwest to where it joins the Grande Ronde River some six miles from the roadless area Although the western slopes of Mt. Emily are included, the ridge and escarpment known as Mt Emily are approximately one mile east of the eastern edge of the area.

In geologic history the areas was a plateau It has since been dissected to the point where only remnants of the plateau remain and amount to approximately one-quarter of the area. The remainder is the steep canyon landscape of the upper Five Points Creek drainage Elevations range from 3,200 feet to 5,400 feet Soils are of volcanic origin, derived either from local bedrock or of ash from Cascade Range eruptions. Soils on the steep slopes tend to be unstable The table lands and north slopes are timbered while most south and west slopes are nontimbered grasslands. The predominant timber species are Douglas-fir, white fir, and ponderosa pine

The area is popular for big-game hunting, grouse hunting, and berry picking. Recreation use amounts to about 4,000 recreation visitor days per year. Approximately three-quarters of the area is in the semiprimitive motorized component of the recreation opportunity spectrum, while the remainder is considered roaded natural

WILDERNESS POTENTIAL

Capability. More than 90 percent of the perimeter is surrounded by National Forest land. The remaining 10 percent is contiguous to small private land parcels. Boundaries of the inventoried area generally follow ridgetop roads, section lines, or random lines which mark the edge of previous timber harvesting Finding suitable boundaries would not be a problem if the area were designated wilderness Because of its relatively small size, the visitor can perceive the entire area from many points along the perimeter and within the interior However, because of its compact shape, there are opportunities for solitude not found in many similar sized areas. The knowledge that roads are never more than two miles away would detract from a sense of self-reliance or adventure for many.

The area is natural appearing with the exception of old railroad grades in the south end along drainage bottoms These grades were used to remove timber from portions of the area in the 1920's and 1930's. With the exception of some damage that occurred to the stream channels and the grades themselves, the logging activity is not readily noticeable. There are several miles of jeep trails within the area and in some instances the jeep trails follow the old railroad grade.

There are no known threatened or endangered plant or animal species in the area Elk and deer are the primary species of human interest although a variety of birds and mammals found in northeast Oregon are available. Five Points Creek is an anadromous fish stream and there is interest in

improving the quality of the stream for fish use At present there is a noticeable lack of riparian vegetation

Availability. The area contains one 160-acre parcel of private land, all of which is timbered and undeveloped.

Although there are no known locatable mineral deposits, the area is considered prospectively valuable for oil and gas by the U S Geological Survey and there is presently one gas and oil lease. There have been no substantiated oil or gas discoveries and the likelihood of discovery is believed to be low. There are no known geothermal opportunities Neither are there significant known cultural or historic values.

If the area were designated for wilderness, the types of recreation use would not be likely to change appreciably There are no particular points of interest that would attract people such as lakes or geologic features. There are no outstanding opportunities for unusual adventure, excitement, or challenge. With wilderness designation, the recreation opportunity spectrum would not change.

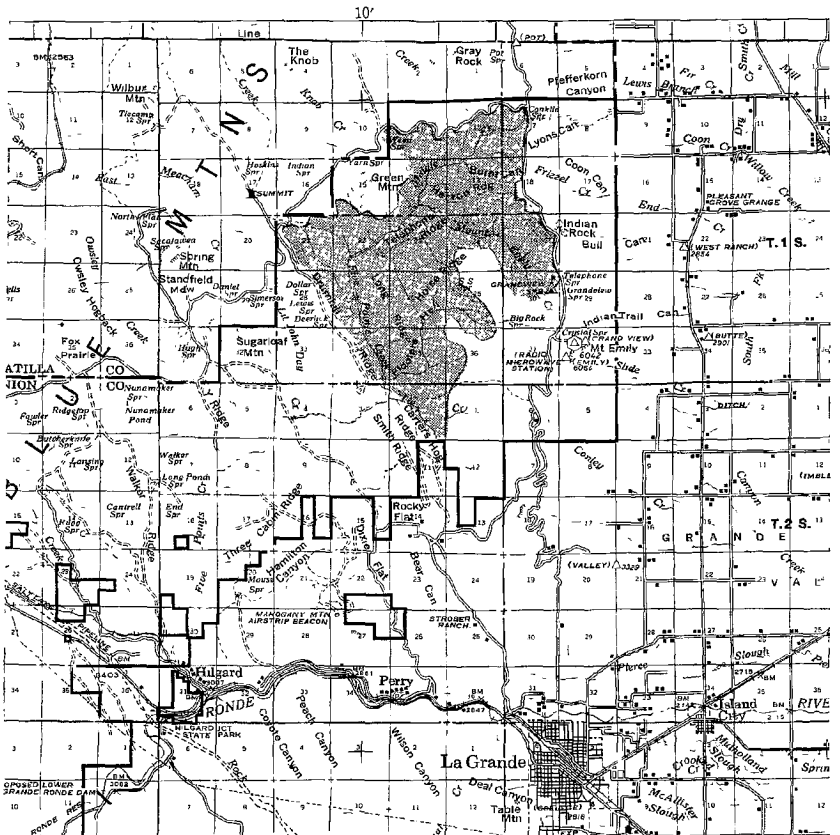
The area is not grazed by livestock at present and there are no plans to permit grazing in the near future due to anticipated problems with riparian vegetation and wildlife. There are 8,119 acres of productive forest land It contains 106 MMBF of standing timber and has a potential to contribute 1 3 MMBF to the annual timber harvest of the Forest.

Potential waterpower and water storage development sites are located in T.1S., R 37E , Section 14 and T.2S., R.37E., Section 3

Need. The Mt. Emily Roadless Area lies some 20 miles west of the Eagle Cap Wilderness and 30 miles south of the Wenaha-Tucanon Wilderness Each of these large wilderness areas contain the ecosystems found in the Mt Emily area and in much greater amounts.

Public interest has been primarily at the local level In 1978 the area was administratively allocated to roadless recreation uses through the Grande Ronde Planning Unit Environmental Impact Statement There has been no Congressional interest in the area Scoping during the Forest Land and Resource Management Plan has not revealed any renewed interest

R 37 E R 38 E



MT. EMILY R.A.

NO. 6277

ACRES 8,822

2/89 J.A.H.

C - 45

Reservoir Roadless Area (6284)
13,595 Acres

Description. This area adjoins the southeast boundary of Eagle Cap Wilderness. It is of varied topography, ranging from steep Sugarloaf and Russell Mountains (both over 7,400 feet) to 5,000-feet elevation at the creeks draining the area It is about 12 miles north of the town of Halfway, Oregon, and several miles northeast of the old mining community of Cornucopia East Pine Creek, Clear Creek and the east fork of Pine Creek all drain from the area. Granite outcroppings and glaciated valleys typical of the south faces of the Wallowa Mountains make up the northern portion of this area, which gradually slopes off to the south with intermixed patches of high elevation forest and meadows Fish Lake and Fish Lake campground, accessed by Forest Road 66, are a half mile east of the eastern boundary of Reservoir Roadless Area

Recreation use is mostly associated with fall big-game hunting, berry picking and fishing. No species of threatened or endangered plants or animals are known to inhabit the area. The area is two miles from the highly mineralized Cornucopia mining district and contains several old mines and prospects in the southwest portion in an area of gold and silver potential.

Recreation opportunities for mountain climbing, snowmobiling and crosscountry skiing exist as well as for hunting, fishing and backpacking Most of the area is considered to be within the semiprimitive motorized portion of the recreation opportunity spectrum (ROS).

This area contains four irrigation reservoirs of importance to a number of ranches outside the Forest boundary. It was partially within the Eagle Cap Wilderness prior to 1972 when it was removed to make more manageable boundaries and to exclude the reservoirs from the wilderness Several miles of ditch line exist within the area, as well as a number of trails Wheel tracks exist in the less steep portions of the area, used under entry permit for repair and maintenance of dams and ditches.

No anadromous fish runs have existed in the area since construction of Hells Canyon Dam. Native populations of rainbow and eastern brook trout provide recreational fishing opportunities throughout the Reservoir Roadless Area portion of the Pine Creek watershed Tributaries from here substantially contribute to the high water quality of the entire watershed

Soils are of granitic origin combined with volcanic ash in timbered areas Ecosystems here are typical of the mid to high elevation levels of the Wallowa Mountains in the Eagle Cap Wilderness

WILDERNESS POTENTIAL

Capability. Reservoir Roadless Area is bounded on all sides by National Forest land. Sights and sounds of human activities would be noticeable on the eastern and western boundaries because of the proximity to mining areas and a campground, the central and north portions of the area offer opportunities for primitive hiking, and serve as a buffer for the Eagle Cap Wilderness

Availability. The main recreation opportunity is for primitive big-game hunting Roads and jeep trails into the area are generally closed during big-game hunting seasons

Several cultural resource sites exist near the west side of the Reservoir area, including historic mining structures Select ("superior") trees* have been designated throughout the area within a quarter mile of trails and wheel tracks

*Trees which exhibit superior growth and form, possibly due to their genetic makeup

The Pine Valley range allotment covers nearly the entire area, with the Duck Creek Allotment in a portion of it These range allotments are used primarily for late summer forage for domestic cattle.

The area includes 4,845 acres of productive forest land with a standing timber volume of 65 MMBF. It has the potential to contribute .8 MMBF to the annual allowable timber harvest for the Forest.

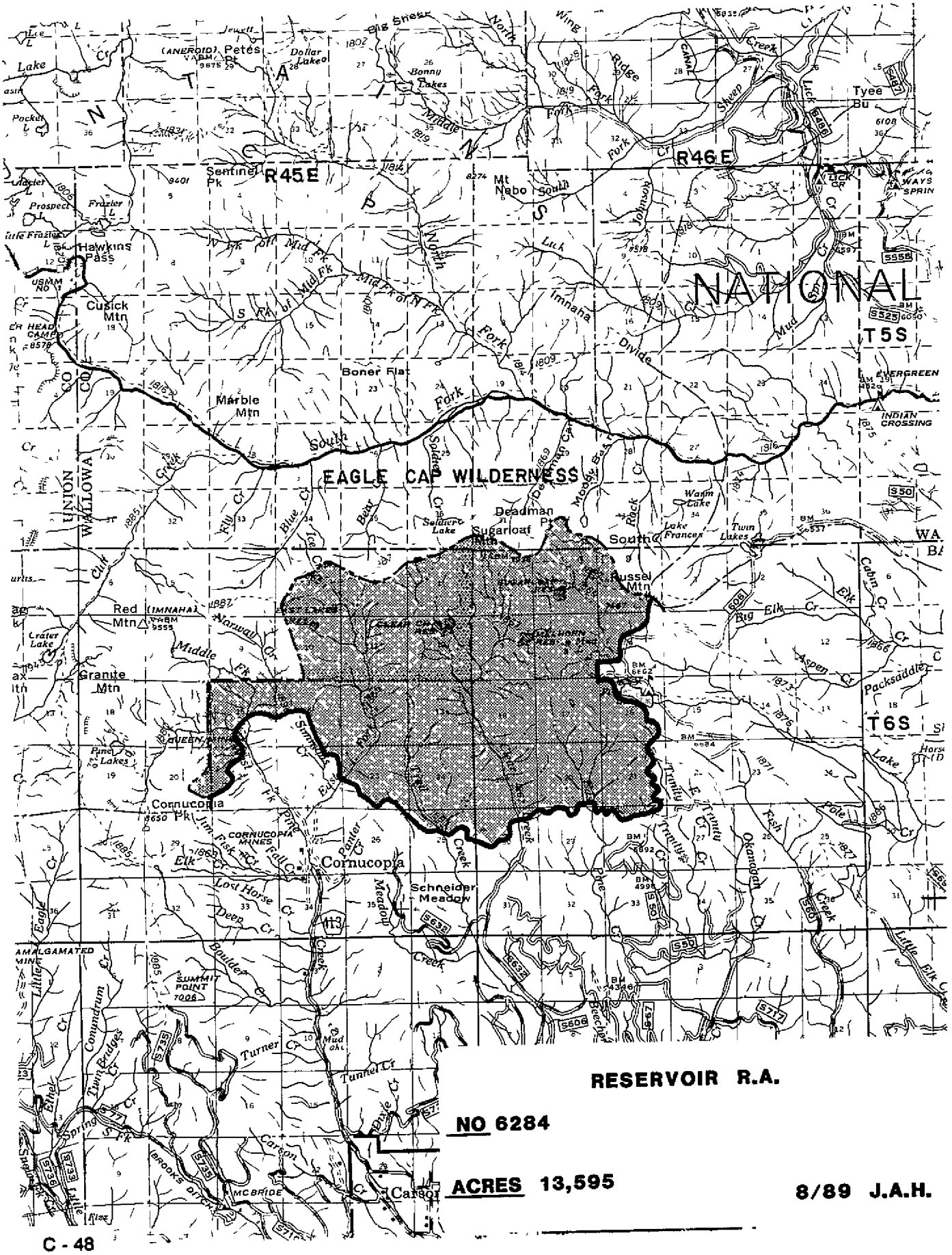
All but about 1,000 acres of this roadless area is being managed under the Burnt Powder Unit Plan (FEIS 1979) to provide dispersed recreation opportunities The acreage outside the dispersed recreation management area lies within the boundaries of the Trail Timber Sale which was sold in July 1987.

Potential waterpower and water storage development sites are located in T.6S., R.45E., Section 12, and T.5S., R 46E , Section 29. The proposed facility is to be a pumping site and storage facility

Need. Eagle Cap Wilderness, 346,000 acres, is immediately to the north. The Oregon portion of the Hells Canyon Wilderness is 13 miles to the east These two large wilderness areas contain the same ecosystems, land forms, and features of the Reservoir Roadless Area, and in greater amount.

The area was eliminated from the Eagle Cap Wilderness in 1972 by Congress due to nonconforming uses (reservoirs and ditches). These uses are still present It was reconsidered during formulation of the Oregon Wilderness Bill of 1984. Conditions have not changed and there does not appear to be any particular reason to protect the area for future wilderness consideration.

Appendix C



RESERVOIR R.A.

NO 6284

ACRES 13,595

8/89 J.A.H.

C - 48

Tope Creek Roadless Area (G03)
8,674 Acres

Description. This area was inventoried during the first Roadless Area Review and Evaluation and allocated to nonwilderness uses through the Wallowa Valley Planning Unit Environmental Impact Statement (Land Management Plan) of November 3, 1975. The potential wilderness character of the area remains essentially unchanged since that time It lies some 20 miles northwest of Enterprise and can be reached via Wallowa County Road No. 500, the Powwatka Ridge Road.

The area includes the upper reaches of Mud Creek, including Tope Creek, a major tributary. Mud Creek runs northerly and enters the Grande Ronde River, some five miles north of the roadless area The canyons within the area are deep and precipitous, typical of many of the Snake River and Grande Ronde River breaks. Most of the north and east slopes, approximately 40 percent of the area, are timbered with Douglas-fir being the dominant species The south and west slopes are of grass and shrub types.

Most of the area is considered to be within the semiprimitive nonmotorized portion of the recreation opportunity spectrum Recreation use is almost exclusively for big-game hunting during elk and deer seasons and amounts to approximately 400 recreation visitor days per year. Other than hunting, the perimeter of the area offers interesting views of rugged canyon topography However, because it is relatively inaccessible, it does not share the viewing popularity of nearby Joseph Canyon which lies along a State highway Most of the area is used as winter range by deer and elk Mud and Tope Creeks are anadromous fish streams and provide spawning habitat for salmon and steelhead

WILDERNESS POTENTIAL

Capability. Because of its narrow, relatively small sized, irregular configuration, and many miles of boundary, manageability of the area as wilderness would be difficult. Because of its shape and size, a visitor can perceive the entire area from nearby points on the perimeter The sounds of motor vehicles would often be audible from much of the interior of area There is a sense of solitude within the depths of the canyons, particularly in the timbered portions, and traversing the difficult terrain would contribute to a spirit of adventure. The sense of self-reliance would be low for many users because of the relatively small size of the area and correspondingly short distances to roads

The interior of the area remains natural appearing except for fences, livestock watering facilities, and livestock trails There are no known special features or notable opportunities for scientific, archaeological, or historical study, nor are there known threatened or endangered species of plants or animals

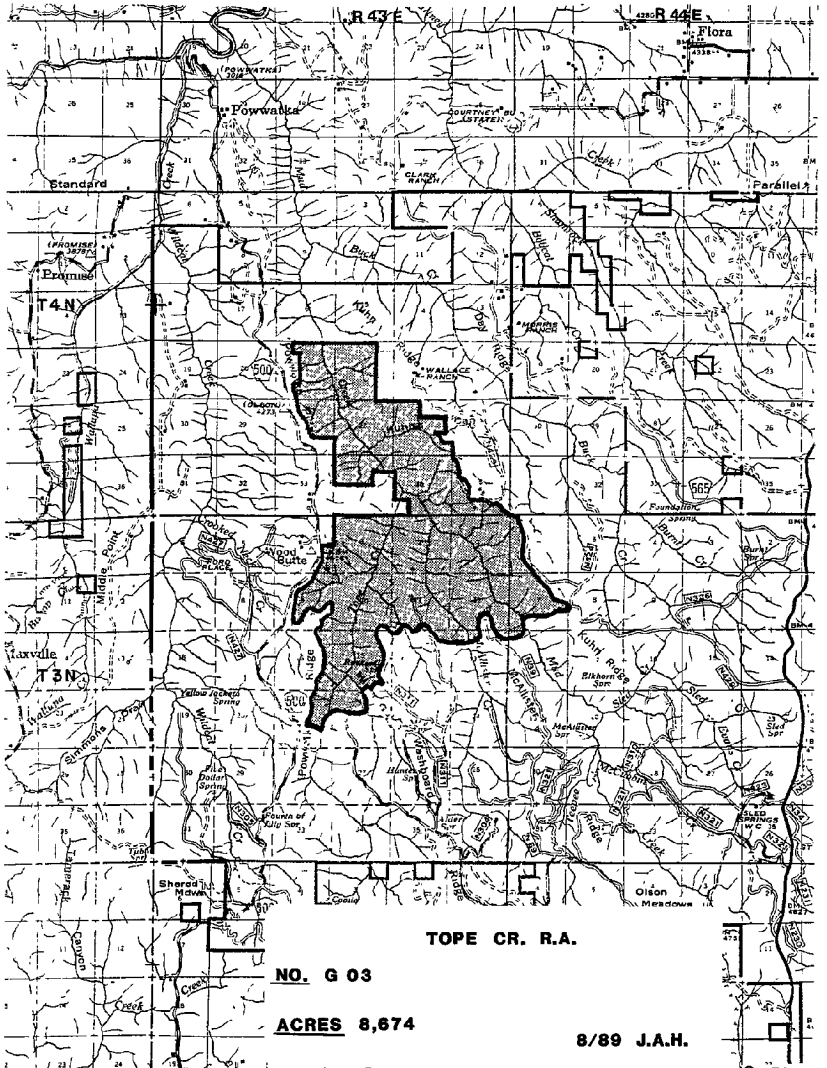
Availability. Recreation opportunity would remain unchanged by wilderness classification, but an increase in use would be probable because of the publicity associated with classification. Increased use for hiking and viewing could be expected. The recreation opportunity spectrum classification would be unchanged

The area provides 1,200 animal unit months of livestock grazing annually There is no evidence of locatable mineralization but the area is considered prospectively valuable for oil and gas by the U S. Geological Survey Nearly half of the perimeter abuts private land

The area contains 1,820 acres of productive forest land with 13 MMBF of standing timber. It has the potential to add 2 MMBF to the annual timber harvest for the Forest

Need. The Eagle Cap Wilderness lies 22 miles to the south, the Hells Canyon Wilderness is 30 miles east of the area and Wenaha-Tucannon Canyon lies 20 miles to the northwest These large nearby wildernesses provide the ecosystems that are found in the Tope Creek Roadless Area and in much greater amount

The area was evaluated by the public during RARE and during unit planning (Wallowa Valley Planning Unit). Interest in the area for wilderness has been low, the only expressions favoring wilderness coming from those who suggested all roadless areas be placed in wilderness.


R 43 E
R 44 E
Flora
Powwatka
Standard
Parallel
Promise
T 4 N
Taxville
T 3 N
Wood Butte
Middle Point
Ridge
Sheard Mdws
Olson Meadows
TOPE CR. R.A.
NO. G 03
ACRES 8,674
8/89 J.A.H.
C - 51

Twin Mountain Roadless Area (6273)
60,903 Acres

Description. This area was considered in RARE and RARE II, but was not selected for wilderness study However, some 15,000 acres were placed in the North Fork John Day Wilderness by The Oregon Wilderness Bill of 1984 The carving out of this wilderness addition resulted in isolating two western portions of the area (see map) including Mt Ireland The remainder of the area is primarily within the Powder River Drainage The roadless area lies about 20 miles west of Baker and is within Baker and Grant Counties. It encompasses most of the Elkhorn Mountain Range Similar to the Wallowa Mountains (Eagle Cap Wilderness) some 40 miles to the northeast, the area is characterized by jagged mountain peaks which reach above timberline, deep glaciated canyons, cirque basins with small lakes, and numerous headwaters of streams including Cracker Creek, Dutch Flat Creek, North Fork of Powder River, and Rock Creek Five of the lakes have been enlarged by low dams to increase storage for downstream irrigation Also included is a major portion of the Baker City Watershed, a pipeline, and a city-owned building

The Elkhorn Range is the second largest geologic batholith in Oregon (second to the Wallowa Mountains) *Soils are formed from granodiorite parent material and volcanic ash from Cascade* volcanic eruptions. Elevations range from 5,000 to 8,900 feet. Canyons and north slopes below 8,000 feet are timbered Along with the Marble Point Roadless Area, it forms a scenic backdrop from the Baker Valley on the east and the Sumpter Valley on the west.

Most of the lakes and streams provide trout fishing and the area is popular in the fall for big-game hunting. Several trails are popular for hiking and off-road recreational users Included is the Elkhorn Crest National Recreation Trail Approximately 30,800 acres of the area are in the semiprimitive motorized component of the recreation opportunity spectrum while 20,900 acres are considered semiprimitive nonmotorized and 9,200 acres are in the roaded natural component

In 1988, the Omnibus Oregon Wild and Scenic Rivers Act resulted in the North Powder River being added to the National Rivers System as a Scenic River Thus, some 2,000 acres will be within the Scenic River Corridor when a special plan for the river, currently being prepared, is completed.

WILDERNESS POTENTIAL

Capability. The area is natural appearing with the exception of wheel track roads, evidence of prospecting and mining, dams on several of the small lakes, and areas along the perimeter where woodcutting has encroached. Approximately 591 acres is excluded from the area for expansion of the Anthony Lake Ski Area

Because the area is relatively large, there are ample opportunities for solitude and for experiencing a sense of self-reliance and adventure There are many opportunities for panoramic views from the popular Elkhorn Crest Trail and other points

The area contains a wide variety of wildlife with elk, deer, and grouse being the primary game species Mountain goats transplanted into the Elkhorn Range have survived three years Officials of the Oregon Department of Fish and Wildlife are optimistic that a herd will become established

Availability. The area contains 22,775 acres of productive forest land containing 269 MMBF of standing timber volume The area has potential to contribute 3 4 MMBF to the annual allowable harvest for the Forest. The area is mineralized as evidenced by approximately 200 mining claims and many prospects and old mines Portions of the North Pole-Columbia Lode (the largest gold-*producing structure in the state), the Highland-Maxwell vein system, the Baisley-Elkhorn vein system,*

and the Cable Cove mining district are within this area This was the primary factor in eliminating the area from wilderness consideration in RARE II Gold is the most sought-after mineral, but copper, lead, tungsten, antimony, and molybdenum are also found Although exploration continues, there are currently no operating mines in the roadless area

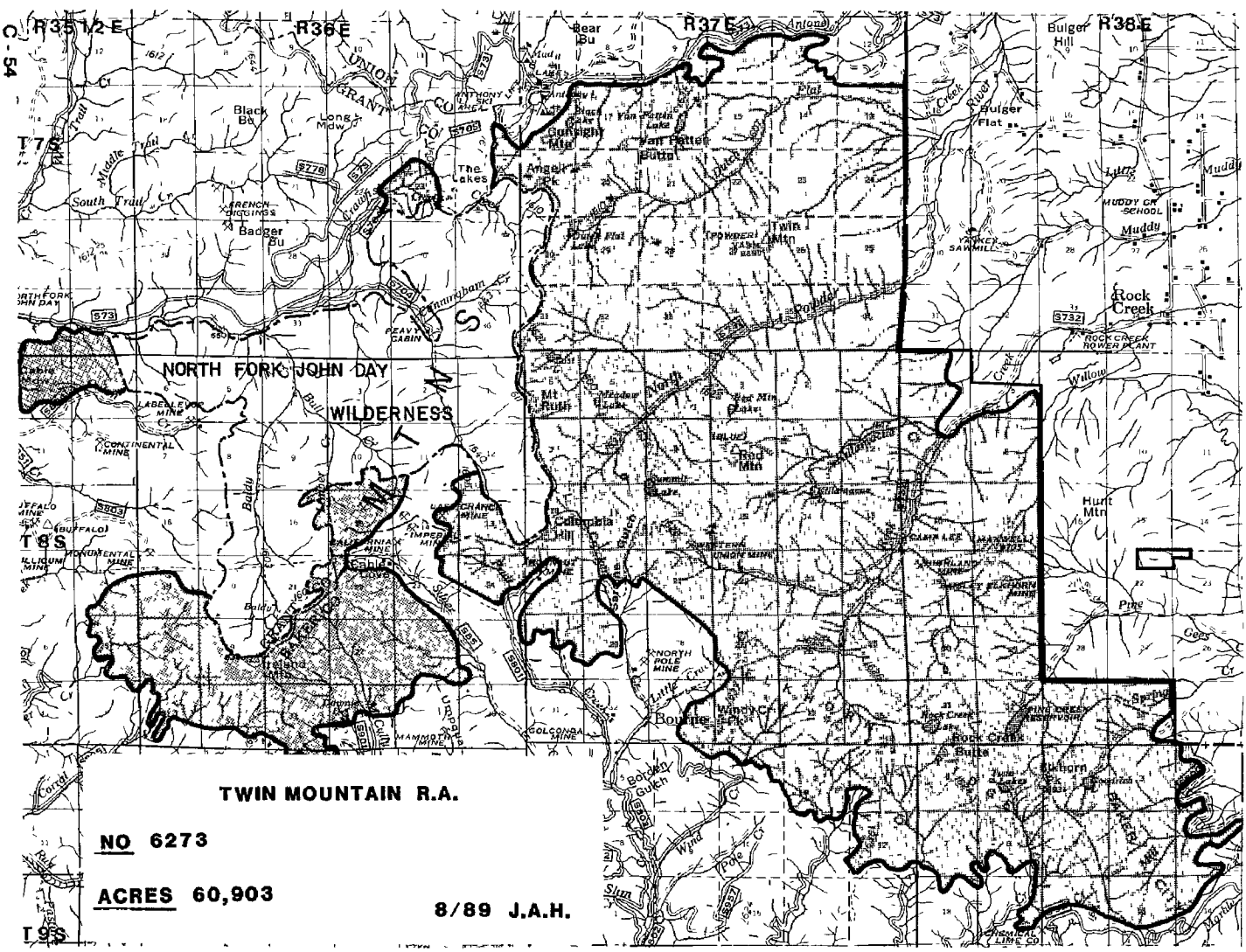
Most of the area is not suitable for grazing due to erodable soils, lack of forage, or rugged terrain Several areas at lower elevations are grazed as part of livestock allotments

The scattered patented mining claims total to over 1,300 acres of private land within the roadless area

Potential water power and water storage development sites are located in T.7S , R 36E., Section 31, T.8S , R.36E , Section 12; T 7S., R 37E., Section 13, T.8S , R 37E., Section 18; T.8S , R.38E , Section 31; and T.8S , R.38E , Section 8.

Need. There are apparently no ecosystems that are not found more abundantly in the Eagle Cap Wilderness or the adjacent North Fork John Day Wilderness. There are no notable opportunities for historic or scientific study, but there are notable geologic features and landforms that are of interest to many people

There has long been interest in the area for wilderness designation There is general agreement that the area has terrain and other features that are usually associated with "wilderness character." The interest in the area for wilderness designation is not likely to subside within the near future.


R35 1/2 E
R36E
R37E
R38E
T7S
T8S
T9S
NORTH FORK JOHN DAY WILDERNESS
TWIN MOUNTAIN R.A.
NO 6273
ACRES 60,903
8/89 J.A.H.

Upper Catherine Creek Roadless Area (6281)
6,844 Acres

Description. This area was not inventoried in RARE. However, it was inventoried in RARE II. It was evaluated for wilderness through the Grande Ronde Unit Planning process and allocated to non-wilderness in 1978 (FEIS, Grande Ronde Planning Unit) It was therefore eliminated from the final RARE II inventory. It was again considered by Congress in 1984 when approximately 65 percent of the former 15,000 acre area was added to the Eagle Cap Wilderness by the Oregon Wilderness Bill of 1984.

The remaining area is generally the lower elevation portion, although elevations do range from as high as 7,400 feet near Burger Butte, to 4,200 feet near the North Fork Catherine Creek Campground

The area contains portions, one to two miles, of several streams including the North and Middle Forks of Catherine Creek, Pole Creek, and Sand Pass Creek. Virtually all species of trees on the Forest are found here, with Douglas-fir, ponderosa pine, and grand fir comprising most of the major commercial volume. The area is considered above-average timber site for the Wallowa-Whitman The entire area is grazed by cattle, being part of the Catherine Creek livestock allotment.

Three trails pass through the area, providing access to the Eagle Cap Wilderness. Primary on-site recreation use is for big-game hunting and fishing The North Fork of Catherine Creek is an anadromous fish stream, providing habitat for steelhead Members of the Umatilla Confederated Tribe fish the stream as part of their ceded land rights

Approximately 2,000 acres of the area are within the roaded natural component of the recreation opportunity spectrum (ROS) while 3,700 acres are considered semiprimitive motorized and 1,200 acres are in the semiprimitive nonmotorized component

WILDERNESS POTENTIAL

Capability. The area is natural appearing There are no special features or notable known opportunities for scientific, archaeological or historical study, nor are there known threatened or endangered species of plants or animals.

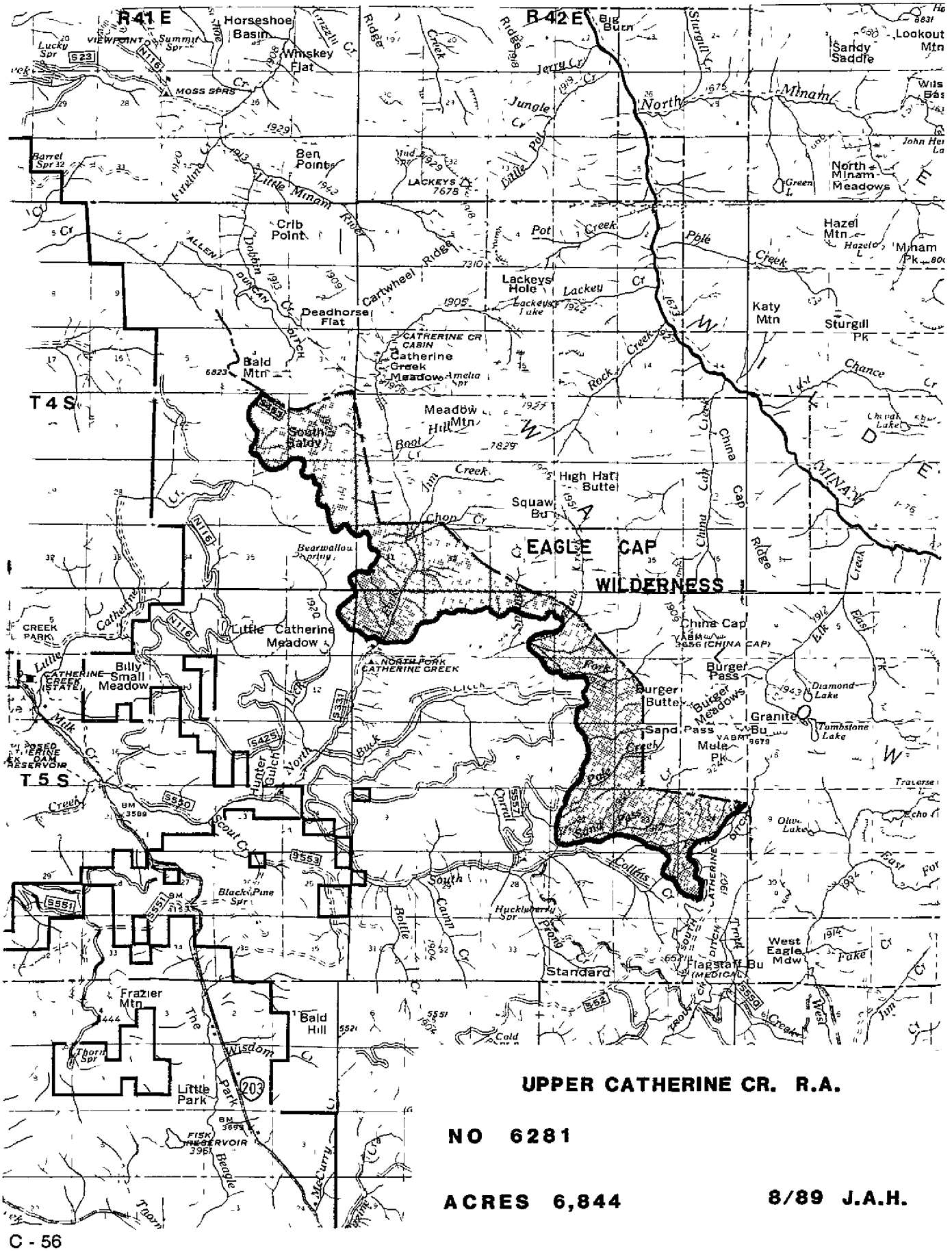
Because the area amounts to a mile-wide fringe along the edge of the existing wilderness, a visitor is never far from roads or sounds of humans. Therefore, within the roadless area proper, there is not high opportunity for experiencing a sense of self-reliance or solitude

Availability. The area contains no private land

There are 5,527 acres of productive forest land with a standing timber volume of 52 MMBF The area has potential to contribute 6 MMBF to the annual allowable harvest for the Forest.

Need. The area contains no ecosystems or special land features that are not found more abundantly in the adjacent Eagle Cap Wilderness.

Although the Oregon Wilderness Bill included the more attactive parts of the original roadless area in wilderness, there is still some sentiment for adding the remainder to wilderness as well. However, there is apparently no reason to add the area to the wilderness unless the purpose is simply to make the Eagle Cap Wilderness larger


R41E
R42E
T4S
T5S
EAGLE CAP WILDERNESS
UPPER CATHERINE CR. R.A.
NO 6281
ACRES 6,844
8/89 J.A.H.

Beaver Creek Roadless Area (6276)
12,470 Acres

Description. The Beaver Creek Roadless Area was inventoried during the second Roadless Area Review and Evaluation (RARE II) but was eliminated from the inventory through the Grande Ronde Planning Unit Final Environmental Impact Statement in 1978. It was allocated to nonwilderness uses. Since that time, the area has been reduced from its original 23,100 acres to its present size by timber sales and associated road construction The remaining undeveloped area includes the La Grande Watershed, an area designated for protection by a 1938 Cooperative Agreement, as amended in 1945, between the Secretary of Agriculture and the City of La Grande. It was supplemented by a Memorandum of Understanding in 1984 between the City of La Grande and the Wallowa-Whitman National Forest (see Chapter 4 of the Land and Resource Management Plan).

This area lies 12 miles southwest of La Grande within the Jordan and Beaver Creek Drainages. Each stream is a tributary to the Grande Ronde River Its topography is characterized as a series of rolling ridges, 90 percent of which are heavily timbered, with lodgepole pine being the predominant tree species. Over 80 percent of the merchantable lodgepole pine has been killed by the mountain pine beetle during the past eight years. That which has been dead for five or more years is falling and accumulating in jackstraw patterns. Elevations within the area range from 4,000 to 6,500 feet.

All of the area is considered important summer range for Rocky Mountain elk. At present it is closed to livestock grazing.

Soils have originated primarily from basalt and volcanic ash. According to the "Environmental Assessment for the Proposed Lodgepole Pine Salvage in the La Grande Watershed Area," runoff from the area is

> " high in relation to the precipitation and is poorly distributed throughout the year Of the total runoff volume, 80-90 percent is confined to a 4-month period between March and June Peak flow from snowmelt runoff occurs usually from mid-April to mid-May. Snowmelt runoff is rapid and there is little opportunity to store water in the soil or bedrock, to be released slowly as groundwater flow.
>
> "The demand for water in the City of La Grande is greatest during summer months when water use is normally increased Supply from the Beaver Creek Watershed cannot totally satisfy the city demand during this period Storage and augmentation by existing city wells is the practice now employed by the city to supply the additional water Beaver Creek is the main source, but during summer months, nearly one-half of the supply comes from wells."

Most of the area is within the semiprimitive motorized component of the recreation opportunity spectrum but the only motorized use is by snowmobiles. Otherwise most of the area would be considered semiprimitive nonmotorized The City of La Grande has recently requested that snowmobile use be curtailed. The dominant recreational use of the area is by elk and deer hunters during the fall. There are no significant water-related recreational opportunities since the 40-acre La Grande Reservoir is closed to fishing, swimming or "activities which would include substantial contact with water," which are prohibited by the city

WILDERNESS POTENTIAL

Capability. Boundaries of the area are defined by roads or lands where timber harvest has obviously occurred Although a Forest visitor can seldom get more than 1.5 miles from a road, a sense of solitude is available largely because of the extensive, dense stands of trees A trail system serves the

area and these are the only visible evidences of man's imprint The area is devoid of unusual scenic or unique features. The overall impression is one of vast stands of lodgepole pine. A prominent exception is the La Grande Reservoir, a jewel-like water storage facility lying within the dense canopy near the edge of the roadless area.

There are no threatened or endangered species of plants or animals known to occupy the area, nor are there known opportunities for historical or archaeological study

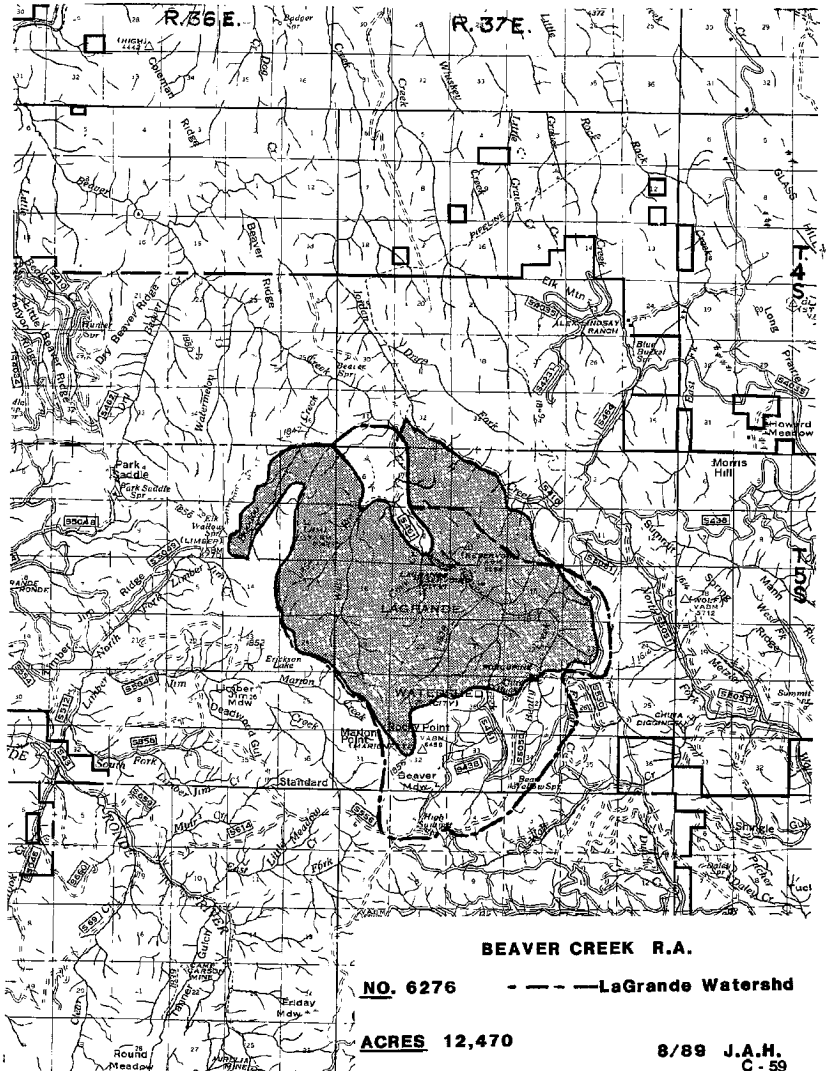
Availability Productive forest land, suitable for timber management, occupies 11,489 acres or 92 percent of the roadless area, with 90 4 MMBF of standing timber. The area could contribute an estimated 1 13 MMBF to the annual allowable harvest for the Wallowa-Whitman. Timber harvest is not precluded by the La Grande Watershed agreement

Recreational use of the area for other than fall hunting is likely to remain low due to the lack of recreational attractions or scenic variety

There are no encumbrances that would preclude designating the area for unroaded recreational use. The agreement with the City for the use of the municipal watershed does not preclude other uses of the land. The La Grande City Council has stated that they prefer that there be no "logging or transportation systems" within the municipal watershed, but if the currently planned salvage program is completed, that there be "no further timber sales "

Need. The North Fork John Day Wilderness, which provides lands of similar character to that of the Beaver Creek Roadless Area, lies 12 miles to the southwest There appears to be no need to save the area for future wilderness designation unless the purpose would be simply to add wilderness acreage.

Response to the Forest Plan DEIS has indicated some interest in retaining the area in a roadless or wilderness condition.



BEAVER CREEK R.A.

NO. 6276 - — - —LaGrande Watershd

ACRES 12,470

8/89 J.A.H.

C - 59

Upper Grande Ronde Roadless Area (6275)
11,810 Acres

Description. The Upper Grande Ronde Roadless Area was inventoried during the second roadless area review and evaluation (RARE II) but was eliminated from the inventory through the Grande Ronde Planning Unit Final Environmental Impact Statement in 1978 It was allocated to nonwilderness uses. Since that time, the area has been reduced from its original 15,235 acres to its present size by timber sales and associated road construction

The area contains the headwaters of the Grande Ronde River and the first five miles of its length Also included are all of Tanner Creek, the upper reaches of Clear Creek and the East Fork of the Grande Ronde River All of these streams are important tributaries of the Grande Ronde The Grande Ronde River is an anadromous fish stream and efforts are underway to restore the salmon runs to levels that were present prior to the dams in the Snake and Columbia Rivers.

Elevations range from 4,700 feet near the mouth of the East Fork to 7,200 feet near Grande Ronde Lake The area straddles the transition zone between Columbia River basalts in the lower north end and the granitic material of the Elkhorn batholith to the south Thus, soils are more erosive and of lower fertility in the southern portion Topography of the western half of the area is, for the most part, a series of gentle basins and rolling ridges, frequently broken by steep, not particularly deep, canyons The eastern third of the area slopes rather steeply to the west toward the Grande Ronde River.

Small streams, springs and spruce bogs are numerous Meadows are sprinkled throughout the southern end of the area and add variety to the otherwise unbroken tree canopy.

Nearly all tree species indigenous to the Forest are found in the area with lodgepole the most abundant species. Grand Fir, Englemann spruce, and larch are common and ponderosa pine are scattered along the eastern breaks of the Grande Ronde River.

The area supports elk and receives moderate use by hunters. There is no livestock grazing at present as most of the area is considered unsuitable for this use.

The area is inventoried as providing semiprimitive nonmotorized recreation opportunities with the exception of a one-half mile strip around the perimeter influenced by roads which is mapped as providing semiprimitive motorized recreation opportunities

WILDERNESS POTENTIAL

Capability. The area is surrounded by National Forest and the boundary is defined by roads or recent timber harvest Within the area there are 10 or more miles of ditches constructed more than a half century ago to transfer water from natural drainages to hydraulic mining sites The ditches average 3 feet in depth and are 8 feet wide There is no longer a maintained trail system within the area The Aurelia Mine, which lies within the heart of the roadless area is abandoned but is of historical interest because of the remnants of camps of Chinese workers that were employed at the Aurelia and other mines in the construction of ditches near the turn of the century The northern-most mile on the Grande Ronde River within the roadless area shows evidence of early day gold dredging, similar to the several miles of like activity outside the roadless area. Although trees of considerable size now grow on the tailing piles, the disturbance is far from healed, and like the ditches, serves as a reminder of historical mining activity The same may be said of the remnants of several old mining cabins

None of these man-made features are likely to detract from the semi-primitive recreation experience that is available -- in fact they may add to it. It is doubtful that most people would consider the mining associated features as something that would disqualify the area from wilderness. Many recently-fallen, insect-killed lodgepole pine trees in many areas make travel by foot or horseback virtually impossible.

Because of the size and configuration of the area, a visitor can seldom get more than two miles from a road However, a sense of solitude is available because of the dense tree cover and numerous small draws and ridges. The size of the area would tend to limit the opportunity for primitive or challenging recreation experiences for most people -- at least when compared to the opportunities for self-reliance found in larger, nearby primitive areas such as those of the North Fork John Day Wilderness or Eagle Cap Wilderness

Although attractive streams, meadows and forest scenes are abundant, the area is devoid of the unusual rock formations, mountain peaks, scenic overlooks, waterfalls or other features often associated with wilderness There are no known threatened or endangered species of plants or animals within the area.

Availability. There is no private land within the roadless area and there are no leases, rights-of-way or other encumbrances that would prohibit wilderness classification. Despite there being no active mining operations at present, past activity within the area and mines near the perimeter, such as the Camp Carson, give ample evidence that the area contains minerals

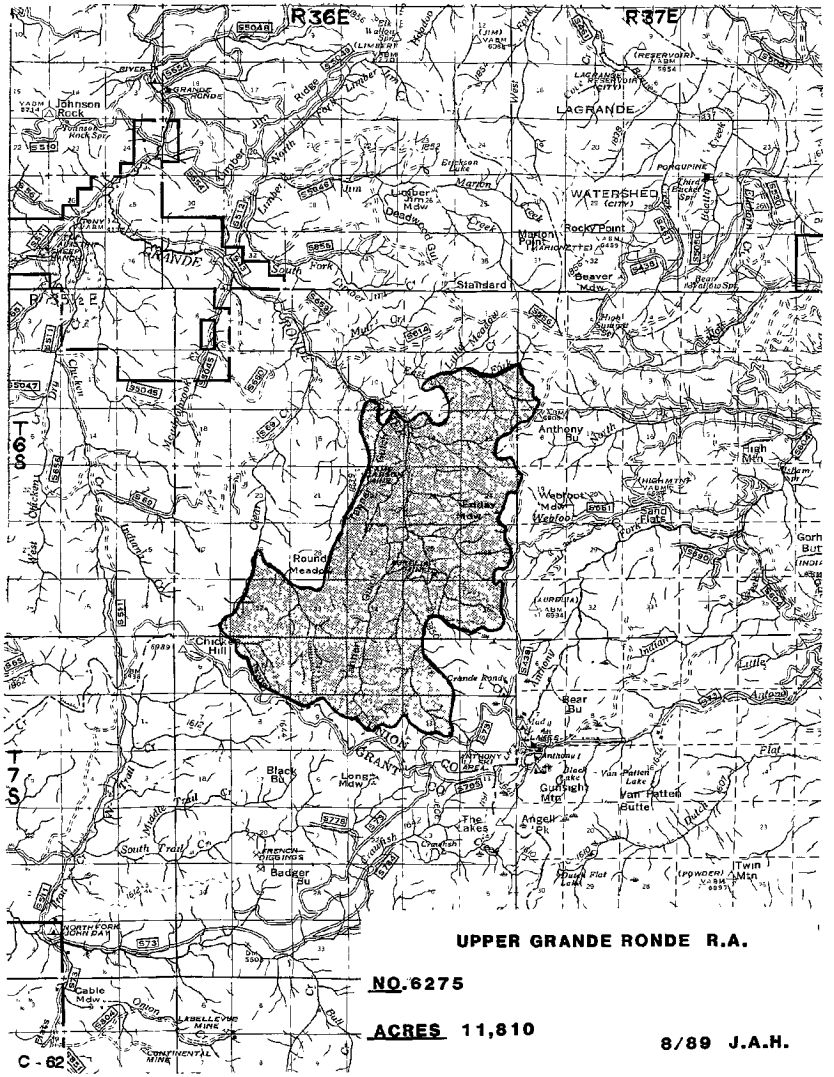
The 1986 fire in the south end of the area near Chicken Hill did not alter the area to the extent that it does not remain eligible for roadless recreation. No roads were built to control the fire and no timber was salvaged.

Productive forest land, suitable for timber management, occupies 10,975 acres or 93 percent of the roadless area, with 97.1 MMBF of standing and recently fallen timber The area could contribute an estimated 1 2 MMBF to the annual allowable harvest from the Wallowa-Whitman

Need. There are no ecosystems or features of interest found in the area that are not found more abundantly in the nearby North Fork John Day Wilderness which lies approximately 7 miles to the southwest Current recreational use is low and confined primarily to big game hunting.

There has been moderate interest in retaining the roadless character of the area. In some cases this has been based on a desire to protect anadromous fish values The Forest Service believes the values can and will be protected with other land allocations as well as with roadless recreation or wilderness designation.

Appendix C


R36E
R37E
T6S
T7S
LAGRANDE
WATERSHED
Johnson Rock
Standard
Rocky Point
Anthony Bu
Round Meadow
Chinch Hill
Bear Bu
Black Bu
Lions Mdw
Badger Bu
Angell Pk
Twin Mtn
Cable Mdw
UPPER GRANDE RONDE R.A.
NO.6275
ACRES 11,810
8/89 J.A.H.
C - 62

Roadless Areas Shared with the Umatilla National Forest

The following areas are fragments of roadless areas which lie primarily on the Umatilla National Forest (Greenhorn also extends onto the Malheur National Forest). The Wallowa-Whitman portions are insignificant in describing or evaluating the roadless areas and do not contain features that would have a bearing in an analysis of potential wilderness attributes. Refer to the Umatilla National Forest Land and Resource Management Plan for descriptions and evaluations of these roadless areas.

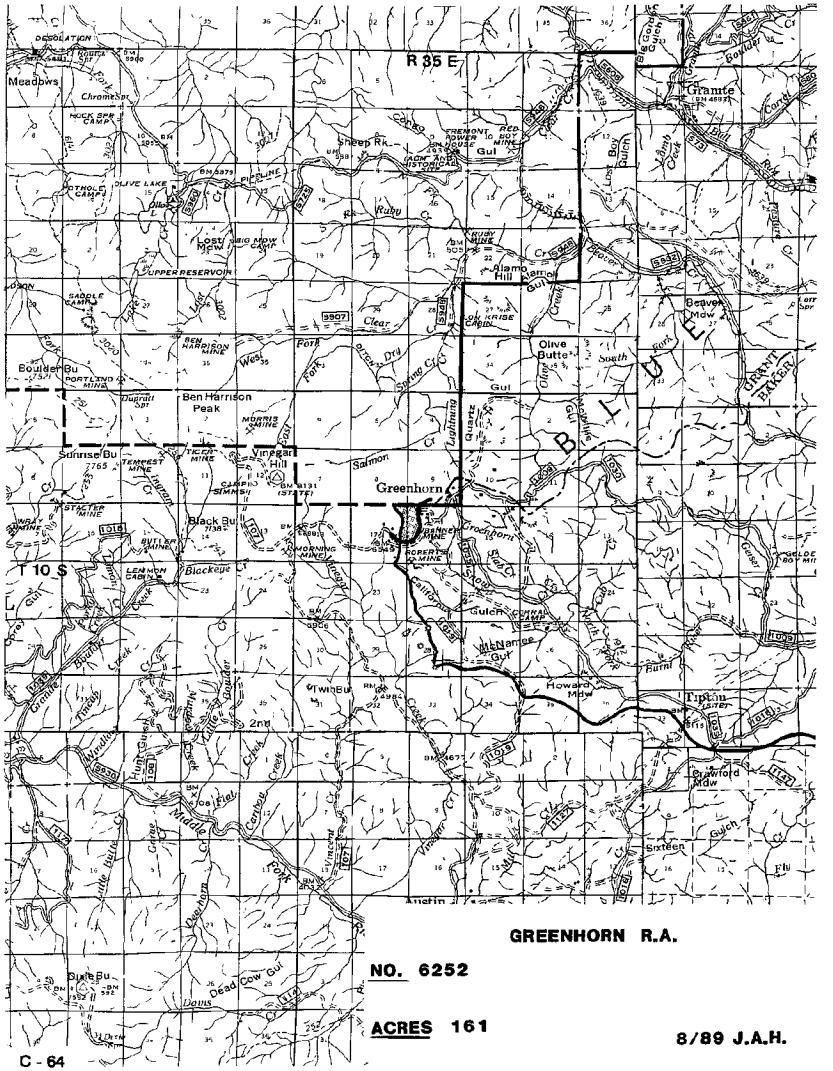
All of the roadless areas listed below are within the roaded natural component of the recreation opportunity spectrum.

The combined standing timber volume of these roadless areas amounts to 59 MMBF Combined they would contribute an estimated 7 MMBF to the allowable harvest for the Forest.

Name	Number	Acres
Tower	256	85
Hellhole	261	513
Greenhorn	252	161
North Mt Emily	262	772
Squaw	601	3,220

The Grande Ronde Roadless Area is also shared with the Umatilla National Forest. A separate description for it is provided earlier in this section.

Appendix C



GREENHORN R.A.

NO. 6252

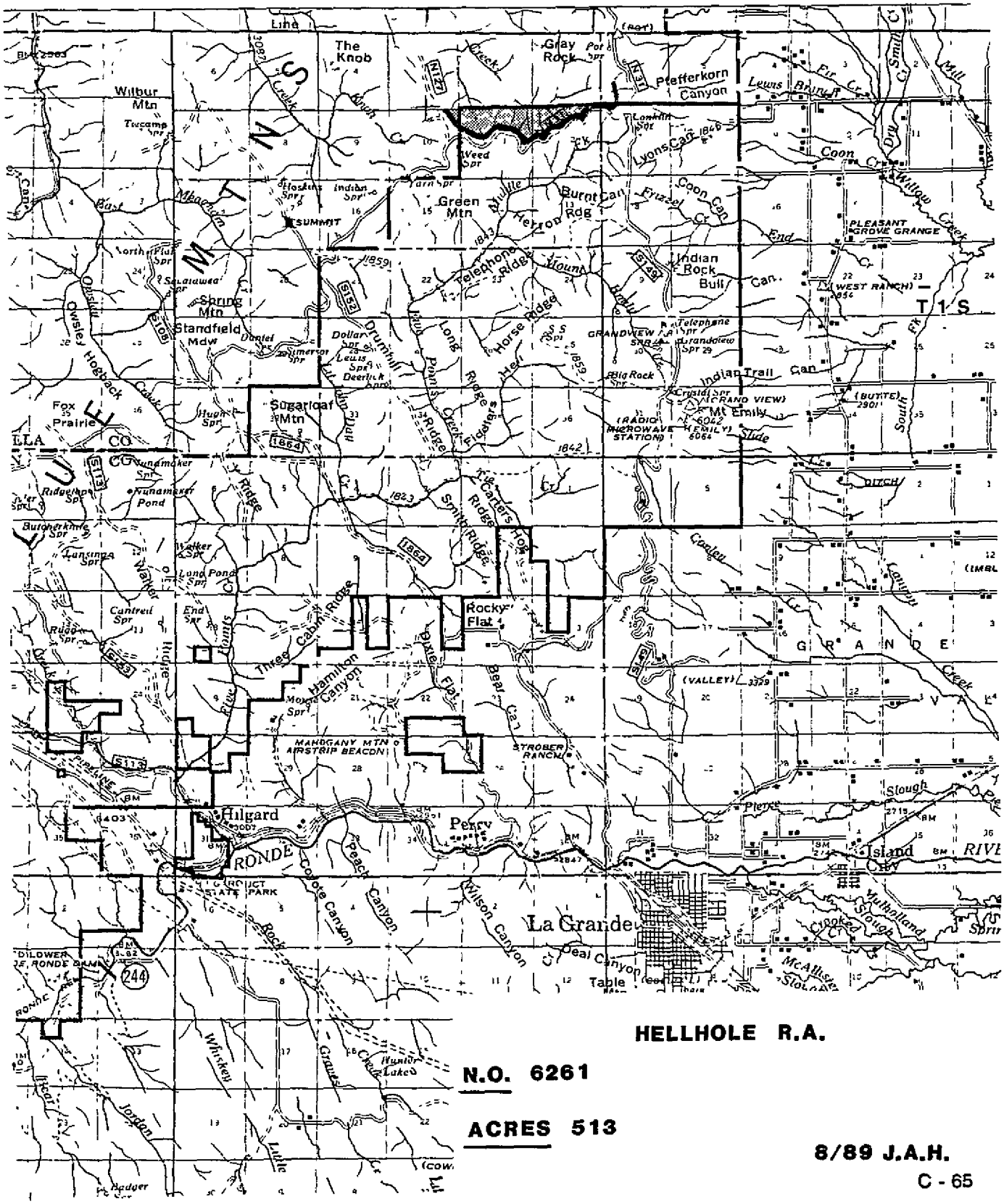
ACRES 161

8/89 J.A.H.

C - 64

R 37 E

R 38 E



HELLHOLE R.A.

N.O. 6261

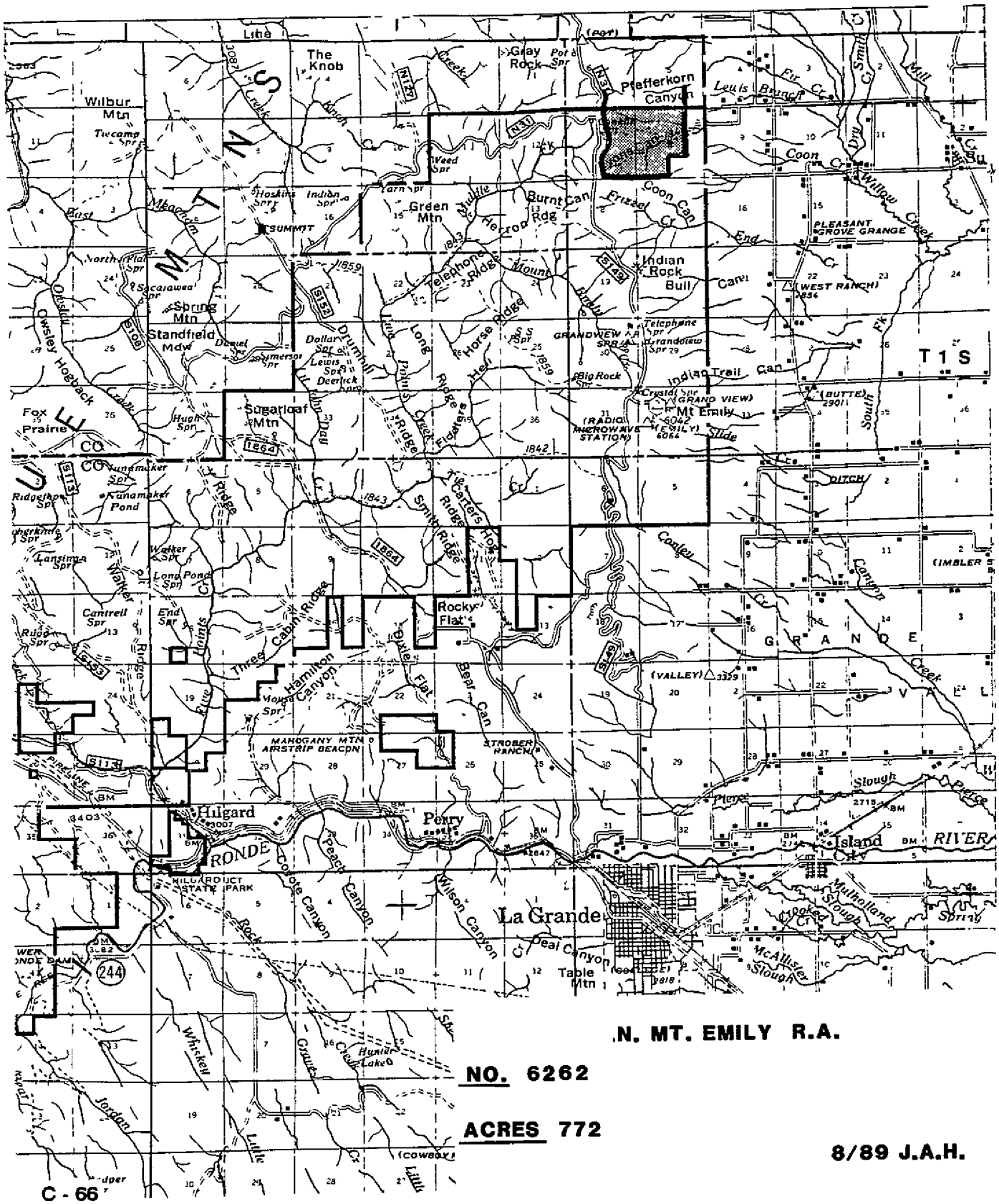
ACRES 513

8/89 J.A.H.

C - 65

R 37 E

R 38 E



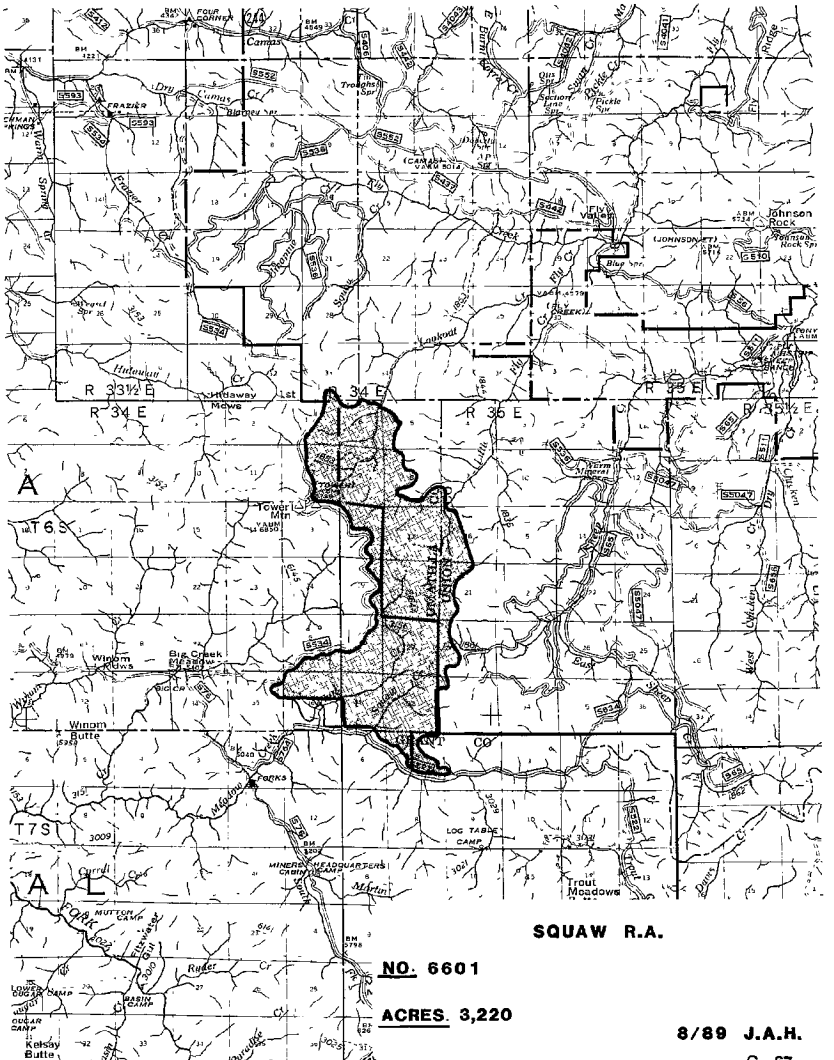
N. MT. EMILY R.A.

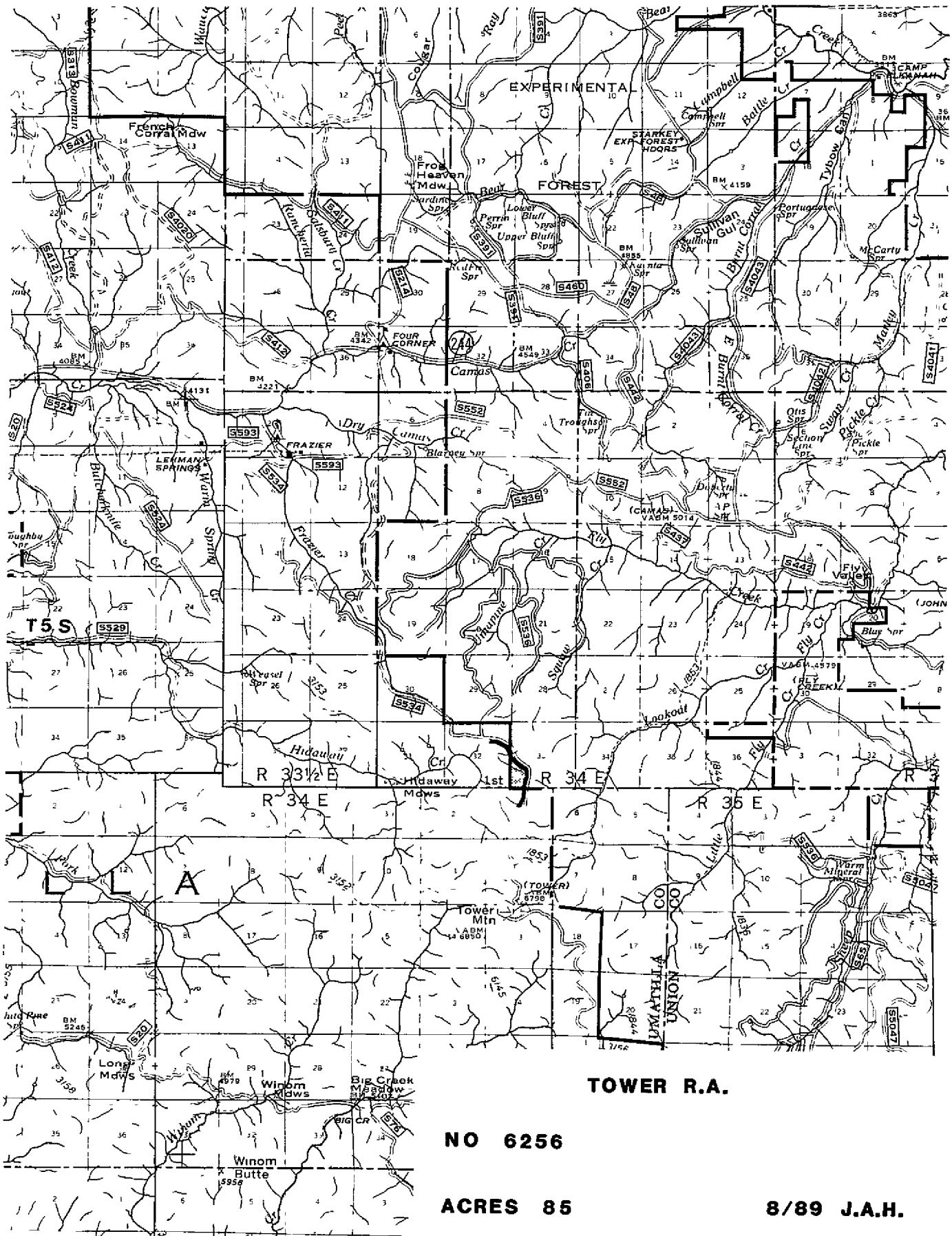
NO. 6262

ACRES 772

8/89 J.A.H.

C - 66


R 34 E
R 35 E
T 6 S
T 7 S
Tower Mtn
Winom Butte
Trout Meadows
Kelsay Butte
Big Creek
Johnson Rock
Hidaway Mdws
Hidaway Mdws 1st
Log Table Camp
Miners Headquarters Camp
Lower Cougar Camp
Cougar Camp
Cabin Camp
Mutton Camp
Four Corners
Camas
Dry Camas Cr
Fraser Cr
Sheep Cr
Hidaway Cr
Larkrat Cr
Fly Creek
Fly Valley
Blue Spr
Johnson Rock Spr
Warm Springs
Big Creek
Big Creek Meadows
Forks
Middle Fork
Rader Cr
Elkhorn Gulch
Pyramid
Mt Hood Nat'l Forest
Clackamas Co
Marion Co
SQUAW R.A.
NO. 6601
ACRES. 3,220
8/89 J.A.H.
C - 67



TOWER R.A.

NO 6256

ACRES 85

8/89 J.A.H.

ENVIRONMENTAL CONSEQUENCES

Effects of Alternatives on Roadless Areas

The primary consequences of the alternatives on roadless areas result from those instances in which the area is allocated to uses which call for construction of roads, timber harvest or other uses which alter the character of the area. Such activities would eliminate areas from future wilderness consideration, provided the development were to occur prior to developing the next Forest Land and Resource Management Plan

Management Strategies 1, 2, and 3 will have the greater effects on roadless areas since they include timber harvest and usually road construction. Therefore, by reviewing Table C-3, the reader can envision which areas are likely to be altered Alternative E allocates nearly all areas to Management Strategy 6, and will virtually ensure that the potential of the areas for wilderness is retained Conversely, Alternative B allocates extensive amounts of roadless areas to the timber management strategies Other alternatives provide varying amounts within the range from B to E But even with such commodity-oriented alternatives as Alternatives B and B-dep, 27 percent of the roadless acres outside the HCNRA will remain undeveloped because they are not suitable for commodity uses which require development As shown in Table C-3, significant roadless area acreages are retained in all alternatives

Table C-6 shows management strategy designation by roadless area by alternative. For many people, those alternatives which retain the roadless character of an area are desirable. To others, however, road access means being able to drive into and use areas that have heretofore been inaccessible to them. Roads also mean access for mineral exploration For those who believe there is sufficient wilderness, potential wilderness value is not a serious adverse consequence of roadless area development.

Effects of Roadless Areas on Other Resources

Chapter IV of the EIS discusses the amount of timber production foregone as a result of allocating land to Management Strategy 6, the dominant strategy that preserves roadless area character. Some roadless areas will not actually be harvested for several decades, due to expensive access and low-value timber species Therefore, the area may not actually be scheduled for timber harvest before a new Forest Plan is completed However, as a part of the total timber inventory the area contributes to the calculated first decade harvest level in those alternatives in which they are allocated to strategies which provide for timber management Table C-7 which the potential annual timber volume by roadless area by alternative.

Because undeveloped areas often have an abundance of overmature timber, susceptible to insects and disease, the roadless areas provide a source of infection that may spread to adjacent stands

Maintaining the roadless areas as roadless areas has much less effect on other renewable resources than on timber. Utilization of other resources usually does not require roading. Roading may make livestock management more convenient, but this advantage may be offset by increased costs for structural improvements such as cattleguards or fences and the inconvenience of nonuse periods while new trees are becoming established in plantations

Keeping the roadless areas in an undeveloped state results in maintaining high levels of dead and down tree wildlife habitat The option of using timber harvest for improving habitat is foregone but since the use of fire is permitted, habitat manipulation is still possible.

Since the semiprimitive motorized and semiprimitive nonmotorized classes of the recreation opportunity spectrum are in short supply, maintaining the roadless areas will serve to retain the recreation experiences offered by these classes in proportion to the amount of area retained. Table C-8 shows the recreation opportunity spectrum by roadless area by alternative.

Mineral exploration is less easily accomplished in roadless areas. The effects of maintaining undeveloped areas on watershed values are more positive than negative since roads are an important cause of sediment

Table C-9 illustrates the proposed roading of the roadless areas, by alternative, over the next 30 years

Alternative E's land allocation is like Alternative B's except for the roadless area acreage which were assigned to Management Strategy 6 By comparing Alternative E with Alternative B, one can compare approximate differences between the alternatives

Table B-43 shows the tradeoffs between Alternative E and B when considering FORPLAN timber costs and benefits only.

Table B-35 shows differences by resource groups in terms of present net value, discounted benefits, and discounted costs

Table C-6
ROADLESS AREA DESIGNATION BY MANAGEMENT STRATEGY
(Acres by Alternative)

	A&NC	B&Bd	C,Cd&H	D	E	F	G
Castle Ridge 278 Acres 8300							
Management Strategy 1		3,540	35	35			3,540
Management Strategy 2		3,412					3,412
Management Strategy 3			3,186	3,186			
Management Strategy 4							
Management Strstegy 6			3,241	3,241	7,326	7,326	
Management Strategy 7							
Management Strategy 12	974	974	974	974	974	974	974
Management Strategy 15		374	864	864			374
Management Strategy 18							
Optimum Wood Big Game Mgt	1,246						
Low Investment Timber Mgt	248						
Dispersed Recreation Mgt	5,832						
Deadhorse G08 Acres 10451							
Management Strategy 1							
Management Strategy 2		10,451					10,451
Management Strategy 3			10,399	10,399			
Management Strategy 4							
Management Strategy 6					10,451		
Management Strategy 7							
Management Strategy 12							
Management Strategy 15			52	52			
Management Strategy 18						10,451	
Low Investment Timber Mgt	10,451						
Dunns Bluff WW1 Acres 1013							
Management Strategy 1		1,013	47	47			1,013
Management Strategy 2							
Management Strategy 3							
Management Strategy 4					1,013	1,103	
Management Strategy 6			966	966			
Management Strategy 7							
Management Strategy 12							
Management Strategy 15							
Low Investment Timber Mgt	708						
Dispersed Recreation Mgt	305						
Grande Ronde 267 Acres 4890							
Management Strategy 1		57					57
Management Strategy 2		2,969					2,969
Management Strategy 3							
Management Strategy 4							
Management Strategy 6			3,026	3,026	3,026	3,026	
Management Strategy 7	1,864	1,864	1,864	1,864	1,864	1,864	1,864
Management Strategy 12							
Management Strategy 15							
Dispersed Recreation Mgt	3,026						

Table C-6 (cont)
ROADLESS AREA DESIGNATION BY MANAGEMENT STRATEGY
(Acres by Alternative)

	A&NC	B&Bd	C,Cd&H	D	E	F	G
Greenhorn 252 Acres 161							
Management Strategy 1		161	161	161			161
Management Strategy 2							
Management Strategy 3						161	
Management Strategy 4							
Management Strategy 6					161		
Management Strategy 7							
Management Strategy 12							
Management Strategy 15							
Dispersed Recreation Mgt	161						
Hellhole 261 Acres 513							
Management Strategy 1		513		513			513
Management Strategy 2							
Management Strategy 3			513				
Management Strategy 4							
Management Strategy 6					513		
Management Strategy 7							
Management Strategy 12							
Management Strategy 15							
Management Strategy 18						513	
Optimum Wood Big Game Mgt	513						
Huckleberry 289 Acres 10107							
Management Strategy 1		8,766	1,038	6,765			8,766
Management Strategy 2		1,341					1,341
Management Strategy 3			6,661	934			
Management Strategy 4							
Management Strategy 6			1,951	1,951	10,107	10,107	
Management Strategy 7							
Management Strategy 12							
Management Strategy 15			457	457			
Intensive Wood Forage Mgt	3,398						
Dispersed Recreation Mgt	2,186						
Old Growth Mgt	4,523						
Low Investment Timber Mgt							
Hurricane Creek 288 Acres 1623							
Management Strategy 1		1,623	119	119			1,623
Management Strategy 2							
Management Strategy 3							
Management Strategy 4							
Management Strategy 6			1,504	1,504	1,623	1,623	
Management Strategy 7							
Management Strategy 12							
Management Strategy 15							
Dispersed Recreation Mgt	1,623						

Table C-6 (cont)
ROADLESS AREA DESIGNATION BY MANAGEMENT STRATEGY
(Acres by Alternative)

	A&NC	B&Bd	C,Cd&H	D	E	F	G
Joseph Canyon G04 Acres 23602							
Management Strategy 1		2,177	1,777	1,777			2,177
Management Strategy 2		18,673					18,673
Management Strategy 3			16,764	16,764			
Management Strategy 4							
Management Strategy 6					20,850		
Management Strategy 7	2,752	2,752	2,752	2,752	2,752	2,752	2,752
Management Strategy 12							
Management Strategy 15			2,309	2,309		3,174	
Management Strategy 18						17,676	
Old Growth Mgt	769						
Low Investment Timber Mgt	20,081						
Little Creek 280 Acres 2907							
Management Strategy 1		1,416	1,416	1,416			1,416
Management Strategy 2		1,491					1,491
Management Strategy 3			1,491	1,491			
Management Strategy 4							
Management Strategy 6					2,907	2,907	
Management Strategy 7							
Management Strategy 12							
Management Strategy 15							
Optimum Wood Big Game Mgt	2,277						
Old Growth Mgt	630						
Little Sheep 286 Acres 5278							
Management Strategy 1		5,278	540	540			5,278
Management Strategy 2							
Management Strategy 3							
Management Strategy 4							
Management Strategy 6			4,738	4,738	5,278	5,278	
Management Strategy 7							
Management Strategy 12							
Management Strategy 15							
Intensive Wood Forage Mgt	2,118						
Dispersed Recreation Mgt	2,124						
Old Growth Mgt	1,036						
Marble Point 271 Acres 7135							
Management Strategy 1		4,985	299	4,669			4,985
Management Strategy 2							
Management Strategy 3			4,307			4,725	
Management Strategy 4							
Management Strategy 6		2,150	2,297	2,297	7,135	2,141	2,150
Management Strategy 7							
Management Strategy 12							
Management Strategy 15			232	169		269	
Intensive Wood Forage Mgt	299						
Optimum Wood Big Game Mgt	217						
Baker City Watershed	6,619						

Table C-6 (cont)
ROADLESS AREA DESIGNATION BY MANAGEMENT STRATEGY
(Acres by Alternative)

	A&NC	B&Bd	C,Cd&H	D	E	F	G
Monument Rock 240 Acres 5958							
Management Strategy 1		5,577	3,781	5,482			5,577
Management Strategy 2							
Management Strategy 3						3,554	
Management Strategy 4							
Management Strategy 6			2,097		5,958	2,125	
Management Strategy 7							
Management Strategy 12							
Management Strategy 15		381	80	476		279	381
Intensive Wood Forage Mgt	2,075						
Optimum Wood Big Game Mgt	3,883						
Mount Emily 277 Acres 8822							
Management Strategy 1		8,539	687	8,341			8,539
Management Strategy 2		283					283
Management Strategy 3			7,961	283			
Management Strategy 4							
Management Strategy 6					8,822	8,822	
Management Strategy 7							
Management Strategy 12							
Management Strategy 15			174	198			
Management Strategy 18							
Optimum Wood Big Game Mgt	679						
Dispersed Recreation Mgt	8,143						
North Mount Emily 262 Acres 772							
Management Strategy 1		417		417			417
Management Strategy 2		355					355
Management Strategy 3			772	355			
Management Strategy 4							
Management Strategy 6					772		
Management Strategy 7							
Management Strategy 12							
Management Strategy 15							
Management Strategy 18						772	
Optimum Wood Big Game Mgt	772						
Reservoir 284 Acres 13595							
Management Strategy 1		6,457		1,502			6,457
Management Strategy 2							
Management Strategy 3			1,502				
Management Strategy 4							
Management Strategy 6		6,462	11,743	11,743	13,595	13,595	6,462
Management Strategy 7							
Management Strategy 12							
Management Strategy 15		676	350	350			676
Intensive Wood Forage Mgt	593						
Optimum Wood Big Game Mgt	386						
Dispersed Recreation Mgt	12,616						

Table C-6 (cont.)
ROADLESS AREA DESIGNATION BY MANAGEMENT STRATEGY
(Acres by Alternative)

	A&NC	B&Bd	C,Cd&H	D	E	F	G
Squaw 601 Acres 3220							
Management Strategy 1		2,860	2,860	2,860			2,860
Management Strategy 2							
Management Strategy 6					3,220		
Management Strategy 15		360	360	360		360	360
Management Strategy 18						2,860	
Optimum Wood Big Game Mgt	130						
Low Investment Timber Mgt	1,829						
Intensive Wood Forage Mgt	576						
Old-Growth Mgt	685						
Tope Creek G03 Acres 8674							
Management Strategy 1		942	942	942			942
Management Strategy 2		7,732					7,732
Management Strategy 3			7,241	7,241			
Management Strategy 4							
Management Strategy 6					8,674		
Management Strategy 7							
Management Strategy 12							
Management Strategy 15			491	491		723	
Management Strategy 18						7,951	
Old Growth Mgt	1,086						
Low Investment Timber Mgt	7,588						
Tower 256 Acres 85							
Management Strategy 1		85	85	85			85
Management Strategy 2							
Management Strategy 3						85	
Management Strategy 4							
Management Strategy 6							
Management Strategy 7							
Management Strategy 12							
Management Strategy 18					85		
Intensive Wood Forage Mgt	85						
Upper Catherine Creek 281 Acres 6844							
Management Strategy 1		6,636	4,576	4,576			6,636
Management Strategy 2							
Management Strategy 3							
Management Strategy 4							
Management Strategy 6			2,071	2,071	6,844	6,844	
Management Strategy 7							
Management Strategy 12							
Management Strategy 15		208	197	197			208
Optimum Wood Big Game Mgt	2,017						
Low Investment Timber Mgt	4,706						
Dispersed Recreation Mgt	121						

Table C-6 (cont)
ROADLESS AREA DESIGNATION BY MANAGEMENT STRATEGY
(Acres by Alternative)

	A&NC	B&Bd	C,Cd&H	D	E	F	G
Homestead 291 Acres 5733 *							
Management Strategy 1		(1879)	(1879)	(1879)	(1879)		(1879)
Management Strategy 2		(528)			(528)		(528)
Management Strategy 3			(528)	(528)		(2407)	
Management Strategy 4							
Management Strategy 6							
Management Strategy 7							
Management Strategy 10	(3326)	(3326)	(3326)	(3326)	(3326)	(3326)	(3326)
Management Strategy 12							
Management Strategy 13	5,733	5,733	5,733	5,733	5,733	5,733	5,733
Management Strategy 15							
Optimum Wood Big Game Mgt	(2407)						
Beaver Creek 276 Acres 12470							
Management Strategy 1		10,808		10,761			10,808
Management Strategy 3			10,670				
Management Strategy 6					12,470		
Management Strategy 15	2,032	1,662	1,800	1,709		1,991	1,662
Management Strategy 18						10,479	
Optimum Wood Big Game Mgt	240						
Low Investment Timber Mgt	10,198						
Upper Grande Ronde 275 Acres 11810							
Management Strategy 1		10,951		10,803			10,951
Management Strategy 3			10,763				
Management Strategy 6					11,810		
Management Strategy 15	204	859	1,047	1,007		789	859
Management Strategy 18						11,021	
Optimum Wood Big Game Mgt	166						
Low Investment Timber Mgt	11,440						

* Figures in parentheses indicate what the land allocation would be if that particular non-wilderness alternative were selected

Table C-6 (cont.)
ROADLESS AREA DESIGNATION BY MANAGEMENT STRATEGY
(Acres by Alternative)

	A	B&Bd	C	Cd&H	D	E	F	G
Boulder Park 282 Acres 12311								
Management Strategy 1		9,133		881	5,861			9,133
Management Strategy 2		104						104
Management Strategy 3			1,100	4,980				
Management Strategy 6		1,906	10,891	5,516	5,516	11,991	11,991	1,906
Management Strategy 7	320	320	320	320	320	320	320	320
Management Strategy 15		848		614	614			848
Optimum Wood Big Game Mgt	1,547							
Low Investment Timber Mgt	304							
Dispersed Recreation Mgt	10,140							
Little Eagle Meadows 283 Acres 7140								
Management Strategy 1		5,156		875	3,860			5,156
Management Strategy 3				2,985				
Management Strategy 6		1,561	6,652	2,792	2,792	7,140	7,140	1,561
Management Strategy 15		423	488	488	488			423
Intensive Wood Forage Mgt	369							
Optimum Wood Big Game Mgt	494							
Dispersed Recreation Mgt	6,277							

	A&NC	B&Bd	C	Cd&H	D	E	F	G
Twin Mountain 273 Acres 60903								
Management Strategy 1		20,095	3,958	5,555	11,912			20,095
Management Strategy 3			2,663	2,663			8,418	
Management Strategy 6		37,248	47,790	45,996	44,614	58,892	46,003	37,248
Management Strategy 7	2,011	2,011	2,011	2,011	2,011	2,011	2,011	2,011
Management Strategy 15		1,549	2,132	2,329	2,366		2,321	1,549
Management Strategy 18			2,349	2,349			2,150	
Intensive Wood Forage Mgt	10,361							
Optimum Wood Big Game Mgt	2,431							
Low Investment Timber Mgt	1,533							
Dispersed Recreation Mgt	42,446							
Baker City Watershed	2,121							
Lake Fork 290 Acres:14898								
Management Strategy 1		13,901	747		13,764			
Management Strategy 3			6,714	13,764			13,545	
Management Strategy 6			6,084			14,898		14,898
Management Strategy 15		997	1,353	1,134	1,134		1,353	
Intensive Wood Forage Mgt	14,153							
Optimum Wood Big Game Mgt	695							
Dispersed Recreation Mgt	50							

Table C-7
POTENTIAL ANNUAL TIMBER HARVEST
(MMBF BY ALTERNATIVE)

Date 08/21/85 Roadless Area Name	RARE#	A&NC	B&B-dep	C	C-dep&H	D	E	F	G
Beaver Creek	276	477	979	.774	774	975	0 000	760	979
Boulder Park	282	076	566	.065	289	348	0 000	0.000	566
Castle Ridge	278	140	661	.258	258	258	0 000	0 000	661
Deadhorse	GO8	093	129	114	114	114	0.000	144	129
Dunns Bluff	WW1	032	070	0.000	0 000	0 000	0 000	0 000	070
Grande Ronde 1/	267	0 000	134	0.000	0 000	0 000	0 000	0 000	134
Greenhorn 1/	252	0 000	.023	.023	.023	023	0 000	018	023
Hellhole 1/	261	071	071	.057	057	071	0 000	057	071
Homestead	291	0 000	042	.041	041	041	0 000	034	042
Huckleberry	289	261	768	.491	491	579	0 000	0 000	768
Hurricane Creek	288	0 000	142	.010	010	010	0 000	0 000	142
Joseph Canyon	GO4	330	662	.498	498	498	0 000	464	662
Lake Fork	290	1 772	1 673	.739	1 324	1 655	0 000	1 308	0 000
Little Creek	280	155	220	208	208	208	0 000	0 000	220
Little Eagle Meadows	283	053	382	0.000	242	287	0 000	0 000	.382
Little Sheep	286	265	520	052	052	052	0 000	0 000	520
Marble Point	271	524	515	389	389	482	0 000	389	515
Monument Rock	240	255	298	203	203	292	0 000	152	298
Mount Emily	277	063	791	0.000	652	793	0 000	0 000	791
North Mount Emily 1/	262	060	082	.069	069	078	0 000	069	082
Reservoir	284	049	379	.071	071	089	0 000	0 000	379
Squaw 1/	601	215	276	.276	276	276	0 000	221	276
Tope Creek	GO3	106	151	.142	142	128	0 000	122	151
Tower 1/	256	008	008	008	008	008	0 000	006	008
Twin Mountain	273	603	1 108	439	517	672	0 000	457	1.108
Upper Catherine Creek	281	424	625	431	431	431	0 000	0 000	625
Upper Grande Ronde	275	600	1,126	.885	.885	1 110	0 000	906	1 126
TOTAL		6 832	12 401	6.243	8 024	9 478	0 000	5 107	10 728
1/ Shared with Umatilla NF		.354	594	.433	433	456	0 000	371	.594

Table C-8
RECREATION OPPORTUNITY SPECTRUM BY ROADLESS AREA*
(Alternatives A and NC)

DATE 6/89 ROADLESS AREA NAME	RARE#	ACRES RURAL	ROAD M	SPM	SPNM	PRIM	TOTALS
Beaver Creek	276	0	12470	0	0	0	12470
Boulder Park	282	0	5851	4580	1880	0	8300
Castle Ridge	278	0	3410	4890	0	0	10451
Deadhorse	G08	0	244	4090	6117	0	10451
Dunns Bluff	WW1	0	1013	0	0	0	1013
Grande Ronde	267	0	0	0	4890	0	4890
Greenhorn	252	0	161	0	0	0	161
Hellhole	261	0	513	0	0	0	513
Homestead	291	0	3503	0	2230	0	5733
Huckleberry	289	9	10107	0	0	0	10107
Hurricane Creek	288	0	0	376	1247	0	1623
Joseph Canyon	G04	0	23602	0	0	0	23602
Lake Fork	290	0	14898	0	0	0	14898
Little Creek	280	0	2907	0	0	0	2907
Little Eagle Meadows	283	0	4220	1370	1550	0	7140
Little Sheep	286	62	3742	0	1474	0	5278
Marble Point	271	0	7135	0	0	0	7135
Monument Rock	240	0	5958	0	0	0	5958
Mount Emily	277	0	5442	3380	0	0	8822
North Mount Emily	262	0	772	0	0	0	772
Reservoir	284	0	1840	11755	0	0	13595
Squaw	601	0	3220	0	0	0	3220
Tope Creek	G03	0	8674	0	0	0	8674
Tower	256	0	85	0	0	0	85
Twin Mountain	273	0	28323	18790	13790	0	60903
Upper Catherine Creek	281	0	6844	0	0	0	6844
Upper Grande Ronde	275	0	11810	0	0	0	11810
TOTAL		62	166744	49231	33178	0	249215

* Road M: Roaded Natural/Modified
SPM: Semiprimitive Motorized
SPNM: Semiprimitive Nonmotorized
PRIM: Primitive
(See glossary for definition of terms)

Table C-8 (cont.)
RECREATION OPPORTUNITY SPECTRUM BY ROADLESS AREA*
(Alternatives B and B-dep)

DATE 6/89 ROADLESS AREA NAME	RARE#	ACRES RURAL	ROAD M	SPM	SPNM	PRIM	TOTALS
Beaver Creek	276	0	12470	0	0	0	12470
Boulder Park	282	0	12311	0	0	0	12311
Castle Ridge	278	0	8300	0	0	0	8300
Deadhorse	G08	0	244	4090	6117	0	10451
Dunns Bluff	WW1	0	1013	0	0	0	1013
Grande Ronde	267	0	4890	0	0	0	4890
Greenhorn	252	0	161	0	0	0	161
Hellhole	261	0	513	0	0	0	513
Homestead	291	0	3503	0	2230	0	5733
Huckleberry	289	9	10107	0	0	0	10107
Hurricane Creek	288	0	1623	0	0	0	1623
Joseph Canyon	G04	0	23602	0	0	0	23602
Lake Fork	290	0	14898	0	0	0	14898
Little Creek	280	0	2907	0	0	0	2907
Little Eagle Meadows	283	0	6680	460	0	0	7140
Little Sheep	286	62	5216	0	0	0	5278
Marble Point	271	0	7135	0	0	0	7135
Monument Rock	240	0	5958	0	0	0	5958
Mount Emily	277	0	8822	0	0	0	8822
North Mount Emily	262	0	772	0	0	0	772
Reservoir	284	0	11305	2290	0	0	13595
Squaw	601	0	3220	0	0	0	3220
Tope Creek	G03	0	8674	0	0	0	8674
Tower	256	0	85	0	0	0	85
Twin Mountain	273	0	49103	5170	6630	0	60903
Upper Catherine Creek	281	0	6844	0	0	0	6844
Upper Grande Ronde	275	0	11810	0	0	0	11810
TOTAL		62	222166	12010	14977	0	249215

* Road M Roaded Natural/Modified
SPM. Semiprimitive Motorized
SPNM. Semiprimitive Nonmotorized
PRIM: Primitive
(See glossary for definition of terms)

Table C-8 (cont.)
RECREATION OPPORTUNITY SPECTRUM BY ROADLESS AREA*
(Alternative C)

DATE 6/89 ROADLESS AREA NAME	RARE#	ACRES RURAL	ROAD M	SPM	SPNM	PRIM	TOTALS
Beaver Creek	276	0	12470	0	0	0	12470
Boulder Park	282	0	6921	2860	2530	0	12311
Castle Ridge	278	0	6235	2065	0	0	8300
Deadhorse	G08	0	244	4090	6117	0	10451
Dunns Bluff	WW1	0	0	1013	0	0	1013
Grande Ronde	267	0	0	0	4890	0	4890
Greenhorn	252	0	161	0	0	0	161
Hellhole	261	0	513	0	0	0	513
Homestead	291	0	3503	0	2230	0	5733
Huckleberry	289	9	10107	0	0	0	10107
Hurricane Creek	288	0	240	376	1007	0	1623
Joseph Canyon	G04	0	23602	0	0	0	23602
Lake Fork	290	0	11858	320	2720	0	14898
Little Creek	280	0	2907	0	0	0	2907
Little Eagle Meadows	283	0	4290	1400	1450	0	7140
Little Sheep	286	62	1388	0	3828	0	5278
Marble Point	271	0	7135	0	0	0	7135
Monument Rock	240	0	5418	540	0	0	5958
Mount Emily	277	0	8822	0	0	0	8822
North Mount Emily	262	0	772	0	0	0	772
Reservoir	284	0	2550	11045	0	0	13595
Squaw	601	0	3220	0	0	0	3220
Tope Creek	G03	0	8674	0	0	0	8674
Tower	256	0	85	0	0	0	85
Twin Mountain	273	0	28623	19580	12700	0	60903
Upper Catherine Creek	281	0	5689	815	340	0	6844
Upper Grande Ronde	275	0	11810	0	0	0	11810
TOTAL		62	167237	44104	37812	0	249215

* Road M: Roaded Natural/Modified
SPM Semiprimitive Motorized
SPNM. Semiprimitive Nonmotorized
PRIM: Primitive
(See glossary for definition of terms)

Table C-8 (cont.)
RECREATION OPPORTUNITY SPECTRUM BY ROADLESS AREA*
(Alternatives C-Dep and H)

DATE 6/89 ROADLESS AREA NAME	RARE#	ACRES RURAL	ROAD M	SPM	SPNM	PRIM	TOTALS
Beaver Creek	276	0	12470	0	0	0	12470
Boulder Park	282	0	10911	470	930	0	12311
Castle Ridge	278	0	6235	2065	0	0	8300
Deadhorse	G08	0	244	4090	6117	0	10451
Dunns Bluff	WW1	0	0	1013	0	0	1013
Grande Ronde	267	0	0	0	4890	0	4890
Greenhorn	252	0	161	0	0	0	161
Hellhole	261	0	513	0	0	0	513
Homestead	291	0	3503	0	2230	0	5733
Huckleberry	289	9	10107	0	0	0	10107
Hurricane Creek	288	0	240	376	1007	0	1623
Joseph Canyon	G04	0	23602	0	0	0	23602
Lake Fork	290	0	14898	0	0	0	14898
Little Creek	280	0	2907	0	0	0	2907
Little Eagle Meadows	283	0	5740	1400	0	0	7140
Little Sheep	286	62	1388	0	3828	0	5278
Marble Point	271	0	7135	0	0	0	7135
Monument Rock	240	0	5418	540	0	0	5958
Mount Emily	277	0	8822	0	0	0	8822
North Mount Emily	262	0	772	0	0	0	772
Reservoir	284	0	2550	11045	0	0	13595
Squaw	601	0	3220	0	0	0	3220
Tope Creek	G03	0	8674	0	0	0	8674
Tower	256	0	85	0	0	0	85
Twin Mountain	273	0	28623	19580	12700	0	60903
Upper Catherine Creek	281	0	5689	815	340	0	6844
Upper Grande Ronde	275	0	11810	0	0	0	11810
TOTAL		62	175715	41394	32042	0	249215

* Road M: Roaded Natural/Modified
SPM Semiprimitive Motorized
SPNM. Semiprimitive Nonmotorized
PRIM. Primitive
(See glossary for definition of terms)

Table C-8 (cont.)
RECREATION OPPORTUNITY SPECTRUM BY ROADLESS AREA*
(Alternative D)

DATE 6/89 ROADLESS AREA NAME	RARE#	ACRES RURAL	ROAD M	SPM	SPNM	PRIM	TOTALS
Beaver Creek	276	0	12470	0	0	0	12470
Boulder Park	282	0	10911	470	930	0	12311
Castle Ridge	278	0	6235	2065	0	0	8300
Deadhorse	G08	0	244	4090	6117	0	10451
Dunns Bluff	WW1	0	0	1013	0	0	1013
Grande Ronde	267	0	0	0	4890	0	4890
Greenhorn	252	0	161	0	0	0	161
Hellhole	261	0	513	0	0	0	513
Homestead	291	0	3503	0	2230	0	5733
Huckleberry	289	9	10107	0	0	0	10107
Hurricane Creek	288	0	240	376	1007	0	1623
Joseph Canyon	G04	0	23602	0	0	0	23602
Lake Fork	290	0	14898	0	0	0	14898
Little Creek	280	0	2907	0	0	0	2907
Little Eagle Meadows	283	0	5740	1400	0	0	7140
Little Sheep	286	62	1388	0	3828	0	5278
Marble Point	271	0	7135	0	0	0	7135
Monument Rock	240	0	5958	0	0	0	5958
Mount Emily	277	0	8822	0	0	0	8822
North Mount Emily	262	0	772	0	0	0	772
Reservoir	284	0	2550	11045	0	0	13595
Squaw	601	0	3220	0	0	0	3220
Tope Creek	G03	0	8674	0	0	0	8674
Tower	256	0	85	0	0	0	85
Twin Mountain	273	0	28623	19580	12700	0	60903
Upper Catherine Creek	281	0	5689	815	340	0	6844
Upper Grande Ronde	275	0	11810	0	0	0	11810
TOTAL		62	176257	40854	32042	0	249215

* Road M· Roaded Natural/Modified
SPM· Semiprimitive Motorized
SPNM· Semiprimitive Nonmotorized
PRIM· Primitive
(See glossary for definition of terms)

Table C-8 (cont.)
RECREATION OPPORTUNITY SPECTRUM BY ROADLESS AREA*
(Alternative E)

DATE 6/89 ROADLESS AREA NAME	RARE#	ACRES RURAL	ROAD M	SPM	SPNM	PRIM	WLD	TOTALS
Beaver Creek	276	0	3494	0	8976	0	0	12470
Boulder Park	282	0	3422	5699	3190	0	0	12311
Castle Ridge	278	0	2160	6140	0	0	0	8300
Deadhorse	G08	0	244	4090	6117	0	0	10451
Dunns Bluff	WW1	0	0	0	0	0	1013	1013
Grande Ronde	267	0	0	0	4890	0	0	4890
Greenhorn	252	0	161	0	0	0	0	161
Hellhole	261	0	513	0	0	0	0	513
Homestead	291	0	3503	0	2230	0	0	5733
Huckleberry	289	9	2155	1690	6262	0	0	10107
Hurricane Creek	288	0	0	376	1247	0	0	1623
Joseph Canyon	G04	0	1606	12597	9399	0	0	23602
Lake Fork	290	0	1830	13068	0	0	0	14898
Little Creek	280	0	1115	160	1632	0	0	2907
Little Eagle Meadows	283	0	1450	3530	2160	0	0	7140
Little Sheep	286	62	578	0	4638	0	0	5278
Marble Point	271	0	1136	5999	0	0	0	7135
Monument Rock	240	0	1537	2003	2418	0	0	5958
Mount Emily	277	0	3385	5437	0	0	0	8822
North Mount Emily	262	0	772	0	0	0	0	772
Reservoir	284	0	167	13428	0	0	0	13595
Squaw	601	0	3220	0	0	0	0	3220
Tope Creek	G03	0	549	0	8125	0	0	8674
Tower	256	0	85	0	0	0	0	85
Twin Mountain	273	0	9157	30845	20901	0	0	60903
Upper Catherine Creek	281	0	2013	3681	1150	0	0	6844
Upper Grande Ronde	275	0	2500	5308	4002	0	0	11810
TOTAL		62	46752	114051	87337	0	1013	249215

* Road M Roaded Natural/Modified
SPM: Semiprimitive Motorized
SPNM. Semiprimitive Nonmotorized
PRIM. Primitive
WLD· Wilderness (Study)
(See glossary for definition of terms)

Table C-8 (*cont*)
RECREATION OPPORTUNITY SPECTRUM BY ROADLESS AREA*
(Alternative F)

DATE 6/89 ROADLESS AREA NAME	RARE#	ACRES RURAL	ROAD M	SPM	SPNM	PRIM	WLD	TOTALS
Beaver Creek	276	0	12470	0	0	0	0	12470
Boulder Park	282	0	3422	5699	3190	0	0	12311
Castle Ridge	278	0	2160	6140	0	0	0	8300
Deadhorse	G08	0	244	4090	6117	0	0	10451
Dunns Bluff	WW1	0	0	0	0	0	1013	1013
Grande Ronde	267	0	0	0	4890	0	0	4890
Greenhorn	252	0	161	0	0	0	0	161
Hellhole	261	0	513	0	0	0	0	513
Homestead	291	0	3503	0	2230	0	0	5733
Huckleberry	289	9	2155	1690	6262	0	0	10107
Hurricane Creek	288	0	0	376	1247	0	0	1623
Joseph Canyon	G04	0	23602	0	0	0	0	23602
Lake Fork	290	0	14898	0	0	0	0	14898
Little Creek	280	0	1115	160	1632	0	0	2907
Little Eagle Meadows	283	0	1450	3530	2160	0	0	7140
Little Sheep	286	62	578	0	4638	0	0	5278
Marble Point	271	0	7135	0	0	0	0	7135
Monument Rock	240	0	5418	540	0	0	0	5958
Mount Emily	277	0	1785	7037	0	0	0	8822
North Mount Emily	262	0	772	0	0	0	0	772
Reservoir	284	0	167	13428	0	0	0	13595
Squaw	601	0	3220	0	0	0	0	3220
Tope Creek	G03	0	8674	0	0	0	0	8674
Tower	256	0	85	0	0	0	0	85
Twin Mountain	273	0	28623	19580	12700	0	0	60903
Upper Catherine Creek	281	0	2013	3681	1150	0	0	6844
Upper Grande Ronde	275	0	2500	5308	4002	0	0	11810
TOTAL		62	126663	71259	50218	0	1013	249215

* Road M: Roaded Natural/Modified
SPM: Semiprimitive Motorized
SPNM: Semiprimitive Nonmotorized
PRIM: Primitive
WLD Wilderness (Study)
(See glossary for definition of terms)

Table C-8 (cont.)
RECREATION OPPORTUNITY SPECTRUM BY ROADLESS AREA*
(Alternative G)

DATE 6/89 ROADLESS AREA NAME	RARE#	ACRES RURAL	ROAD M	SPM	SPNM	PRIM	TOTALS
Beaver Creek	276	0	12470	0	0	0	12470
Boulder Park	282	0	12311	0	0	0	12311
Castle Ridge	278	0	8300	0	0	0	8300
Deadhorse	G08	0	244	4090	6117	0	10451
Dunns Bluff	WW1	0	1013	0	0	0	1013
Grande Ronde	267	0	4890	0	0	0	4890
Greenhorn	252	0	161	0	0	0	161
Hellhole	261	0	513	0	0	0	513
Homestead	291	0	3503	0	2230	0	5733
Huckleberry	289	9	10107	0	0	0	10107
Hurricane Creek	288	0	16232	0	0	0	1623
Joseph Canyon	G04	0	23602	0	0	0	23602
Lake Fork	290	0	18308	13068	0	0	14898
Little Creek	280	0	2907	0	0	0	2907
Little Eagle Meadows	283	0	6680	460	0	0	7140
Little Sheep	286	62	5216	0	0	0	5278
Marble Point	271	0	7135	0	0	0	7135
Monument Rock	240	0	5958	0	0	0	5958
Mount Emily	277	0	8822	0	0	0	8822
North Mount Emily	262	0	772	0	0	0	772
Reservoir	284	0	11305	2290	0	0	13595
Squaw	601	0	3220	0	0	0	3220
Tope Creek	G03	0	8674	0	0	0	8674
Tower	256	0	85	0	0	0	85
Twin Mountain	273	0	49103	5170	6630	0	60903
Upper Catherine Creek	281	0	6844	0	0	0	6844
Upper Grande Ronde	275	0	11810	0	0	0	11810
TOTAL		62	209098	25078	14977	0	249215

* Road M: Roaded Natural/Modified
SPM: Semiprimitive Motorized
SPNM: Semiprimitive Nonmotorized
PRIM: Primitive
(See glossary for definition of terms)

Table C-9
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE A AND NC
DECADE ONE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	2.0	0.0	0.0	15 0	4 0	21.0
Boulder Park	282	0 0	0 0	2 4	9 2	1.2	12 8
Castle Ridge	278	2 5	0.0	0.0	17 3	1.6	21 4
Deadhorse	G08	0 0	0 0	0.0	0.0	0 0	0.0
Dunns Bluff	WW1	0 0	0 0	0 0	0.0	0 0	0 0
Grande Ronde*	267	0 0	0.0	0 0	0 0	0.0	0 0
Greenhorn*	252	0 0	0.0	0 0	0 0	0.0	0 0
Hellhole*	261	0 0	0 0	0 0	0 0	0 0	0 0
Homestead	291	0 0	0.0	0 0	0 0	0.0	0 0
Huckleberry	289	0.0	0.0	3 4	13 7	3.4	20.5
Hurricane Creek	288	0.0	0.0	0.0	0 0	0 0	0.0
Joseph Canyon	G04	0.0	0.0	5.7	19 3	3.1	28.1
Lake Fork	290	0 0	2.2	6 6	37 4	7 2	53.4
Little Creek	280	0 0	0 0	0 0	0 0	0.0	0.0
Little Eagle Meadows	283	0 0	0.0	0 0	1 6	0.5	2.1
Little Sheep	286	0 0	0.0	0.0	0 0	0.0	0.0
Marble Point	271	0 0	0.0	0.0	12 8	2 9	15.7
Monument Rock	240	0.0	0.0	0.0	22.3	4 0	26.3
Mount Emily	277	2 5	0 0	0 0	19.1	2 5	24 1
North Mount Emily*	262	0 0	0 0	0 0	0 0	0.0	0.0
Reservoir	284	0.0	0.0	0.0	0 0	0.0	0 0
Squaw*	601	0.0	0.0	0.0	16 7	4 0	20.7
Tope Creek	G03	0 0	0.0	0.0	0 0	0.0	0.0
Tower*	256	0 0	0 0	0.0	0.0	0 0	0 0
Twin Mountain	273	5.3	4.3	8.2	46 4	9.4	73.6
Upper Catherine Creek	281	0 0	0 0	5 0	18.6	2 6	26 2
Upper Grande Ronde	275	1.5	7.0	0.0	16 3	4 0	28 8
TOTAL		13 8	13 5	31 3	265.7	50.4	374 7
*Shared with Umatilla NF		0 0	0 0	0 0	16 7	4 0	20.7

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE A AND NC
DECADE TWO

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0 0	0 0	0.0	15 0	0.0	15.0
Boulder Park	282	0 0	0 0	1.2	4 6	1.2	7 0
Castle Ridge	278	0 0	0 0	0 0	0.0	2 4	2 4
Deadhorse	G08	0 0	0.0	0.0	0.0	0.0	0 0
Dunns Bluff	WW1	0 0	0 0	0 0	0.0	0.0	0 0
Grande Ronde*	267	0 0	0 0	0 0	0 0	0.0	0 0
Greenhorn*	252	0 0	0.0	0.0	0 0	0.0	0.0
Hellhole*	261	0.0	0 0	0 0	0.0	0 0	0 0
Homestead	291	0.0	0 0	0.0	0.0	0 0	0 0
Huckleberry	289	0 0	0 0	6.8	27 3	3.4	37 5
Hurricane Creek	288	0 0	0.0	0.0	0 0	0.0	0 0
Joseph Canyon	G04	0 0	0 0	0 0	0 0	3.1	3 1
Lake Fork	290	0 0	1.1	3 3	18 7	7.2	30 3
Little Creek	280	0 0	0.0	0 5	9 3	0.9	10 7
Little Eagle Meadows	283	0 0	0 0	0.0	0 8	0.5	1 3
Little Sheep	286	0 0	0 0	0.0	0.0	0 0	0 0
Marble Point	271	0 0	0 0	0 0	6.4	2 9	9.3
Monument Rock	240	0.0	0 0	0.0	7.2	1.3	8.5
Mount Emily	277	0 0	0 0	0.0	0 0	2 5	2 5
North Mount Emily*	262	0.0	0.0	0 0	0 0	0 0	0.0
Reservoir	284	0 0	0 0	3.0	5.5	0 6	9.1
Squaw*	601	0 0	0 0	0.0	8 3	4.0	12.3
Tope Creek	G03	0 0	0 0	0.0	0.0	0 0	0.0
Tower*	256	0.0	0 0	0 0	0.0	0 0	0.0
Twin Mountain	273	5 3	4.3	8.2	46.4	9.4	73.6
Upper Catherine Creek	281	0.0	0.0	5 0	18.6	2 6	26.2
Upper Grande Ronde	275	3.0	2.5	0 0	9 5	2 0	17.0
TOTAL		8 3	7.9	28.0	177 6	44 0	265 8
*Shared with Umatilla NF		0 0	0 0	0.0	8.3	4.0	12 3

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE A AND NC
DECADE THREE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0.0	0.0	0 0	10 0	0 0	10.0
Boulder Park	282	0.0	0.0	0 0	0 0	1 2	1.2
Castle Ridge	278	0.0	0.0	0.0	0 0	2 4	2 4
Deadhorse	G08	0.0	0 0	0 0	0 0	0 0	0.0
Dunns Bluff	WW1	0.0	0 0	0 0	0 0	0 0	0.0
Grande Ronde*	267	0 0	0 0	0 0	0 0	0 0	0.0
Greenhorn*	252	0 0	0 0	0.0	0.0	0.0	0 0
Hellhole*	261	0 0	0 0	0 0	0 0	0 0	0.0
Homestead	291	0 0	0.0	0.0	0.0	0.0	0 0
Huckleberry	289	0 0	0 0	0 0	0 0	3.4	3.4
Hurricane Creek	288	0.0	0.0	0 0	0 0	0 0	0.0
Joseph Canyon	G04	0.0	0.0	0.0	0 0	3 1	3.1
Lake Fork	290	0.0	0.0	0.0	0 0	7 2	7.2
Little Creek	280	0.0	0.0	0.0	4.7	0 9	5.6
Little Eagle Meadows	283	0.0	0.0	0.0	0.0	0 5	0.5
Little Sheep	286	0 0	0.0	1.0	20.2	1 5	22.7
Marble Point	271	0 0	0 0	0.0	0.0	2 9	2 9
Monument Rock	240	0 0	0.0	0.0	0.0	1 3	1.3
Mount Emily	277	0.0	0.0	0.0	0 0	2 5	2.5
North Mount Emily*	262	0 0	0 0	0 0	0.0	0 0	0.0
Reservoir	284	0 0	0 0	0.0	0.0	0 6	0.6
Squaw*	601	0 0	0 0	0.0	0 0	4 0	4.0
Tope Creek	G03	0 0	0 0	0.0	3.4	0 7	4 1
Tower*	256	0 0	0 0	0.0	0 0	0 0	0.0
Twin Mountain	273	0 0	00	0.0	0.0	9 4	9.4
Upper Catherine Creek	281	0 0	0 0	0.0	0 0	2 6	2.6
Upper Grande Ronde	275	0.0	0.0	0 0	0 0	0.0	0.0
TOTAL		0 0	0 0	1.0	38.3	44 2	83.5
*Shared with Umatilla NF		0 0	0 0	0 0	0.0	4 0	4 0

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVES B, B-DEPARTURE
DECADE ONE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	2.0	0.0	0.0	15.0	4.0	21.0
Boulder Park	282	0 0	0 0	6.0	22 7	2.9	31.6
Castle Ridge	278	5 0	0 0	0.0	34.6	3.3	42.9
Deadhorse	G08	0 0	0 0	0 0	0 0	0 0	0 0
Dunns Bluff	WW1	0.0	0.0	0 0	0 0	0.0	0 0
Grande Ronde*	267	0 0	0 0	7 6	11 4	1 0	20.0
Greenhorn*	252	0 0	0 0	0 0	0 0	0 0	0 0
Hellhole*	261	0.0	0.0	0 0	0 0	0.0	0 0
Homestead	291	0 0	0 0	0 0	0 0	0 0	0 0
Huckleberry	289	0 0	0 0	3 4	13 7	3 4	20 5
Hurricane Creek	288	0 0	0 0	0 0	0 0	0 0	0 0
Joseph Canyon	G04	0 0	0.0	5.7	19.3	3.1	28 1
Lake Fork	290	0.0	2 2	6.6	37.4	7.2	53 4
Little Creek	280	0 0	0.0	0.0	0 0	0 0	0 0
Little Eagle Meadows	283	0.0	0.0	0.0	6.0	2.1	8 1
Little Sheep	286	0.0	0.0	0.0	0.0	0.0	0.0
Marble Point	271	0.0	0 0	0 0	12.8	2.9	15.7
Monument Rock	240	0 0	0 0	0.0	14.3	1.3	15.6
Mount Emily	277	2 5	0 0	0 0	23.3	5.3	31.1
North Mount Emily*	262	0 0	0 0	0 0	0.0	0.0	0.0
Reservoir	284	0.0	0.0	0.0	0.0	0.0	0 0
Squaw*	601	0.0	0 0	0.0	16.7	4.0	20.7
Tope Creek	G03	0 0	0 0	0 0	0.0	0 0	0.0
Tower*	256	0 0	0 0	0.0	0.0	0.0	0.0
Twin Mountain	273	7.3	5.9	11.3	63.4	11.9	99.8
Upper Catherine Creek	281	0 0	0.0	5 0	18 6	2 6	26 2
Upper Grande Ronde	275	1 5	7 0	0 0	16 3	4 0	28 8
TOTAL		18 3	15 1	45.6	325.5	59.0	463.5
*Shared with Umatilla NF		0 0	0.0	7 6	28 1	5 0	40 7

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVES B, B-DEPARTURE
DECADE TWO

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0 0	0 0	0 0	15 0	0.0	15 0
Boulder Park	282	0 0	0.0	3.0	11 3	2 9	17.2
Castle Ridge	278	0 0	0 0	0.0	0 0	4 8	4.8
Deadhorse	G08	0.0	0 0	0.0	0 0	0 0	0.0
Dunns Bluff	WW1	0.0	0 0	0.0	0.0	0 0	0.0
Grande Ronde*	267	0 0	0.0	0 0	0 0	1 0	1.0
Greenhorn*	252	0 0	0.0	0 0	0 0	0.0	0.0
Hellhole*	261	0.0	0 0	0.0	0.0	0.0	0 0
Homestead	291	0 0	0.0	0 0	0 0	0.0	0.0
Huckleberry	289	0 0	0.0	6 8	27 3	3.4	37 5
Hurricane Creek	288	0 0	0.0	0.0	4 0	0.6	4.6
Joseph Canyon	G04	0 0	0 0	0 0	0 0	3.1	3.1
Lake Fork	290	0.0	1 1	3.3	18 7	7 2	30.3
Little Creek	280	0.0	0 0	0.5	9.3	0 9	10.7
Little Eagle Meadows	283	0 0	0.0	0 0	3.0	2.1	5 1
Little Sheep	286	0 0	0.0	0 0	0.0	0.0	0 0
Marble Point	271	0.0	0.0	0 0	6.4	2.9	9 3
Monument Rock	240	0.0	0 0	0 0	7.2	1 3	8 5
Mount Emily	277	0.0	0 0	0.0	12.0	5 3	17 3
North Mount Emily*	262	0.0	0 0	0.0	0 0	0 0	0 0
Reservoir	284	0.0	0 0	3 0	27.3	3 2	33 5
Squaw*	601	0.0	0.0	0 0	8.3	4 0	12 3
Tope Creek	G03	0 0	0.0	0.0	0 0	0.0	0.0
Tower*	256	0.0	0 0	0 0	0.0	0.0	0 0
Twin Mountain	273	7.3	5 9	11.3	63.4	11 9	99.8
Upper Catherine Creek	281	0.0	0 0	5.0	18 6	2 6	26.2
Upper Grande Ronde	275	3 0	2 5	0.0	9.5	2 0	17.0
TOTAL		10 3	9.5	32.9	241 3	59.2	353.2
*Shared with Umatilla NF		0.0	0 0	0.0	8.3	4.0	12 3

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVES B, B-DEPARTURE
DECADE THREE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0.0	0 0	0 0	10 0	0.0	10.0
Boulder Park	282	0.0	0 0	0 0	0.0	2 9	2.9
Castle Ridge	278	0 0	0.0	0 0	0.0	4 8	4.8
Deadhorse	G08	0 0	0 0	0.0	0 0	0.0	0.0
Dunns Bluff	WW1	0.0	0 0	0 0	0.0	0 0	0.0
Grande Ronde*	267	0.0	0.0	0 0	0.0	1 0	1 0
Greenhorn*	252	0 0	0 0	0 0	0.5	0 0	0.5
Hellhole*	261	0.0	0 0	0.0	0 0	0 0	0.0
Homestead	291	0.0	0 0	0 0	0 0	0 0	0.0
Huckleberry	289	0.0	0 0	0 0	0.0	3 4	3.4
Hurricane Creek	288	0 0	0 0	0 0	2.0	0 6	2.6
Joseph Canyon	G04	0 0	0 0	0.0	0 0	3.1	3.1
Lake Fork	290	0 0	0 0	0.0	0 0	7.2	7.2
Little Creek	280	0 0	0 0	0.0	4 7	0.9	5.6
Little Eagle Meadows	283	0.0	0 0	0.0	0 0	2.1	2.1
Little Sheep	286	0.0	0.0	1.5	28 0	2.1	31.6
Marble Point	271	0 0	0 0	0.0	0 0	2.9	2.9
Monument Rock	240	0.0	0 0	0 0	0.0	1 3	1.3
Mount Emily	277	0 0	0.0	0 0	0.0	5 3	5 3
North Mount Emily*	262	0 0	0.0	0 0	0.0	0 0	0 0
Reservoir	284	0 0	0.0	0 0	0.0	3 2	3 2
Squaw*	601	0.0	0 0	0 0	0 0	4 0	4.0
Tope Creek	G03	0.0	0 0	0.0	3 4	0.7	4.1
*Tower**	*256*	*0 0*	*0 0*	*0.0*	*0 0*	*0.0*	*0 0*
Twin Mountain	273	0.0	0 0	0 0	0 0	11.9	11.9
Upper Catherine Creek	281	0.0	0.0	0 0	0.0	2 6	2.6
Upper Grande Ronde	275	0 0	0.0	0 0	0.0	0 0	0.0
TOTAL		0.0	0.0	1 5	48.6	60 0	110.1
*Shared with Umatilla NF		0 0	0.0	0 0	0 5	5.0	5 5

Table C-9 (cont.)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE C
DECADE ONE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	2.0	0 0	0 0	15 0	4.0	21.0
Boulder Park	282	0 0	0 0	4 0	14 0	2.9	20.9
Castle Ridge	278	3 9	0 0	0.0	26.6	2.5	33.0
Deadhorse	G08	0 0	0 0	0.0	0.0	0.0	0 0
Dunns Bluff	WW1	0.0	0.0	0.0	0 0	0 0	0.0
Grande Ronde*	267	0 0	0 0	0 0	0 0	0.0	0.0
Greenhorn*	252	0.0	0.0	0.0	0 0	0.0	0.0
Hellhole*	261	0.0	0.0	0.0	0.0	0 0	0.0
Homestead	291	0.0	0.0	0.0	0.0	0 0	0 0
Huckleberry	289	0 0	0 0	3.4	13.7	3.4	20 5
Hurricane Creek	288	0 0	0 0	0.0	0.0	0 0	0 0
Joseph Canyon	G04	0 0	0.0	5.7	19 3	3 1	28.1
Lake Fork	290	0.0	1.5	4 6	24 0	7.2	37.3
Little Creek	280	0 0	0 0	0.0	0.0	0 0	0.0
Little Eagle Meadows	283	0.0	0.0	0.0	3 0	2.1	5.1
Little Sheep	286	0.0	0.0	0 0	0 0	0.0	0.0
Marble Point	271	0.0	0.0	0 0	12 8	2.9	15.7
Monument Rock	240	0.0	0.0	0 0	21 5	1.3	22.8
Mount Emily	277	2.0	0.0	0 0	16 0	5 3	23.3
North Mount Emily*	262	0 0	0.0	0.0	0 0	0 0	0 0
Reservoir	284	0 0	0 0	0.0	0.0	0 0	0.0
Squaw*	601	0 0	0 0	0.0	16.7	4.0	20 7
Tope Creek	G03	0 0	0 0	0.0	0.0	0.0	0 0
Tower*	256	0 0	0 0	0 0	0 0	0.0	0 0
Twin Mountain	273	4 3	3 5	6.7	37.8	7.6	59.9
Upper Catherine Creek	281	0 0	0.0	4.3	16.1	2.2	22 6
Upper Grande Ronde	275	1 5	7.0	0.0	16.3	4.0	28 8
TOTAL		13 7	12 0	28 7	252 8	52.5	359.7
*Shared with Umatilla NF		0 0	0 0	0 0	16.7	4.0	20 7

Table C-9 (cont.)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE C
DECADE TWO

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0.0	0.0	0 0	15 0	0.0	15.0
Boulder Park**	282	0.0	0.0	3 0	6.0	2.9	11.9
Castle Ridge	278	0 0	0.0	0 0	0 0	3 7	3 7
Deadhorse	G08	0.0	0 0	0.0	0.0	0 0	0 0
Dunns Bluff	WW1	0.0	0.0	0 0	0 0	0.0	0.0
Grande Ronde*	267	0 0	0.0	0 0	0 0	0.0	0.0
Greenhorn*	252	0 0	0.0	0 0	0 0	0.0	0.0
Hellhole*	261	0 0	0.0	0 0	0 0	0.0	0.0
Homestead	291	0.0	0.0	0 0	0 0	0.0	0.0
Huckleberry	289	0 0	0.0	6 8	27.3	3.4	37.5
Hurricane Creek	288	0 0	0.0	0 0	3	0.0	0.3
Joseph Canyon	G04	0 0	0.0	0 0	0 0	3.1	3.1
Lake Fork**	290	0 0	1.1	3 3	18 7	7.2	30.3
Little Creek	280	0 0	0.0	5	9 3	0.9	10.7
Little Eagle Meadows**	283	0 0	0.0	0 0	2 0	2.1	4.1
Little Sheep	286	0 0	0.0	0 0	0 0	0.0	0.0
Marble Point	271	0 0	0 0	0.0	6 4	2 9	9 3
Monument Rock	240	0.0	0.0	0 0	0 0	1.3	1 3
Mount Emily	277	0 0	0 0	0 0	12 0	5 3	17.3
North Mount Emily*	262	0 0	0 0	0.0	0 0	0 0	0 0
Reservoir	284	0 0	0 0	3.0	10 4	1 2	14 6
Squaw*	601	0 0	0 0	0.0	8 3	4 0	12 3
Tope Creek	G03	0 0	0.0	0 0	0 0	0.0	0.0
Tower*	256	0.0	0 0	0 0	0.0	0.0	0.0
Twin Mountain	273	4.3	3.5	6 7	37 8	7.6	59.9
Upper Catherine Creek	281	0.0	0.0	4 3	16.1	2.2	22 6
Upper Grande Ronde	275	3.0	2 5	0.0	9.5	2 0	17 0
TOTAL		7.3	7.1	27 6	179.1	49.8	270.9
*Shared with Umatilla NF		0 0	0.0	0 0	8 3	4 0	12.3

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE C
DECADE THREE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0 0	0 0	0.0	10.0	0.0	10.0
Boulder Park	282	0 0	0.0	0 0	0.0	2 9	2.9
Castle Ridge	278	0 0	0.0	0 0	0.0	3 7	3.7
Deadhorse	G08	0 0	0.0	0.0	0.0	0 0	0 0
Dunns Bluff	WW1	0 0	0.0	0.0	0.0	0 0	0.0
Grande Ronde*	267	0 0	0.0	0.0	0.0	0.0	0.0
Greenhorn*	252	0 0	0 0	0.0	0.5	0 0	0.5
Hellhole*	261	0 0	0.0	0 0	0.0	0 0	0.0
Homestead	291	0 0	0.0	0 0	0.0	0.0	0.0
Huckleberry	289	0.0	0 0	0.0	0 0	3.4	3 4
Hurricane Creek	288	0.0	0 0	0.0	0.0	0 0	0.0
Joseph Canyon	G04	0.0	0 0	0.0	0 0	3.1	3 1
Lake Fork	290	0 0	0.0	0 0	0 0	7.2	7.2
Little Creek	280	0.0	0 0	0.0	4.7	0.9	5.6
Little Eagle Meadows	283	0.0	0 0	0.0	0 0	2.1	2 1
Little Sheep	286	0 0	0 0	0.0	3 5	0 3	3.8
Marble Point	271	0 0	0.0	0 0	0.0	2 9	2.9
Monument Rock	240	0 0	0.0	0 0	0.0	1 3	1.3
Mount Emily	277	2 5	0.0	0 0	0.0	5 3	7.8
North Mount Emily*	262	0 0	0.0	0 0	0.0	0 0	0.0
Reservoir	284	0.0	0.0	0.0	0.0	1.2	1.2
Squaw*	601	0.0	0 0	0.0	0 0	4 0	4.0
Tope Creek	G03	0.0	0.0	0 0	3.4	0.7	4.1
Tower*	256	0 0	0 0	0 0	0.0	0 0	0.0
Twin Mountain	273	0.0	0 0	0.0	0 0	7 6	7.6
Upper Catherine Creek	281	0.0	0 0	0.0	0.0	2 2	2.2
Upper Grande Ronde	275	0.0	0 0	0.0	0 0	0.0	0.0
TOTAL		2.5	0 0	0.0	22 1	48.8	73.4
*Shared with Umatilla NF		0 0	0.0	0 0	0 5	4.0	4 5

Table C-9 (cont.)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE C-DEPARTURE
DECADE ONE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	2.0	0.0	0.0	15 0	4.0	21.0
Boulder Park	282	0.0	0.0	6 0	22 7	2.9	31.6
Castle Ridge	278	3 9	0 0	0.0	26 6	2.5	33.0
Deadhorse	G08	0 0	0.0	0.0	0 0	0.0	0.0
Dunns Bluff	WW1	0 0	0.0	0 0	0.0	0 0	0 0
Grande Ronde*	267	0.0	0.0	0.0	0.0	0.0	0.0
Greenhorn*	252	0 0	0.0	0 0	0.0	0 0	0 0
Hellhole*	261	0 0	0.0	0 0	0.0	0 0	0 0
Homestead	291	0 0	0 0	0 0	0.0	0 0	0 0
Huckleberry	289	0 0	0 0	3 4	13.7	3 4	20 5
Hurricane Creek	288	0 0	0 0	0 0	0.0	0 0	0 0
Joseph Canyon	G04	0 0	0 0	5 7	19.3	3 1	28 1
Lake Fork	290	0 0	2 2	6.6	37 4	7 2	53 4
Little Creek	280	0 0	0 0	0.0	0 0	0 0	0 0
Little Eagle Meadows	283	0.0	0 0	0 0	6 0	2.1	8.1
Little Sheep	286	0.0	0 0	0 0	0.0	0 0	0.0
Marble Point	271	0.0	0 0	0 0	12 8	2.9	15.7
Monument Rock	240	0.0	0.0	0.0	21.5	1.3	22.8
Mount Emily	277	2 5	0.0	0.0	23 3	5.3	31.1
North Mount Emily*	262	0 0	0 0	0.0	0 0	0 0	0 0
Reservoir	284	0 0	0 0	0.0	0.0	0 0	0 0
Squaw*	601	0 0	0 0	0.0	16 7	4 0	20 7
Tope Creek	G03	0 0	0 0	0.0	0 0	0 0	0 0
Tower*	256	0.0	0.0	0 0	0 0	0.0	0.0
Twin Mountain	273	4.3	3 5	6 7	37.8	7.6	59.9
Upper Catherine Creek	281	0.0	0.0	4.3	16 1	2.2	22.6
Upper Grande Ronde	275	1.5	7.0	0.0	16 3	4 0	28 8
TOTAL		14 2	12 7	32.7	285 2	52 5	397 3
*Shared with Umatilla NF		0 0	0 0	0 0	16.7	4 0	20 7

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE C-DEPARTURE
DECADE TWO

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0 0	0 0	0 0	15.0	0.0	15.0
Boulder Park**	282	0.0	0.0	3 0	11 3	2 9	17.2
Castle Ridge	278	0.0	0.0	0.0	0 0	3 7	3.7
Deadhorse	G08	0.0	0.0	0 0	0 0	0 0	0.0
Dunns Bluff	WW1	0.0	0.0	0.0	0 0	0 0	0.0
Grande Ronde*	267	0.0	0.0	0.0	0 0	0 0	0.0
Greenhorn*	252	0 0	0 0	0 0	0 0	0.0	0.0
Hellhole*	261	0 0	0 0	0 0	0.0	0.0	0 0
Homestead	291	0 0	0.0	0 0	0 0	0 0	0 0
Huckleberry	289	0 0	0 0	6 8	27 3	3.4	37.5
Hurricane Creek	288	0 0	0 0	0 0	3	0.0	0.3
Joseph Canyon	G04	0 0	0 0	0 0	0 0	3 1	3.1
Lake Fork**	290	0.0	1 1	3 3	18 7	7 2	30 3
Little Creek	280	0 0	0 0	5	9 3	0.9	10.7
Little Eagle Meadows**	283	0 0	0 0	0 0	3 0	2.1	5.1
Little Sheep	286	0 0	0.0	0.0	0.0	0.0	0 0
Marble Point	271	0 0	0 0	0 0	6.4	2.9	9.3
Monument Rock	240	0 0	0 0	0 0	0 0	1.3	1.3
Mount Emily	277	0 0	0 0	0 0	12.0	5.3	17.3
North Mount Emily*	262	0 0	0 0	0.0	0.0	0.0	0 0
Reservoir	284	0.0	0.0	3 0	10 4	4 0	17.4
Squaw*	601	0.0	0.0	0.0	8 3	4 0	12.3
Tope Creek	G03	0.0	0.0	0.0	0 0	0 0	0 0
Tower*	256	0 0	0 0	0 0	0.0	0.0	0 0
Twin Mountain	273	4.3	3.5	6.7	37 8	7 6	59.9
Upper Catherine Creek	281	0 0	0 0	4.3	16 1	2 2	22 6
Upper Grande Ronde	275	3 0	2 5	0 0	9.5	2.0	17 0
TOTAL		7 3	7 1	27 6	185.4	52.6	280 0
*Shared with Umatilla NF		0 0	0 0	0 0	8.3	4 0	12 3

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE C-DEPARTURE
DECADE THREE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0 0	0 0	0.0	10.0	0 0	10 0
Boulder Park	282	0 0	0.0	0.0	0 0	2 9	2.9
Castle Ridge	278	0 0	0.0	0.0	0 0	3 7	3.7
Deadhorse	G08	0.0	0 0	0 0	0 0	0.0	0 0
Dunns Bluff	WW1	0 0	0 0	0 0	0.0	0.0	0 0
Grande Ronde*	267	0 0	0 0	0.0	0.0	0.0	0 0
Greenhorn*	252	0 0	0 0	0.0	0.5	0.0	0 5
Hellhole*	261	0 0	0 0	0.0	0.0	0.0	0 0
Homestead	291	0 0	0 0	0.0	0.0	0.0	0 0
Huckleberry	289	0 0	0.0	0.0	0.0	3 4	3.4
Hurricane Creek	288	0 0	0.0	0 0	0 0	0 0	0.0
Joseph Canyon	G04	0 0	0.0	0.0	0.0	3.1	3.1
Lake Fork	290	0 0	0 0	0 0	0.0	7.2	7 2
Little Creek	280	0 0	0 0	0 0	4 7	0.9	5 6
Little Eagle Meadows	283	0.0	0 0	0 0	0 0	2.1	2.1
Little Sheep	286	0 0	0 0	0 0	3.5	0 3	3 8
Marble Point	271	0 0	0.0	0 0	0 0	2 9	2.9
Monument Rock	240	0.0	0 0	0 0	0 0	1.3	1 3
Mount Emily	277	2 5	0 0	0.0	0 0	5 3	7 8
North Mount Emily*	262	0 0	0.0	0 0	0 0	0 0	0.0
Reservoir	284	0 0	0.0	0 0	0 0	1 2	1.2
Squaw*	601	0 0	0.0	0 0	0 0	4 0	4.0
Tope Creek	G03	0 0	0.0	0.0	3 4	0 7	4 1
Tower*	256	0 0	0.0	0.0	0 0	0 0	0 0
Twin Mountain	273	0 0	0 0	0 0	0.0	7.6	7 6
Upper Catherine Creek	281	0 0	0.0	0 0	0 0	2.2	2.2
Upper Grande Ronde	275	0 0	0 0	0.0	0 0	0 0	0.0
TOTAL		2 5	0.0	0 0	22 1	48.8	73.4
*Shared with Umatilla NF		0 0	0 0	0.0	0 5	4 0	4 5

Table C-9 (cont.)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE D
DECADE ONE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	2 0	0.0	0.0	15.0	4 0	21.0
Boulder Park	282	0 0	0 0	6.0	22 7	2 9	31.6
Castle Ridge	278	3 9	0 0	0.0	26 6	2 5	33.0
Deadhorse	G08	0.0	0 0	0 0	0 0	0.0	0 0
Dunns Bluff	WW1	0.0	0 0	0.0	0 0	0 0	0.0
Grande Ronde*	267	0 0	0 0	0.0	0.0	0 0	0.0
Greenhorn*	252	0 0	0.0	0 0	0 0	0.0	0 0
Hellhole*	261	0.0	0 0	0 0	0 0	0.0	0 0
Homestead	291	0.0	0 0	0.0	0 0	0 0	0.0
Huckleberry	289	0.0	0 0	3.4	13 7	3.4	20.5
Hurricane Creek	288	0 0	0 0	0 0	0.0	0 0	0.0
Joseph Canyon	G04	0 0	0 0	5 7	19.3	3 1	28.1
Lake Fork	290	0 0	2.2	6 6	37.4	7 2	53.4
Little Creek	280	0 0	0 0	0 0	0.0	0 0	0.0
Little Eagle Meadows	283	0 0	0.0	0 0	6.0	2.1	8 1
Little Sheep	286	0 0	0 0	0.0	0.0	0.0	0 0
Marble Point	271	0 0	0 0	0 0	12.8	2.9	15.7
Monument Rock	240	0 0	0 0	0 0	14.3	1.3	15 6
Mount Emily	277	2 5	0 0	0 0	23.3	5 3	31.1
North Mount Emily*	262	0 0	0.0	0 0	0 0	0.0	0.0
Reservoir	284	0.0	0 0	0.0	0 0	0 0	0.0
Squaw*	601	0.0	0 0	0.0	16 7	4 0	20.7
Tope Creek	G03	0.0	0 0	0.0	0 0	0 0	0.0
Tower*	256	0 0	0.0	0 0	0.0	0.0	0 0
Twin Mountain	273	4 8	3.9	7.4	41.8	8.4	66 3
Upper Catherine Creek	281	0 0	0 0	4 3	16.1	2.2	22 6
Upper Grande Ronde	275	1.5	7 0	0.0	16.3	4 0	28.8
TOTAL		14 7	13.1	33 4	282.0	53.3	396 5
*Shared with Umatilla NF		0 0	0 0	0.0	16 7	4.0	20.7

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE D
DECADE TWO

Date 6/89 Roadless Area Name	RARE#	Arterial and *Collector* Reconst	Arterial and *Collector* Const	Local *Reconst*	Local *Const*	Temp	Totals
Beaver Creek	276	0 0	0.0	0.0	15 0	0 0	15.0
Boulder Park	282	0 0	0 0	3.0	11.3	2 9	17 2
Castle Ridge	278	0 0	0 0	0.0	0 0	3 7	3 7
Deadhorse	G08	0 0	0 0	0.0	0 0	0 0	0.0
Dunns Bluff	WW1	*0 0*	*0.0*	*0 0*	*0 0*	*0 0*	*0.0*
Grande Ronde*	267	0 0	0.0	0.0	0 0	0 0	0.0
Greenhorn*	252	0 0	0.0	0.0	0 0	0 0	0.0
Hellhole*	261	0 0	0.0	0 0	0 0	0 0	0.0
Homestead	291	0.0	0 0	0 0	0 0	0.0	0 0
Huckleberry	289	0 0	0 0	6.8	27 3	3.4	37.5
Hurricane Creek	288	0 0	0 0	0.0	.3	0 0	.3
Joseph Canyon	G04	0 0	0 0	0.0	0 0	3 1	3.1
Lake Fork	290	0 0	1 1	3.3	18.7	7 2	30.3
Little Creek	280	0 0	0 0	.5	9 3	0 9	10.7
Little Eagle Meadows	283	0 0	0.0	0.0	2 0	2 1	4.1
Little Sheep	286	0 0	0.0	0.0	0 0	0 0	0.0
Marble Point	271	0 0	0 0	0.0	6 4	2 9	9 3
Monument Rock	240	0 0	0 0	0 0	7.2	1.3	8 5
Mount Emily	277	0 0	0 0	0.0	12 0	5 3	17.3
North Mount Emily*	262	0 0	0.0	0.0	0 0	0 0	0.0
Reservoir	284	0.0	0 0	3 0	10 4	1.2	14 6
Squaw*	601	0 0	0 0	0.0	8.3	4.0	12 3
Tope Creek	G03	0 0	0 0	0.0	0 0	0 0	0.0
Tower*	256	0 0	0.0	0 0	0 0	0 0	0.0
Twin Mountain	273	4 8	3 9	7.4	41 8	8 4	66.3
Upper Catherine Creek	281	0.0	0 0	4 3	16.1	2 2	22 6
Upper Grande Ronde	275	3 0	2.5	0 0	9 5	2.0	17 0
TOTAL		7 8	7 5	28.3	195 6	50 6	289 8
*Shared with Umatilla NF		0 0	0 0	0.0	8 3	4.0	12.3

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE D
DECADE THREE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0 0	0 0	0.0	10 0	0 0	10 0
Boulder Park	282	0 0	0 0	0.0	0.0	2 9	2 9
Castle Ridge	278	0 0	0.0	0.0	0.0	3 7	3 7
Deadhorse	G08	0 0	0 0	0.0	0.0	0 0	0 0
Dunns Bluff	WW1	0 0	0 0	0.0	0.0	0.0	0 0
Grande Ronde*	267	0 0	0.0	0.0	0 0	0 0	0 0
Greenhorn*	252	0 0	0.0	0.0	0.5	0 0	0 5
Hellhole*	261	0 0	0 0	0.0	0.0	0.0	0.0
Homestead	291	0.0	0 0	0 0	0 0	0.0	0.0
Huckleberry	289	0.0	0.0	0.0	0 0	3 4	3.4
Hurricane Creek	288	0 0	0 0	0 0	0.0	0 0	0 0
Joseph Canyon	G04	0.0	0 0	0 0	0 0	3.1	3.1
Lake Fork	290	0.0	0 0	0 0	0 0	7 2	7.2
Little Creek	280	0.0	0.0	0 0	4 7	0.9	5.6
Little Eagle Meadows	283	0.0	0 0	0 0	0 0	2.1	2.1
Little Sheep	286	0.0	0 0	0 0	3 5	0.3	3.8
Marble Point	271	0 0	0 0	0 0	0.0	2.9	2 9
Monument Rock	240	0 0	0.0	0.0	0 0	4 0	4.0
Mount Emily	277	0 0	0 0	0.0	0 0	5 3	5.3
North Mount Emily*	262	0 0	0 0	0 0	0.0	0 0	0 0
Reservoir	284	0 0	0 0	0 0	0.0	1 2	1 2
Squaw*	601	0.0	0 0	0 0	0.0	4 0	4 0
Tope Creek	G03	0.0	0 0	0 0	3.4	0 7	4 1
Tower*	256	0.0	0 0	0 0	0.0	0 0	0 0
Twin Mountain	273	0 0	0.0	0 0	0 0	8.4	8 4
Upper Catherine Creek	281	0.0	0 0	0 0	0.0	2 2	2 2
Upper Grande Ronde	275	0.0	0 0	0 0	0 0	0 0	0.0
TOTAL		0.0	0.0	0 0	22.1	52.3	74 4
*Shared with Umatilla NF		0 0	0 0	0.0	0 5	4 0	4.5

Table C-9 (cont.)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE E
DECADES ONE, TWO, AND THREE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0 0	0.0	0 0	0 0	0.0	0 0
Boulder Park	282	0 0	0.0	0 0	0 0	0.0	0 0
Castle Ridge	278	0 0	0 0	0 0	0 0	0.0	0 0
Deadhorse	G08	0 0	0.0	0.0	0 0	0.0	0 0
Dunns Bluff	WW1	0 0	0 0	0.0	0 0	0.0	0.0
Grande Ronde*	267	0 0	0 0	0.0	0 0	0.0	0.0
Greenhorn*	252	0 0	0.0	0 0	0 0	0.0	0 0
Hellhole*	261	0 0	0.0	0 0	0 0	0 0	0 0
Homestead	291	0 0	0.0	0 0	0 0	0 0	0 0
Huckleberry	289	0 0	0.0	0 0	0 0	0.0	0 0
Hurricane Creek	288	0 0	0 0	0 0	0 0	0.0	0 0
Joseph Canyon	G04	0 0	0 0	0.0	0 0	0.0	0.0
Lake Fork	290	0 0	0 0	0.0	0 0	0.0	0.0
Little Creek	280	0.0	0 0	0 0	0.0	0 0	0 0
Little Eagle Meadows	283	0.0	0.0	0 0	0.0	0 0	0 0
Little Sheep	286	0 0	0.0	0 0	0 0	0.0	0 0
Marble Point	271	0 0	0 0	0 0	0 0	0.0	0 0
Monument Rock	240	0 0	0 0	0.0	0 0	0.0	0 0
Mount Emily	277	0 0	0.0	0 0	0 0	0.0	0 0
North Mount Emily*	262	0 0	0 0	0.0	0 0	0 0	0.0
Reservoir	284	0 0	0 0	0.0	0.0	0 0	0.0
Squaw*	601	0 0	0 0	0.0	0.0	0 0	0.0
Tope Creek	G03	0 0	0 0	0.0	0 0	0 0	0.0
Tower*	256	0 0	0 0	0.0	0 0	0.0	0 0
Twin Mountain	273	0 0	0 0	0.0	0 0	0 0	0 0
Upper Catherine Creek	281	0 0	0 0	0.0	0 0	0 0	0.0
Upper Grande Ronde	275	0 0	0 0	0.0	0 0	0.0	0.0
TOTAL		0 0	0 0	0 0	0.0	0 0	0 0
*Shared with Umatilla NF		0 0	0 0	0.0	0 0	0 0	0.0

Table C-9 (cont.)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE F
DECADE ONE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	2.0	0 0	0.0	15 0	4.0	21.0
Boulder Park	282	0.0	0 0	0.0	0 0	0.0	0 0
Castle Ridge	278	0 0	0 0	0.0	0 0	0 0	0 0
Deadhorse	G08	0 0	0 0	0.0	0 0	0 0	0 0
Dunns Bluff	WW1	0 0	0.0	0.0	0 0	0 0	0.0
Grande Ronde*	267	0 0	0.0	0 0	0.0	0 0	0.0
Greenhorn*	252	0 0	0.0	0.0	0.0	0.0	0 0
Hellhole*	261	0 0	0 0	0.0	0 0	0.0	0 0
Homestead	291	0.0	0 0	0.0	0 0	0 0	0 0
Huckleberry	289	0 0	0 0	0.0	0 0	0 0	0.0
Hurricane Creek	288	0 0	0 0	0.0	0 0	0 0	0.0
Joseph Canyon	G04	0 0	0.0	0 0	0.0	0 0	0.0
Lake Fork	290	0 0	0 0	0.0	0 0	0.0	0 0
Little Creek	280	0.0	0 0	0.0	0 0	0.0	0.0
Little Eagle Meadows	283	0 0	0.0	0 0	0.0	0 0	0.0
Little Sheep	286	0 0	0 0	0 0	0.0	0.0	0.0
Marble Point	271	0 0	0.0	0 0	12.8	2 9	15.7
Monument Rock	240	0 0	0.0	0 0	21.5	1 3	22.8
Mount Emily	277	1.0	0 0	0.0	0 0	0.0	0 0
North Mount Emily*	262	0 0	0 0	0.0	0 0	0.0	0.0
Reservoir	284	0.0	0 0	0.0	0 0	0 0	0.0
Squaw*	601	0.0	0 0	0 0	16 7	4 0	20.7
Tope Creek	G03	0.0	0 0	0.0	0 0	0 0	0.0
Tower*	256	0.0	0 0	0.0	0 0	0 0	0 0
Twin Mountain	273	4.3	3 5	6.7	37 8	7 6	59 9
Upper Catherine Creek	281	0.0	0 0	0.0	0 0	0 0	0 0
Upper Grande Ronde	275	1.5	7.0	0.0	16.3	4 0	28.8
TOTAL		7 8	10.5	6 7	120.1	23.8	168 9
*Shared with Umatilla NF		0 0	0 0	0.0	16 7	4.0	20 7

Table C-9 (cont.)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE F
DECADE TWO

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0 0	0 0	0.0	15.0	0 0	15 0
Boulder Park	282	0 0	0 0	0 0	0.0	0 0	0 0
Castle Ridge	278	0 0	0.0	0 0	0 0	0.0	0 0
Deadhorse	G08	0 0	0 0	0.0	0 0	0 0	0.0
Dunns Bluff	WW1	0 0	0 0	0.0	0 0	0 0	0.0
Grande Ronde*	267	0 0	0.0	0.0	0 0	0 0	0.0
Greenhorn*	252	0 0	0.0	0 0	0 0	0.0	0.0
Hellhole*	261	0 0	0 0	0 0	0.0	0 0	0 0
Homestead	291	0 0	0 0	0 0	0.0	0 0	0 0
Huckleberry	289	0 0	0.0	0 0	0 0	0.0	0.0
Hurricane Creek	288	0 0	0 0	0.0	0 0	0 0	0 0
Joseph Canyon	G04	0 0	0 0	0 0	0.0	0 0	0 0
Lake Fork	290	0.0	0 0	0 0	0 0	0.0	0 0
Little Creek	280	0 0	0.0	0 0	0 0	0.0	0 0
Little Eagle Meadows	283	0 0	0.0	0 0	0 0	0.0	0.0
Little Sheep	286	0 0	0 0	0.0	0 0	0 0	0.0
Marble Point	271	0 0	0 0	0.0	6 4	2.9	9.3
Monument Rock	240	0 0	0 0	0.0	0 0	1.3	1.3
Mount Emily	277	0 0	0 0	0.0	0.0	0 0	0.0
North Mount Emily*	262	0 0	0 0	0 0	0 0	0 0	0.0
Reservoir	284	0 0	0 0	0 0	0 0	0 0	0 0
Squaw*	601	0.0	0.0	0 0	8 3	4 0	12 3
Tope Creek	G03	0.0	0 0	0 0	0 0	0 0	0 0
Tower*	256	0 0	0 0	0 0	0.0	0 0	0 0
Twin Mountain	273	4.3	3 5	6 7	37.8	7 6	59 9
Upper Catherine Creek	281	0 0	0 0	0 0	0.0	0 0	0 0
Upper Grande Ronde	275	3 0	2 5	0 0	9.5	2 0	17 0
TOTAL		7.3	6 0	6 7	77 0	17.8	114 8
*Shared with Umatilla NF		0.0	0 0	0 0	8.3	4.0	12.3

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE F
DECADE THREE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0 0	0.0	0 0	10 0	0.0	10.0
Boulder Park	282	0 0	0.0	0 0	0.0	0.0	0 0
Castle Ridge	278	0.0	0.0	0 0	0.0	0 0	0.0
Deadhorse	G08	0.0	0.0	0 0	0.0	0.0	0 0
Dunns Bluff	WW1	0 0	0 0	0.0	0 0	0 0	0.0
Grande Ronde*	267	0.0	0 0	0.0	0.0	0.0	0 0
Greenhorn*	252	0.0	0.0	0 0	0 0	0.0	0.0
Hellhole*	261	0 0	0.0	0.0	0 0	0 0	0 0
Homestead	291	0 0	0.0	0.0	0.0	0.0	0 0
Huckleberry	289	0 0	0.0	0.0	0.0	0.0	0 0
Hurricane Creek	288	0 0	0 0	0 0	0.0	0.0	0 0
Joseph Canyon	G04	0 0	0 0	0.0	0.0	0 0	0 0
Lake Fork	290	0 0	0 0	0.0	0.0	0 0	0 0
Little Creek	280	0 0	0 0	0.0	0.0	0 0	0 0
Little Eagle Meadows	283	0 0	0.0	0.0	0.0	0 0	0.0
Little Sheep	286	0 0	0 0	0.0	0 0	0 0	0 0
Marble Point	271	0.0	0 0	0 0	0.0	2.9	2 9
Monument Rock	240	0.0	0 0	0 0	0.0	1.3	1 3
Mount Emily	277	0 0	0.0	0 0	0 0	0 0	0.0
North Mount Emily*	262	0 0	0 0	0.0	0 0	0 0	0 0
Reservoir	284	0 0	0 0	0.0	0.0	0 0	0 0
Squaw*	601	0.0	0 0	0.0	0.0	4 0	4 0
Tope Creek	G03	0 0	0 0	0.0	3 4	0 7	4.1
Tower*	256	0 0	0.0	0 0	0.0	0.0	0.0
Twin Mountain	273	0 0	0 0	0 0	0.0	7 6	7 6
Upper Catherine Creek	281	0.0	0 0	0 0	0.0	0 0	0.0
Upper Grande Ronde	275	0 0	0 0	0 0	0.0	0 0	0 0
TOTAL		0 0	0.0	0.0	13.4	16 5	29.9
*Shared with Umatilla NF		0 0	0 0	0.0	0.0	4 0	4 0

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE G
DECADE ONE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	2.0	0 0	0 0	15.0	4 0	21.0
Boulder Park	282	0.0	0 0	6.0	22 7	2 9	31.6
Castle Ridge	278	5 0	0 0	0.0	34 6	3 3	42.9
Deadhorse	G08	0 0	0 0	0.0	0 0	0 0	0.0
Dunns Bluff	WW1	0 0	0.0	0 0	0 0	0 0	0 0
Grande Ronde*	267	0 0	0 0	7 6	11.4	1.0	20 0
Greenhorn*	252	0 0	0 0	0 0	0.0	0.0	0 0
Hellhole*	261	0 0	0 0	0 0	0.0	0.0	0 0
Homestead	291	0 0	0 0	0 0	0.0	0 0	0.0
Huckleberry	289	0.0	0 0	3 4	13.7	3.4	20 5
Hurricane Creek	288	0 0	0 0	0 0	0 0	0.0	0 0
Joseph Canyon	G04	0 0	0.0	5 7	19 3	3.1	28 1
Lake Fork	290	0 0	0.0	0 0	0 0	0.0	0 0
Little Creek	280	0 0	0 0	0 0	0.0	0.0	0 0
Little Eagle Meadows	283	0 0	0 0	0.0	6 0	2 1	8.1
Little Sheep	286	0 0	0.0	0 0	0 0	0.0	0 0
Marble Point	271	0 0	0 0	0 0	12.8	2.9	15 7
Monument Rock	240	0.0	0 0	0 0	14.3	1.3	15 6
Mount Emily	277	2 5	0 0	0 0	23.3	5 3	31 1
North Mount Emily*	262	0 0	0 0	0 0	0.0	0.0	0 0
Reservoir	284	0 0	0 0	0 0	0 0	0.0	0 0
Squaw*	601	0 0	0.0	0 0	16 7	4.0	20 7
Tope Creek	G03	0 0	0.0	0 0	0 0	0.0	0 0
Tower*	256	0 0	0 0	0.0	0 0	0 0	0 0
Twin Mountain	273	7 3	5 9	11.3	63 4	11 9	99.8
Upper Catherine Creek	281	0 0	0.0	5.0	18 6	2.6	26 2
Upper Grande Ronde	275	1 5	7.0	0 0	16 3	4.0	28 8
TOTAL		18 3	12 9	39 0	288.1	51.8	410.1
*Shared with Umatilla NF		0 0	0.0	7 6	28 1	5.0	40 7

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE G
DECADE TWO

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0.0	0.0	0 0	15 0	0 0	15.0
Boulder Park	282	0.0	0 0	3 0	11.3	2.9	17.2
Castle Ridge	278	0 0	0 0	0 0	0 0	4 8	4.8
Deadhorse	G08	0 0	0.0	0.0	0 0	0 0	0 0
Dunns Bluff	WW1	0 0	0.0	0.0	0.0	0.0	0.0
Grande Ronde*	267	0 0	0 0	0.0	0.0	1.0	1.0
Greenhorn*	252	0 0	0 0	0 0	0.0	0.0	0.0
Hellhole*	261	0 0	0.0	0.0	0.0	0.0	0.0
Homestead	291	0 0	0.0	0 0	0.0	0 0	0 0
Huckleberry	289	0 0	0.0	6.8	27.3	3.4	37.5
Hurricane Creek	288	0 0	0.0	0.0	0.0	0.0	0 0
Joseph Canyon	G04	0 0	0.0	0 0	0 0	3.1	3.1
Lake Fork	290	0.0	0.0	0 0	0 0	0 0	0.0
Little Creek	280	0.0	0.0	0 5	9 3	0 9	10.7
Little Eagle Meadows	283	0.0	0 0	0 0	3 0	2 1	5.1
Little Sheep	286	0.0	0 0	0 0	0.0	0 0	0.0
Marble Point	271	0.0	0 0	0 0	6 4	2 9	9 3
Monument Rock	240	0.0	0 0	0 0	7.2	1 3	8 5
Mount Emily	277	0.0	0 0	0 0	12 0	5 3	17.3
North Mount Emily*	262	0.0	0 0	0 0	0 0	0 0	0 0
Reservoir	284	0.0	0 0	3 0	27 3	3 2	33 5
Squaw*	601	0.0	0 0	0 0	8 3	4 0	12 3
Tope Creek	G03	0 0	0 0	0.0	0.0	0.0	0.0
Tower*	256	0 0	0.0	0.0	0.0	0.0	0.0
Twin Mountain	273	7 3	5.9	11.3	63.4	11.9	99.8
Upper Catherine Creek	281	0 0	0.0	5.0	18.6	2.6	26.2
Upper Grande Ronde	275	3 0	2.5	0.0	9.5	2.0	17.0
TOTAL		10 3	8 4	29 6	218 6	51 4	318 3
*Shared with Umatilla NF		0 0	0 0	0 0	8 3	5.0	13 3

Table C-9 (cont.)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE G
DECADE THREE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0.0	0.0	0 0	10.0	0 0	10.0
Boulder Park	282	0 0	0.0	0 0	0.0	2 9	2.9
Castle Ridge	278	0 0	0.0	0 0	0 0	4 8	4.8
Deadhorse	G08	0 0	0.0	0 0	0 0	0.0	0.0
Dunns Bluff	WW1	0 0	0 0	0 0	0 0	0 0	0.0
Grande Ronde*	267	0 0	0.0	0 0	0.0	1 0	1.0
Greenhorn*	252	0 0	0.0	0 0	0.0	0 0	0.0
Hellhole*	261	0 0	0 0	0 0	0 0	0 0	0.0
Homestead	291	0 0	0.0	0 0	0.0	0 0	0.0
Huckleberry	289	0.0	0.0	0.0	0 0	3.4	3.4
Hurricane Creek	288	0.0	0.0	0 0	0.0	0 0	0.0
Joseph Canyon	G04	0 0	0.0	0.0	0 0	3 1	3 1
Lake Fork	290	0 0	0 0	0.0	0 0	0 0	0 0
Little Creek	280	0 0	0 0	0,0	4 7	0.9	5 6
Little Eagle Meadows	283	0 0	0.0	0 0	0.0	2 1	2.1
Little Sheep	286	0 0	0.0	1 5	28 0	2 1	31 6
Marble Point	271	0 0	0 0	0.0	0 0	2 9	2 9
Monument Rock	240	0 0	0 0	0 0	0 0	1 3	1.3
Mount Emily	277	0 0	0 0	0.0	0 0	5 3	5 3
North Mount Emily*	262	0.0	0 0	0 0	0 0	0.0	0.0
Reservoir	284	0 0	0.0	0 0	0.0	3 2	3.2
Squaw*	601	0 0	0.0	0 0	0.0	4 0	4 0
Tope Creek	G03	0.0	0 0	0 0	3 4	0.7	4.1
Tower*	256	0 0	0 0	0 0	0 0	0 0	0 0
Twin Mountain	273	0 0	0.0	0 0	0.0	11 9	11 9
Upper Catherine Creek	281	0 0	0.0	0 0	0 0	2 6	2 6
Upper Grande Ronde	275	0 0	0 0	0.0	0 0	0.0	0.0
TOTAL		0.0	0.0	1 5	46.1	52 2	99.8
*Shared with Umatilla NF		0.0	0.0	0 0	0.0	5 0	5.0

Table C-9 (cont.)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE H
DECADE ONE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst.	Local Const	Temp	Totals
Beaver Creek	276	2 0	0.0	0.0	12 0	3.0	17.0
Boulder Park	282	0.0	0 0	6.0	22 7	2.9	31 6
Castle Ridge	278	3.9	0 0	0.0	26.6	2.5	33.0
Deadhorse	G08	0 0	0 0	0 0	0.0	0.0	0.0
Dunns Bluff	WW1	0 0	0.0	0.0	0.0	0.0	0 0
Grande Ronde*	267	0 0	0 0	0.0	0.0	0.0	0 0
Greenhorn*	252	0.0	0 0	0.0	0.0	0.0	0 0
Hellhole*	261	0 0	0 0	0 0	0.0	0.0	0 0
Homestead	291	0 0	0 0	0 0	0.0	0 0	0.0
Huckleberry	289	0 0	0 0	3 4	13.7	3 4	20.5
Hurricane Creek	288	0 0	0.0	0 0	0 0	0 0	0.0
Joseph Canyon	G04	0 0	0 0	5 7	19 3	3 1	28.1
Lake Fork	290	0.0	2 2	6 6	37.4	7.2	53.4
Little Creek	280	0.0	0 0	0.0	0.0	0.0	0.0
Little Eagle Meadows	283	0 0	0.0	0 0	6 0	2 1	8 1
Little Sheep	286	0 0	0.0	0.0	0.0	0 0	0 0
Marble Point	271	0.0	0 0	0 0	12.8	2.9	15 7
Monument Rock	240	0.0	0 0	0 0	21.5	1.3	22.8
Mount Emily	277	2.5	0.0	0 0	23 3	5 3	31.1
North Mount Emily*	262	0.0	0 0	0 0	0 0	0 0	0.0
Reservoir	284	0.0	0.0	0 0	0 0	0 0	0.0
Squaw*	601	0.0	0.0	0.0	16 7	4 0	20 7
Tope Creek	G03	0.0	0 0	0.0	0.0	0 0	0 0
Tower*	256	0 0	0.0	0 0	0 0	0 0	0.0
Twin Mountain	273	4 3	3 5	6 7	37 8	7.6	59.9
Upper Catherine Creek	281	0.0	0 0	4 3	16.1	2.2	22.6
Upper Grande Ronde	275	1 0	7 0	0.0	14.0	3 0	25 0
TOTAL		13 7	12.7	32 7	279.9	50 5	389.5
*Shared with Umatilla NF		0 0	0.0	0 0	16 7	4 0	20.7

Table C-9 (cont.)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE H
DECADE TWO

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	2.0	0 0	0.0	11 0	0 0	11.0
Boulder Park	282	0 0	0 0	3 0	11.3	2.9	17 2
Castle Ridge	278	0 0	0 0	0.0	0 0	3 7	3.7
Deadhorse	G08	0.0	0 0	0.0	0 0	0 0	0.0
Dunns Bluff	WW1	0 0	0 0	0 0	0 0	0.0	0 0
Grande Ronde*	267	0 0	0.0	0 0	0.0	0.0	0 0
Greenhorn*	252	0 0	0.0	0 0	0.0	0 0	0 0
Hellhole*	261	0 0	0.0	0 0	0.0	0.0	0.0
Homestead	291	0 0	0.0	0 0	0.0	0.0	0.0
Huckleberry	289	0.0	0 0	6.8	27.3	3 4	37.5
Hurricane Creek	288	0.0	0 0	0.0	0 3	0.0	.3
Joseph Canyon	G04	0.0	0 0	0.0	0 0	10 0	10.0
Lake Fork	290	0.0	1 1	3.3	18 7	7.2	30.3
Little Creek	280	0.0	0 0	0.5	9 3	0 9	10.7
Little Eagle Meadows	283	0.0	0 0	0.0	3 0	2 1	5 1
Little Sheep	286	0.0	0 0	0.0	0 0	0.0	0 0
Marble Point	271	0 0	0.0	0 0	6 4	2 9	9 3
Monument Rock	240	0 0	0 0	0 0	0.0	1.3	1 3
Mount Emily	277	0 0	0 0	0 0	12.0	5 3	17.3
North Mount Emily*	262	0.0	0 0	0.0	0 0	0 0	0.0
Reservoir	284	0.0	0.0	3.0	10 4	1.2	14 6
Squaw*	601	0 0	0 0	0 0	8.3	4.0	12 3
Tope Creek	G03	0 0	0.0	0 0	0.0	0.0	0 0
Tower*	256	0.0	0 0	0.0	0 0	0 0	0.0
Twin Mountain	273	4 3	3 5	6.7	37 8	7 6	59.9
Upper Catherine Creek	281	0 0	0.0	4 3	16.1	2.2	22 6
Upper Grande Ronde	275	2 0	1.0	0 0	6.0	2.0	11.0
TOTAL		6 3	5.6	27 6	177.9	56.7	274 1
*Shared with Umatilla NF		0 0	0 0	0.0	8 3	4 0	12.3

Table C-9 (cont)
ROAD MILES BY ROADLESS AREAS IN ALTERNATIVE H
DECADE THREE

Date 6/89 Roadless Area Name	RARE#	Arterial and Collector Reconst	Arterial and Collector Const	Local Reconst	Local Const	Temp	Totals
Beaver Creek	276	0.0	0 0	0.0	5 0	0.0	5.0
Boulder Park	282	0.0	0 0	0.0	0 0	2.9	2.9
Castle Ridge	278	0.0	0.0	0.0	0 0	3.7	3.7
Deadhorse	G08	0.0	0 0	0.0	0 0	0 0	0.0
Dunns Bluff	WW1	0.0	0 0	0.0	0.0	0 0	0.0
Grande Ronde*	267	0 0	0 0	0.0	0.0	0.0	0.0
Greenhorn*	252	0 0	0.0	0 0	0 0	0.0	0 0
Hellhole*	261	0 0	0.0	0 0	0 0	0 0	0.0
Homestead	291	0.0	0.0	0 0	0 0	0 0	0.0
Huckleberry	289	0.0	0 0	0.0	0 0	3 4	3.4
Hurricane Creek	288	0 0	0 0	0.0	0.0	0.0	0 0
Joseph Canyon	G04	0 0	0 0	0.0	0.0	3.1	3 1
Lake Fork	290	0 0	0 0	0.0	0.0	7 2	7 2
Little Creek	280	0 0	0 0	0.0	4.7	0 9	5 6
Little Eagle Meadows	283	0.0	0.0	0.0	0.0	2 1	2.1
Little Sheep	286	0.0	0.0	0.0	3 5	0 3	3.8
Marble Point	271	0.0	0.0	0.0	0 0	2 9	2.9
Monument Rock	240	0.0	0 0	0.0	0 0	1 3	1.3
Mount Emily	277	0.0	0 0	0 0	0.0	5.3	5 3
North Mount Emily*	262	0.0	0.0	0 0	0.0	0.0	0.0
Reservoir	284	0.0	0.0	0 0	0 0	1 2	1.2
Squaw*	601	0.0	0 0	0.0	0 0	4 0	4.0
Tope Creek	G03	0.0	0.0	0.0	3 4	0 7	4.1
Tower*	256	0 0	0.0	0 0	0.0	0.0	0.0
Twin Mountain	273	0.0	0 0	0.0	0.0	7.6	7 6
Upper Catherine Creek	281	0 0	0.0	0.0	0 0	2 2	2.2
Upper Grande Ronde	275	0 0	0 0	0 0	0.0	0.0	0.0
TOTAL		0 0	0.0	0.0	16 6	48 8	65.4
*Shared with Umatilla NF		0.0	0.0	0 0	0 0	4.0	4.0

APPENDIX D

Standards and Guidelines For All Alternatives

APPENDIX D

STANDARDS AND GUIDELINES FOR ALL ALTERNATIVES

The standards and guidelines for the preferred alternative are found in Chapter 4 of the Forest Plan accompanying this FEIS Nearly all of these standards and guidelines apply to all other Forest Plan alternatives (except Alternative A, the No Action alternative and Alternative NC, the no change alternative). The reader is encouraged to review these standards and guidelines as they will provide a much better understanding of the activities which would occur under any Forest Plan alternative *The standards and guidelines described here are those which differ from or are in addition to those for the preferred alternative (Alternative C)*

Some of the management activities on the Forest would cause significant environmental damage if they were to occur without some means of mitigating that potential harm. Because we are able to anticipate many of those adverse environmental effects, we can design and prescribe, in advance, ways to prevent or mitigate that damage

These mitigation measures, consisting of a broad scope of actions that avoid, minimize, rectify, reduce, or compensate for environmental effects, are found in multiple-use Standards and Guidelines Some of the standards and guidelines are taken directly from the Pacific Northwest Regional Guide, while most were developed by the interdisciplinary team

Between the DEIS and the FEIS, a number of changes to the Standards and Guidelines were made. Most of these changes resulted from public comment (such as requests to strengthen protective prescriptions for riparian areas) although some were the result of Congressional action or new Regional direction These changes are summarized as follows:

1. Management direction was changed to reflect the additions to the National Wild and Scenic Rivers System resulting from the Omnibus Oregon Wild and Scenic Rivers Act of 1988.

2 Standards and guidelines for protecting water quality, fish habitat, meeting State Water Quality Management Plans, and conducting watershed cumulative effects analysis were significantly expanded.

3. Standards and guidelines for restoration of stream channels and riparian areas disturbed by mining activities were added.

4 Standards and guidelines for meeting open road density goals were substantially rewritten and clarified.

5. Direction to provide higher snag levels over much of the Forest was added

6 Direction for the protection of special habitats (cliffs, talus slopes, and caves) was added

7. Direction for management of raptor nest sites was added.

8 Standards and guidelines for timber management were changed to permit uneven-aged management wherever it is determined, through project level environmental analysis, to be the best approach for meeting management area goals

9 Timber management direction within Management Area 6 was changed to be more consistent with the recreation emphasis of these areas

10. The guideline for open road density in Management Area 18 was reduced from 2 5 miles per square mile to 1 5 miles per square mile

11 A goal statement and standards and guidelines for diversity were added

Alternative NC

Management direction for Alternative NC (the no change alternative) is found in the 1962 Timber Management Plan

Alternative A (No Action)

Standards and Guidelines for Alternative A are found in the management direction for the unit plans listed below. Copies of these plans are available for public review at the National Forest Headquarters in Baker City, Oregon.

Burnt Powder Unit Plan
Grande Ronde Unit Plan
Wallowa Valley Unit Plan
Desolation Unit Plan
Elgin Unit Plan
Hells Canyon NRA Comprehensive Management Plan

Alternatives B and B-departure

Transportation System

Road development is permitted within the Joseph Canyon roadless area with an open-road density not to exceed 2 5 miles per square mile.

Roads within the Five Points Creek drainage may remain open to public use with an open-road density of 2.5 miles per square mile or less

Recreation

Forest landscapes will be managed with visual quality objectives (outside the NRA) reduced one objective level

Alternative D

Transportation System

Road development is permitted within the Joseph Canyon roadless area with an open road density not to exceed 2.5 miles per square mile

Alternative E

Municipal Watersheds

Timber harvest and additional road development within the Baker and La Grande domestic supply watersheds will not occur except as specified in the description of Management Area 6

Transportation System

Timber harvest and road construction within the Joseph Canyon Roadless Area and the Five Points Creek drainage will not occur except as specified in the description of Management Area 6.

Recreation

Forest landscapes will be managed with visual quality objectives (outside the HCNRA) reduced one objective level.

Alternative F

Wildlife

Where timber management occurs outside of riparian areas, stands will be managed to provide habitat for snag dependent wildlife species at not less than 40 percent level as defined by Thomas (1979).

Alternative G

Transportation System

Road development is permitted within the Joseph Canyon Roadless Area with an open road density not to exceed 2.5 miles per square mile

Roads within the Five Points Creek drainage may be made open to public use with an open-road density of 2.5 miles per square mile or less.

Recreation

Forest landscapes will be managed with visual quality objectives (outside the HCNRA) reduced one objective level.

Timber

Timber harvest will be limited to those stands and practices where an economic analysis indicates that the discounted costs of timber management are less than the discounted benefits

Alternatives B, B-departure, E and G

These alternatives contain a Management Area (MA 2) not included in the proposed action. A description of Management Area 2 follows.

Management Area 2 emphasizes wood fiber and forage production although timber harvest scheduling is constrained to provide greater recreational variety and wildlife diversity than is found in Management Area 1

Timber areas consist of numerous timber stands of a variety of ages Management using even-aged and uneven-aged techniques are appropriate Regeneration harvest of units adjacent to an existing regenerated unit will not be initiated until the prescribed tree stocking on the existing unit reaches ten feet in height Roads open to public use generally do not exceed 1 5 miles per square mile.

Direction

Watershed Apply Forest-wide standards and guidelines.

Wildlife Apply Forest-wide standards and guidelines.

Timber. Timber management will be identical to that of Management Area 1 except that a harvested area of commercial forest land will be considered a created opening until the prescribed stocking level is reached and this stock consists of trees 10 feet, or greater, in height.

Transportation. Management of the transportation system will be identical to that of Management Area 1 except that roads left open year long on summer ranges will, in general, be limited to 1 5 miles per square mile. Winter ranges will be managed so that roads open to public travel will normally not exceed the 1.5 mile per square mile standard during critical big game use periods. Where winter snowfall normally achieves the desired results, additional barriers need not be constructed On winter ranges closure to snowmobiles may be necessary to reduce conflicts with big game use

Range No change from Management Area 1

Recreation. No change from Management Area 1

Visuals. Apply Forest-wide standards and guidelines

Insects and Diseases No change from Management Area 1.

Landownership No change from Management Area 1.

Minerals. Apply Forest-wide standards and guidelines.

Fire No change from Management Area 1.

Planning Assumptions

No change from Management Area 1 except as follows.

Timber

- Commercial harvest of some stands may be delayed for one decade to permit adequate height of adjacent regenerated stands

Transportation

- Snow will effectively close most winter range areas to access by wheeled vehicles during the winter months Consequently, road closures more restrictive than those applied to Management Area 1 will not normally be necessary on winter ranges

Wildlife

- Management of this area will result in an average habitat effectiveness index of 72 percent of potential (including discounting for roads), although individual sites may have higher or lower values.

APPENDIX E

Determination of Land Suitability for Timber Production

APPENDIX E

DETERMINATION OF LAND SUITABILITY FOR TIMBER PRODUCTION

INTRODUCTION

The National Forest Management Act regulations discuss suitability in several places Section 219 3 defines suitability, in general, as "the appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices." Section 219.14 focuses on timber suitability stating that land will be considered unsuited for timber production if.

1 The land is not forest land as defined in Section 219.3

2. Technology is not available to ensure timber production from the land without irreversible resource damage to soils productivity or watershed conditions.

3. *There is not reasonable assurance that such lands can be adequately restocked as provided* in Section 219.27(c)(3).

4 The land has been withdrawn from timber production by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service

These criteria can be summarized by saying that land will be considered suitable for timber production if it is *capable, available*, and *technically suited* under currently available management techniques The processes used for making these determinations on the Wallowa-Whitman are described in the following paragraphs

An additional suitability screen, *economic suitability*, is dependent upon the objectives of the various alternatives and is dealt with in the sections dealing with alternatives and their effects (Chapters II and IV) and in Appendix B

CAPABILITY

The first phase of the suitability determination (identification of capable lands) relied heavily on the Wallowa-Whitman timber inventory, which was conducted in 1978-79 As a part of this inventory the Forest was classified into the following categories:

1. Water - streams, sloughs, lakes, ponds, reservoirs more than 120 feet wide and more than an acre in size

2. Nonforest - land that has apparently never supported trees (grassland, rock barrens, meadows, etc) and lands formerly forested but now precluded from timber production by other uses (improved roads, helispots, railroad rights-of-way, pipelines, etc.).

3 Unproductive land - forest land incapable of yielding 20 cu ft /acre/ year because of adverse site conditions, or land considered permanently inoperable because of rockiness Lands incapable of yielding 20 cubic feet of industrial wood were considered unsuited during the initial suitability determination because: 1) the 1979 timber inventory, the source for most timber-related data, used 20 cubic feet as the cutoff between productive and unproductive lands; 2) there is very little historical data about management of less productive sites (i e , the techniques and costs involved in managing these lands are unknown); and 3) because of the relatively low timber volume likely to exist on these sites and the low rate of growth it is not expected that they would make substantial contribution to timber harvest levels. Included are saturated and poorly drained forest land which produces stunted and deformed trees, alpine forests at the upper limits of tree growth, steep rock areas with cliffs, ledges, and talus slopes, and forest lands capable of producing only noncommercial tree species

4 Capable forest lands - forest land which is producing or capable of producing crops of industrial wood in excess of 20 cu ft /acre of annual growth This includes both accessible and inaccessible areas nonstocked areas which are stockable and otherwise meet this definition are included.

Areas where the productivity was in question were visited on the ground Growth was determined using the Growth Basal Area (GBA)1/ technique and the sites were classified as above.

Under original planning direction, lands not capable of producing 20 cu. feet of timber growth per year were automatically considered unsuited Subsequent planning direction required that these lands be further evaluated to determine if they were available and technically suited for timber production This process is described later in this appendix.

AVAILABILITY

There are presently six areas on the Wallowa-Whitman that have been legislatively or administratively withdrawn from timber harvest. These areas are listed below·

	Net National Forest Areas	
	Total	*Forested*
Eagle Cap Wilderness	345,915	141,013
Hells Canyon Wilderness	213,993	68,183
Monument Rock Wilderness	7,283	6,690
North Fork John Day Wilderness	15,509	14,855
NRA Snake Wild and Scenic River Corridor	14,355	0
Indian Creek Research Natural Area	974	882
Total	598,029	231,623

1/ Hall, Frederick C A Method for Evaluating Forest Productivity and Stock Density Site Index and Growth Basal Area (SI-GBA). U S. Department of Agriculture, Forest Service, Pacific Northwest Region

TECHNICAL SUITABILITY ON LANDS CAPABLE OF PRODUCING 20 CUBIC FEET/ACRE/YEAR

Determination of technical suitability began early in the Forest planning process The following is a summary of the steps involved. (Maps, internal and external communication, and mapping standards are available at the National Forest Headquarters in Baker, Oregon.)

Ranger District silviculturists identified those acres of productive forest land on which regeneration within five years could not be reasonably assured. These delineations were made on 4-inch per mile orthophotos and were based primarily on difficulties experienced in past regeneration attempts. Where the reasons for the experienced difficulty were known these reasons were documented. This process identified three general types of regeneration difficulty

1 Shallow, droughty soils These are sites where high moisture stress is expected. Planting is frequently hindered by the high rock content of the soil.

2 Severe competition from brush, primarily ninebark The presence of these shrubs has reduced regeneration success on some Douglas-fir dominated sites

3 High elevation sites with cold soils The concern was that the harsh conditions experienced at these high elevations would prevent adequate site regeneration within five years.

A Forest soil scientist identified areas which were unsuitable for timber harvest because extreme soil instability would result in irreversible resource damage or because shallow, droughty soils precluded successful regeneration

Soils identified as shallow and droughty largely coincided with areas previously identified as unproductive or with regeneration difficulty by silviculturists The vast majority of soil instability areas lie within the Eagle Cap Wilderness and are not available for timber production. These determinations were made using 1:80,000 black and white aerial photos

The soil scientist and silviculturists resolved differences between their maps to arrive at a single overlay delineating technically unsuited lands.

The maps and criteria were reviewed by a team of Regional Office timber and watershed specialists. Following this review suitability criteria to be applied Region-wide were developed Application of these Regional criteria returned brush competition and high elevation cold soil areas to the suitable land base. The Regional suitability criteria for shallow, droughty, rocky soils required a degree of soils and climatological data not available on the Wallowa-Whitman. It was assumed that the acres identified as shallow, droughty, or rocky by the Forest specialists approximate the acres which would have been identified through the application of the Regional criteria

A field review of the ninebark brushfield competition areas by representatives of the Wallowa-Whitman, the Regional Office, and the timber industry reaffirmed that these areas are normally suitable for timber production. Based on this field review, it was estimated that 20 percent of the ninebark sites actually were shallow-soiled, droughty sites unsuited for timber production. For calculation of timber yields, 20 percent of these ninebark sites are assumed to be unsuited.

In 1984, at the request of the Northwest Pine Association (a group representing a portion of the timber industry), a review was made of the Forest's land suitability determination This review was conducted by the Forest Silviculturist and Forest Soil Scientist and included a field review on each Ranger District of the land suitability mapping. Ten to 20 sites were visited on each District and the adequacy of the mapping was assessed. Following the field review and based on its findings mapping corrections were made In some areas more suited lands were identified and in other areas additional unsuited

lands were found The net result was that some 35,000 fewer acres were identified as unsuited for timber management These changes were primarily due to two factors (1) in the original determination of restockability a site was not considered adequately restocked unless it contained 250-300 trees per acre. The current Regional minimum stocking standard for the Forest types on the Wallowa-Whitman is 75 trees per acre Many areas where restocking to 250-300 trees per acre could not be reasonably assured could easily be restocked to 75 trees per acre, and (2) in the four years since the original suitability determination, the silviculturists on the Forest have substantially more experience in reforestation

SUITABILITY ASSESSMENT OF LANDS PRODUCING LESS THAN 20 CUBIC FEET PER ACRE PER YEAR

With the new NFMA implementing regulations of September 30, 1982 (36 CFR 219), the Chief's 1920 letter of July 15, 1983 and subsequent Regional planning direction it became necessary to assess the timber management suitability of forest lands producing (or capable of producing) less than 20 cubic feet per acre per year (previously termed unproductive forest land)

On the Wallowa-Whitman the data base for distinguishing among nonforest land, unproductive forest land, and productive forest land is the TRI (Total Resource Information) data base It indicates some 340,000 acres of unproductive forest land, of which 40 percent is within proclaimed wilderness

In preliminary reviews of the 200,000 acres of unproductive forest outside wilderness it became apparent that much was actually nonforest (grassland, rock, etc). This misclassification came about because at the time of the original ecoclass mapping (part of the 1979 timber inventory) there was no apparent need to differentiate accurately between nonforest and unproductive forest since neither were to be managed for timber production Similar misclassification did not appear to be significant in lands previously classified as nonforest or productive forest

The problem then on the Wallowa-Whitman was to assess 1) how much of the land classified as unproductive forest actually fits that classification? 2) how much of the actual unproductive forest land was suited for timber management under 36 CFR 219 14(a) 2 and 3, and 3) what is the proper classification for the remaining acres?

A number of alternatives for assessing the suitability of these lands were considered including 1) remapping of unproductive forest lands, 2) reviewing through aerial photo interpretation, each cell classified as unproductive in TRI (approximately 11,000 cells outside proclaimed wilderness, and 3) a sampling procedure whereby some of the 11,000 unproductive cells would be reviewed through aerial photo interpretation and the results of the review applied to the total unproductive area

Use of a sampling procedure was approved by the Regional Forester on December 1, 1983 A major consideration in taking this approach was the length of time required for either remapping unproductive forest or reviewing all 11,000 cells

It was decided to begin with approximately a 10 percent sample with the understanding that additional cells could be reviewed if needed to achieve adequate statistical reliability The process was as follows:

1. A Total Resource Information (TRI) extract (list) of all unproductive forest cells was made. Initially these were combined into three groups spruce-fir (CW, CA, CE), ponderosa pine/ Douglas-fir (CP-CD), and lodgepole pine (LP) but since there were only 600 acres of lodgepole pine type identified as unproductive forest land these were grouped with the spruce-fir

2 Since all TRI cells are numbered and the numbers are unrelated to physical characteristics of the cells, these numbes were used to select the cells to be sampled All cells ending in "5" were

selected Cells which were too small to review using aerial photos (less than 5 acres) were eliminated from the sample and the next cell on the TRI extract which was five acres or larger was included as a replacement.

3. All sample cells were delineated on 4-inch/mile TRI orthophoto maps. These served as a place to document results.

4 Each sample cell was reviewed on resource photography by the Forest Soil Scientist and the District Silviculturist using criteria from the November 10, 1983 Regional direction package. For each cell the following were estimated:

a) Percent nonforest
b) Percent productive forest
c) Percent productive, suitable forest
d) Percent unproductive forest
e) Percent unproductive, suitable forest

Where forest land (either productive or unproductive) was determined to be unsuited for timber management the reasons were documented. Estimates were made to be the nearest 5 percent Stringers less than two chains wide were ignored as were stands less than two acres in size which could not be combined with adjacent stands.

5. Percentages in the various categories for each cell were multiplied by the total acreage of the cell to arrive at acres of each category.

6. Statistical adequacy of the sample was assessed by performing linear regressions on the relationships of acres of nonforest and unproductive forest, with total cell size.

Results

A total of 985 cells were reviewed Of these 652 were within the spruce- fir-lodgepole group and 333 were within the ponderosa pine/Douglas-fir group Sample size, as a percentage of total acres, was 15.4 percent for the spruce-fir-lodgepole group with 8.8 percent of the cells sampled In the ponderosa pine/Douglas-fir group the sample was 12.7 percent with the total acres with 9.5 percent of the cells sampled. Table E-1 shows sample results.

Table E-1
SAMPLE RESULTS (PERCENTAGES)

Species Group	Acres Sampled	% Nonforest	% Productive Forest*	% Productive Suitable	% Unproductive Forest*	% Unproductive Suitable
CW/CA/ CL/CE	20602	86.13	4 64	2 76	9 23	0 19
CP/CD	9346	85 62	4.44	3.21	9.94	0.13

* Includes both suitable and unsuitable acres

When these percentages are applied to the total available, unproductive forest acreage the results are as shown in Table E-2.

Table E-2
Sample Results (Acres)

Species Group	Classified Unproductive Acres From TRI 1/	Nonforest Acres	Productive Forest Acres 2/	Productive Suitable Acres	Unproductive Forest Acres 2/	Unproductive Suitable Acres
CW/CA/ CL/CE	133,157	114,689	6,175	3,677	12,293	251
CP/CD	73,031	62,527	3,242	2,341	7,262	96
TOTAL	206,188	177,216	9,417	6,018	19,555	347

1/ Some of these lands became wilderness following passage of the Oregon Wilderness Bill of 1984.
2/ Includes both suitable and unsuitable acres.

As can be seen from the table, most lands previously classified as unproductive forest are actually nonforest Of those lands meeting the definition of unproductive forest few are considered suitable for timber management. Nearly all of those lands identified as unsuitable forest were unsuited due to regeneration difficulty caused by shallow soils. Other factors which entered into the suitability determination on some lands were: excessive rockiness (too rocky to plant and inadequate assurance that natural regeneration would occur), excessive moisture due to wet meadows or springs, avalanche paths; and cold soils

Table E-2 was used to complete the land suitability display shown in Table E-3. One concern in developing the display was placement of the productive forest inclusions (9,417 acres) within the unproductive forest land base. Nonforest inclusions within the productive forest base were assumed to compensate for this, so the productive acreage was included in the nonforest acreage

The 347 acres of suitable lands producing less than 20 cubic feet per acre per year, if managed for timber production, would provide a long-term sustained yield of approximately 5,000 cubic feet per year. This amounts to approximately 0 013% of the long-term sustained yield from productive forest lands based upon current land allocations. The suitable land display (Table E-3) shows these acres in the unsuited base

Limitations of the Suitability Determination

Both the silvicultural and soils mapping of unsuited areas rely heavily on the professional judgment and experience of the specialists involved The results of this subjective analysis are probably more difficult to reproduce and less accurate than an analysis based on field-gathered data

It is likely that some acreage which is actually suitable for timber production will be labeled "unsuited" for this planning period and other areas which are actually unsuitable for timber production will be labeled "suited." This is due primarily to inaccuracies in the data available It is assumed that these acreages will balance out.

Historically, high elevation-cold soil areas and sites with ninebark plant communities have been difficult to reforest. For this and other reasons (including the high logging costs) timber harvest in

these areas has been largely avoided To some degree the ability to reforest these areas will remain in question until successful examples are available If, in fact, available technology does not provide adequate reforestation, correction in suitable acres will be needed in future planning updates

Information Needed for Future Planning

- Mapping of soil characteristics with a degree of detail that will permit comparison with Regional or similar suitability standards.

- Local data substantiating or disproving the suitability of the ninebark community types.

- Local data substantiating or disproving the suitability of the high elevation-cold soil sites on the Forest

- Field verification of shallow, droughty unsuited areas.

Table E-3
LAND SUITABILITY FOR TIMBER MANAGEMENT

		NOT SUITED FOR TIMBER PRODUCTION	SUITED FOR TIMBER PRODUCTION	TOTALS
I.	TOTAL NATIONAL FOREST AREA (ACRES)			2,667,961
	A. OTHER OWNERSHIPS	318,746		
II	NET NATIONAL FOREST AREA			2,349,215
	A. WATER	5,386		
	B NONFOREST (NOT STOCKED WITH 10% TREE COVER)	921,218 1/		
	C ROADS	10,686		
III.	FORESTED LANDS			1,411,925
	A. WITHDRAWN FROM SCHEDULED TIMBER PRODUCTION (219.14(a)(4))			
	1. WILDERNESS			
	EAGLE CAP	134,900 2/ 6,113 3/		
	HELLS CANYON	64,504 2/ 3,679 3/		
	MONUMENT ROCK	5,972 2/ 718 3/		
	N FK. JOHN DAY	11,603 2/ 3,252 3/		
	2 INDIAN CREEK RESEARCH NATURAL AREA	876 2/ 6 3/		

1/ Nonforest (305,214 ac) plus nonforest from Forest-wide analysis of lands classified as unproductive forest (316,004).
2/ Lands capable of producing 20 cubic feet of commercial wood fiber annually.
3/ Lands not capable of producing 20 cubic feet of commercial wood fiber annually

Table E-3 (Cont)
LAND SUITABILITY FOR TIMBER MANAGEMENT

	NOT SUITED FOR TIMBER PRODUCTION	SUITED FOR TIMBER PRODUCTION
3. STARKEY EXPERIMENTAL FOREST AND RANGE		15,823 4/
4. HCNRA "FORAGE" ALLOCATION		39,620 4/
5. HCNRA "DISPERSED RECREATION/NATIVE VEGETATION" ALLOCATION		51,690 4/
SUBTOTAL	231,623	107,133
B. LANDS GROWING LESS THAN 20 CUBIC FEET/AC/YEAR		
1 LANDS CLASSIFIED AS UNSUITABLE	12,534 5/	
2. LANDS CLASSIFIED AS SUITABLE		(347) 6/
3. LANDS CLASSIFIED AS A SEPARATE SUITABILITY COMPONENT		0
C. REGENERATION DIFFICULTY	67,489	
D. IRREVERSIBLE DAMAGE	9,860	

4/ Includes only productive, suited lands
5/ From Forest-wide analysis of lands classified as unproductive forest

342,653	-total acreage classified as unproductive forest
-316,004	-grassland
- 13,762	-within wilderness
- 6	-within Indian Creek RNA
- 347	-identified as suitable in III B 2
12,534	

6/ Although 347 acres were considered to be suitable this was not a large enough acreage to justify creation of a separate suitability component These acres were returned to the unsuited base.

Table E-3 (Cont)
LAND SUITABILITY FOR TIMBER MANAGEMENT

		NOT SUITED FOR TIMBER PRODUCTION	SUITED FOR TIMBER PRODUCTION
IV.	TENTATIVELY SUITABLE FOREST LAND		1,090,072
V.	TOTALS OF SUITABLE AND NONSUITABLE LANDS	1,259,143 7/8/	1,090,072
VI.	SUITABLE LAND SUMMARY APPROVED FOR FOREST PLANNING PRIOR TO REGULATIONS OF 9/30/82 AND THE CHIEF'S LETTER OF 7/15/83.	1,265,760 7/	1,083,485
VII	LAND STATUS UNDER CURRENT TIMBER MANAGEMENT PLAN 9/	968,384	1,238,297

7/ Excluding private lands from I.A
8/ Includes 347 acres from III.B.2.
9/ From Amendment 9 to the 1962 Wallowa-Whitman Timber Management Plan These acreages do not include lands in Idaho and do not reflect the effects of P L 98-328 Acreages were determined using plot-expansion techniques rather than map measurements

APPENDIX F

Sediment Coefficients

APPENDIX F

SEDIMENT COEFFICIENTS

Overview

Sediment yields were estimated for the purpose of comparing the various alternatives. While the techniques used result in actual tons/acre/year estimates of sediment production, the state-of-the-art is such that these values are better used as indices. Consequently, the Environmental Consequences Section of the Environmental Impact Statement displays sediment output by alternative as a percent of natural sediment output rather than through a display of actual output levels.

Determination of Sediment Production From Land Surfaces Other Than Roads

On-site erosion was estimated using the techniques described by Anderson 1/ In order to arrive at sediment production, it was necessary to estimate the amount of eroded soil reaching a stream channel (sediment delivery) 2/

The unit of land used for estimating outputs was the land type Land types are discussed, in detail, in Appendix B. Sediment coefficients were developed for each land type/activity combination, and were then used in the FORPLAN computer model as a scheduled output.

Table F-1 displays the values used in developing FORPLAN sediment yield tables

Determination of Sediment Production From Roads

Road construction is often cited as a major cause of erosion and sediment from timber harvest activities. 3/ Estimates for road sediment production were made using a technique developed by Leaf. 4/ These estimates were included, along with nonroad sediment production, in the FORPLAN model as a scheduled output A record of this analysis is on file at the National Forest Headquarters

---

1/ Anderson, David A., Guidelines for Computing Quantified Soil Erosion Hazard and On-Site Soil Erosion. U S. Department of Agriculture, Forest Service, Southwestern Region, October 1969.

2/ U S Department of Agriculture, Forest Service, Pacific Southwest Region, Q/D Technical Note No 1, 1978.

3/ Brown, George W and James T. Krygier, Clearcut Logging and Sediment Production in the Oregon Coast Range, in Water Resource Research Vol. 7, No. 5, October 1971.

4/ U. S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, A Model for Predicting Erosion and Sediment Yeild from Secondary Forest Road Construction, Research Note RM-274, December, 1974.

01625

Table F-1
ESTIMATION OF SEDIMENT PRODUCTION

Land Type	Cover Type 1/	Basic Erosion Rate 2/	Baseline Erosion Rate (Tons/Ac/Yr) 2/	Sediment Delivery Coefficient 3/	Baseline Sediment Production (Tons/Ac Decade) 4/	First Decade Sediment Following Activity (Tons/Acre Treated) 5/ 6/ HCC, HSH	HCT	HFR
G2	F	41	0363	05	0182	.0889	0386	0256
	N	54	2152	.10	2152			
G3	F	41	0363	.05	0182	0889	0386	0256
	N	54	2152	10	2152			
G4	F	41	0545	04	0218	.1096	0471	0322
	N	54	3345	08	2676			
G5	F	41	1101	05	0551	2707	1162	0809
	N	54	6627	10	6627			
S1	F	54	2723	25	6808	1.2017	8853	7644
	N	65	7087	36	2 5513			
S2	F	41	1543	.14	2160	3775	2785	2421
	N	54	.4306	22	8879			
S3	F	41	1452	14	2033	3596	3568	2293
	N	54	4153	22	9137			
S4	F	54	.1089	24	2614	4579	3328	.2881
	N	65	2776	34	9438			
S5	F	54	1180	24	2832	4975	3636	3189
	N	65	3022	34	1 0275			
S2H	F	41	1535	14	.2135	3761	2761	2385
	N	54	4306	22	9473			
S3H	F	41	1736	19	3298	5513	4264	3685
	N	54	2961	.30	8883			
S4H	F	54	1258	32	4026	7089	5204	4497
	N	65	3244	39	1 2652			
S5H	F	54	1382	32	4422	7789	5717	4941
	N	65	3565	39	1 3904			

1/ F = forested, N = nonforested
2/ Estimated as described in *guidelines for Computing Quantified Soil Erosion hazard and On-Site Soil Erosion*, (Anderson, 1969) assuming soil bulk density of 0 8 gms/cc
3/ Determined using technique in R-5 Q/D Technical Report No 1
4/ Baseline Erosion Rate (Annual) x Sediment Delivery Coefficient x 10
5/ Values reflect improving ground cover during first decade after activity, HCC = Clearcut, HSH = Shelterwood harvest, HCT = *Commercial Thinning*, HRF = Final Removal
Assumes bare soil percentages following harvest and fuel treatment as follows
Gentle Land Types HCC, HSH - 50%, HCT - 30%, HFR - 20%
Steep Land Types HCC, HSH - 25%, HCT - 15%, HFR - 10%
6/ Activity-related (timber harvest) sediment changes are applied only to forested land types

APPENDIX G

Wildlife/Forest Diversity

APPENDIX G

WILDLIFE/FOREST DIVERSITY

Management Indicator Species

Background

Regulations published pursuant to the National Forest Management Act of 1976 (36 CFR 219.19(a)(1)) require the identification of management indicator species.

". . . the following categories shall be represented where appropriate: Endangered and threatened plant and animal species identified on State and Federal lists for the planning area; species with special habitat needs that may be influenced significantly by planned management programs; species commonly hunted, fished, or trapped, nongame species of special interest, and additional plant or animal species selected because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality."

Endangered or Threatened Species

The bald eagle is a threatened species wintering along the Snake, Burnt, and Grande Ronde Rivers. Only one pair is known to nest on the Forest, though eight pair are assigned to the vicinity of the Wallowa-Whitman National Forest in the Pacific States Bald Eagle Recovery Plan. 1/

The American peregrine falcon is an endangered species Historical nesting has occurred in Hells Canyon and the Eagle Cap Wilderness Four pair are assigned northeast Oregon as part of the Pacific States Peregrine Falcon Recovery Plan Peregrine falcon chicks have been "hacked out" at a site in Hells Canyon since 1987.2/

Neither of these species was determined to be appropriate as a management indicator species because the changes in their populations better reflect recovery plan success than the effects of general Forest management activities Regardless, populations of both species will be closely monitored during plan implementation.

Species Commonly Hunted, Fished, or Trapped

The Rocky Mountain elk is a highly-valued game animal and is selected as an indicator of the quality of habitat diversity, the interspersion of cover and forage areas, and the security of cover provided.

1/ Anthony, R G , et al Pacific States Bald Eagle Recovery Plan approved, Fish and Wildlife Service, 1986.

2/ U S Fish and Wildlife Service Recovery Plan for Peregrine Falcon (Pacific Population) Fish and Wildlife Reference Service, Unit 1, 3840 York St., Denver, CO 1982.

Species with Special Habitat Needs

Species/habitat relationships as defined in *Wildlife Habitats in Managed Forests* 1/ were systematically reviewed to identify species having special habitat needs which might be impacted by management.

The following criteria were used to identify the species having special habitat needs

1. Feeding or reproduction orientations limited to only one or two successional stages of coniferous forest

2. Restrictive habitat requirements within coniferous forest, other than successional stage

3 A primary dependency on riparian/aquatic habitat

From this review, the following were selected as indicators of coniferous forest, and riparian/aquatic management.

1. Old-Growth Forest

   The pileated woodpecker is one of the indicator species for mature and old-growth forest. Originally identified as an indicator of the availability and distribution of large snags, it became apparent in the development of managed stand yield tables that the managed forest would probably not provide an adequate food base for this species, even if it could be managed to provide adequate numbers of large snags for nesting

   The goshawk is considered a supporting indicator of the abundance and distribution of mature and old-growth forests The goshawk is associated with dense-canopied mixed conifer, white fir, and lodgepole pine associations

   The pine marten is an indicator of the quality and distribution of mature and old-growth forest in the mixed conifer, white fir, and subalpine fir associations, particularly in high elevation areas The pine marten is also indicative of the continuity of cover between these old-growth stands.

2. Snags

   Primary cavity excavators as a group are indicators of this habitat. There is increasing pressure on their habitat as logging safety restrictions and fuelwood gathering intensify. Many of these species, and the species that use the cavities they excavate, feed on forest insects and play a role in maintaining healthy, productive forests Included in this group are

   > common flicker, Lewis woodpecker, yellow-bellied sapsucker, Williamson's sapsucker, hairy woodpecker, downy woodpecker, white-headed woodpecker, black-backed three-toed woodpecker, northern three-toed woodpecker, mountain chickadee, white-breasted nuthatch, red-breasted nuthatch, and pygmy nuthatch

---

1/ USDA Forest Service. Agricultural Handbook No. 552, Washington, D. C. 1979

Details on preferred habitats and tree size can be found in *Wildlife Habitats of Managed Forests of the Blue Mountains* 1/

3 Riparian/Aquatic Zone Management

Steelhead and resident trout are indicators of the maintenance and quality of instream habitat

Table G-1
MANAGEMENT INDICATOR SPECIES AND THEIR PRIMARY HABITATS

Species/Species Groups	Primary Habitat
Pileated woodpecker	Old-growth and mature forest
Primary cavity excavators	Snags (see 1/ for more detail)
Goshawk	Old-growth and mature forest
Rocky Mountain elk	Cover forage
Pine marten	Old-growth and mature forest
Resident trout	Riparian/Aquatic
Steelhead trout	Riparian/Aquatic

Diversity

The National Forest Management Act regulations (36 CFR 219 27(g)) require that the Forest Service ". . . provide for and maintain diversity of plant and animal communities " Numerous indices are available to make quantified estimates of plant community diversity, and wildlife or plant species diversity. All emphasize abundance and evenness of distribution. That is, diversity is highest when many species or communities are present and all are abundant.

Abundance and evenness of distribution are fairly effective estimators of plant or animal species diversity, if adequate census can be made of all the species occurring in the area. Such census data are not available for the Wallowa-Whitman. Alternatively, wildlife species diversity may be indexed indirectly by plant community diversity.

Plant community diversity is assumed to be highest when all successional stages of many community types are well represented. This diversity can be documented through summation of acreage by community type and successional stage. These summations must be carefully evaluated because they do not consider the important spatial distributions of successional stages and community types across the landscape

Diversity was indexed by measuring the evenness of distribution of successional stages among the different working groups and land classes. The five successional stages (age classes in decades) were· 1) shrub- seedling (age class 0); 2) pole-sapling (age classes 1-3), 3) young (age classes 4-7); 4) mature (age classes 8-15); and 5) old (age classes 16+). These successional stages are described in Wildlife Habitats in Managed Forests. 1/ Working groups are CD, CW, LP, and CD-B. The land classes are G (gentle), S (steep), and H (long span - helicopter) (see - Appendix B for description of working groups and land classes)

1/ USDA Forest Service Agricultural Handbook No 552, Washington, D.C. 1979

The evenness of distribution was evaluated through application of the evenness of distribution index found in Odum 1/ Two alteratives (Alternative C and Alternative B-departure) were fully evaluated using this diversity index The index proved largely ineffective in displaying significant differences between these alternatives. Several things contributed to this·

1 Age class data in FORPLAN are necessarily very generalized and are therefore "lumpy" This results in a relatively low initial diversity index value as a starting point in all alternatives It results in an apparent increase in diversity in all alternatives which is more dramatic than what would be expected on the ground

2 The age structure of the Wallowa-Whitman National Forest is currently dominated by relatively mature stands which if graphed would very crudely resemble an inverted pyramid This age class distribution in all alternatives tends to right itself so that the pyramid has a broad base in the young age classes and a limited distribution in the old-age classes

3 Because all of the successional stages are weighted equally in assessing the diversity under this evenness of distribution concept, the diversity index does not reflect differences in loss of old-growth well This may not adequately account for the fact that many species associated with the mature and old-growth successional stages are habitat specialists and less adaptable than species associated with early successional stages As a result, species diversity may not be adequately reflected by a strict evenness-of-distribution index

4 Within the commodity emphasis alternative, reduced diversity associated with the loss of mature successional stages is often compensated for by the increased diversity induced by early successional stages on areas which would not be logged at all in more amenity-oriented alternatives As discussed above, these early successional stages carry the same weight as mature or old-growth in assessing evenness of distribution, and the diversity index again is not sensitive to the apparent loss of old-growth habitat.

For these reasons, it was decided not to display this diversity index and assess the implications of diversity in more qualitative terms. The calculations from the spreadsheet matrix that were used to derive this evenness of distribution index for Alternative C and Alternative B-departure are on file at the Forest Supervisor's Office in Baker City, Oregon.

The structure and composition of the forest and nonforest landscape determines the level of diversity of flora and fauna and contributes to the vitality of the plant communities contained within the National Forest. Natural events such as fire, insect epidemics, and disease outbreaks contribute to the appearance, structure, as well as the composition of plant communities Human-caused events such as logging, grazing by domestic animals, road building, and spraying, all contribute to the degree of diversity within and among the plant communities and their associated fauna. The ability of various sites to sustain long-term productivity is determined by the extent and severity as well as the periodicity of site modification, either natural or induced by man

Diversity speaks strongly to the distribution and abundance of different plant communities and their associated plant and animal species The distribution of various seral stages across the landscape provides a break in monotony and creates a stability among the plant and animal species that are adaped to specific seral stages of a diverse landscape As a way of maintaining diversity, human-caused modifying events should ideally leave a patchwork of different seral stages across the National Forest at a scale which allows late seral stage sites to be repopulated by species of earlier

1/ Odum, Eugene P Fundamentals of Ecology W B Saunders Company, Philadelphia, PA 1971

seral stages when those areas lose their older-growth component A linkage of old- with mid- to late-seral stage vegetation is important for the diversity desired for stable, thrifty, and resilient plant and animal communities.

Greater variation in the population of plant and animal species requires that modification be a part of the management area. The opportunity to promote divesity requires the active planning for creating compartments to scale across a contiguous landscape which promotes structural and temporal variation. To achieve this goal will require planning in terms of several hundred years instead of decades. The need for replication of varying kinds of plant communities and varying structural as well as seral units is of particular importance in the creation of a more varied landscape through proper management practices.

The section that follows deals with vegetative responses to modification in forest stand structure for the plant associations encountered in the Blue and Wallowa Mountains In creating compositional and structural changes through silvicultural practices, prescribed burning, and other modifying practices, total diversity can be improved based on a knowledge of those plant communities which will respond in predictable fashion following prescriptions of either light, moderate, or heavy site impact

General Harvest Practice Effects on Stand Diversity

No Harvest - High elevation plant communities dominated by whitebark pine, mountain hemlock, and subalpine fir are too cold and wet or too cold and dry for successful regeneration Additionally, ponderosa pine climax plant communities are too hot and dry or contain shallow soils unsuited for commercial timber growing

Selective Harvest - Individual tree selection promotes uneven-aged management and is best employed to maintain the status quo In true fir-dominated plant communities, it can promote the late seral chjaracter by emphasizing spruce and fir. In mixed coniferous stands, it helps to promote a continued ponderosa pine dominance if these trees are favored for retention, otherwise a complete overstory removal promotes the succedding climax grand fir and Douglas-fir

Shelterwood - This practice promotes the maximum species diversity and structural diversity in grand fir plant communities In conjunction with underburing, western larch is stimulated to add to a more diverse mix of tree species.

Seed Tree - The favored tree is promoted This practice helps produce natural regeneration of early seral tree species (i.e , ponderosa pine, Douglas-fir) in the grand fir series of plant associations The grand fir series contains the warm, moist plant associations that are the most manageable for timber commodity production

Clearcut - Clearcutting is detrimental to enhancement of diversity in the Blue and Wallowa Mountains except in the promotion of early seral vegetation (i e , lodgepole pine, shrubfields) It is best employed on northerly aspects in the grand fir series

Patch Clearcut - A practice which enables diversity to be strengthened by creating early seral vegetation within more dominating late or mid-seral stands Its utility is best employed to promote wildlife cover, increased forage, and

establish ponderosa pine and Douglas-fir in small parcels where rhizomatous shrubs and/or grasses have persisted

Underburning - Underburning can be used for promoting larch on true fir sites after clearcutting or shelterwood treatments; for enhancing establishment opportunities for ponderosa pine in mixed coniferous stands pertaining to the grand fir and Douglas-fir series, and for providing sanitation and fireproofing our commercial timberlands. Also, underburning tends to increase vigor and vitality of grasses and sedges for foraging animals.

Table G-2 displays how six common management activities affect onsite vegetation characteristics in the major forested plant associations on the Forest Table G-3 identifies the principal tree, shrub, and herbaceous species found in each plant association.

Big-Game Winter Ranges

Big-game winter ranges, winter ranges for deer and elk, were mapped by Oregon Department of Fish and Wildlife and Idaho Department of Fish and Game biologists, and reviewed by Forest Service District biologists and Rangers. The criterion for mapping big-game winter range was: These ranges represent the area occupied by approximately 90 percent of the elk population from December 1 to April 1, two out of three winters

The mapping was done on 1" per mile topograpical overlays of orthophoto mosaics of the Ranger Districts. Following the review and minor editing corrections, these winter range maps were approved by the Wallowa-Whitman Forest Supervisor and the Area Manager for the Oregon Department of Fish and Wildlife. Alternatives did not attempt to differentiate between the relative importance of various winter ranges. Rather, they applied varying levels of management intensity to entire areas mapped as winter range.

Habitat Effectiveness Index for Elk

The model used to predict the influence of forest management on elk is a habitat effectiveness model It is a biologically based model that tells us how effective an area will be in supporting elk The model was designed to measure effectiveness on a scale of 0 to 1, with 1 representing the highest potential effectivenss and 0 representing the least desirable situation for elk It is intended to be only a relative measure of effectiveness, and does not consider many factors that would influence the actual number of elk found on an area These additional factors include the effects of hunting, predators, disease, yearly changes in weather and forage production, competition with other animals, and the rate at which elk populations can change from one level to another.

To make the results of the model easier to interpret, the effectiveness index was translated into a number of animals that could be supported on an area This was done by estimating the density of animals that could be supported on an area if the habitat effectiveness value of 1 translated to this highest possible density of elk, and that lower values would translate to proportionally lower densities The numbers shown in the document are these numbers of elk that could be supported on the area The numbers are not projections of actual elk populations As noted above, many additional factors would have to be considered in order to project actual elk populations It is especially important to note that the current elk numbers on an area may not be the direct result of factors that are measured in the habitat effectiveness model The current population in an area could be limited by the availability of winter range on private land, by hunting pressure, or by any of the other factors discussed above In this case, habitat effectiveness might decline but have no influence on the number of elk Because the numbers shown in tables and graphs only represent habitat effectiveness, it is important to read the full text in order to understand the effect of forest management on the elk population

Table G-2
TREATMENT RESPONSE - FORESTED PLANT ASSOCIATIONS OF THE WALLOWA-SNAKE PROVINCE

Series	Plant Association	No Harvest	Selection Harvest	Shelterwood	Seed Tree
Whitebark Pine	PIAL	X - Non-Commercial Cold, Dry			
Mountain Hemlock	TSME/VASC, TSME/VAME	X - Non-Commercial Cold, Dry			
Subalpine Fir	ABLA2/MEFE	X - Avoid Silv Mgt Cold, Moist	Promotes PIEN, ABLA2	Promotes PIEN, ABLA2	
	ABLA2/VASC	X - Avoid Silv Mgt Cold, Frost	Promotes PIEN, ABLA2	Promotes PIEN, ABLA2	
	ABLA2/VAME	X - Avoid Silv Mgt Cool Sites	Promotes PIEN, ABLA2	Promotes PIEN, ABLA2	Promotes PIEN, ABLA2, LAOC
	ABLA2/CLUN	X - Avoid High Water Table Bottoms	Promotes PIEN, ABLA2	Promotes PIEN, ABLA2	Promotes PIEN, ABLA2
	ABLA2/LIBO2		Promotes PIEN, ABLA2	Promotes PIEN, ABLA2	Promotes PIEN, ABLA2, LAOC
Grand Fir	ABGR/TABR/CLUN	X - Avoid Bottoms With High Water Table	Promotes PIEN, ABGR	Promotes PIEN, ABGR	Promotes PIEN, ABGR
	ABGR/CLUN	X - Avoid Bottoms With High Water Table		Promotes PIEN, ABGR	Promotes PIEN, ABGR
	ABGR/VAME		Promotes ABGR, PSME	Promotes Max Sp Diversity	Promotes Mixed Conifer
	ABGR/LIBO2			Promotes Max Sp Diversity	Promotes PSME, PICO
	ABGR/ACGL			Promotes PSME	Promotes PSME, PIPO
	ABGR/SPBE		Promotes ABGR	Promotes PIPO, PSME	Promotes PIPO, PSME
	ABGR/CARU		Promotes ABGR	Promotes PIPO, PSME	
	ABGR/ACGL-PHMA		Promotes ABGR	Promotes PIPO, PSME	Promotes PIPO, PSME
	ABGR/ALSI	X - Avoid Bottoms With High Water Table	Promotes ABGR	Promotes PIEN, LAOC	Promotes PIEN, LAOC
	ABGR/VASC		Promotes ABGR	Promotes PSME	Promotes PSME
Douglas-fir	PSME/CARU		Promotes PSME	Promotes PIPO	Promotes PIPO
	PSME/PHMA	X - Avoid Steep Slope Shrub-tree Savanah			
	PSME/SPBE		Promotes PSME	Promotes PSME	Promotes PSME, PIPO
	PSME/SYAL		Promotes PSME	Promotes PSME	Promotes PSME, PIPO
	PSME/SYOR	X - Avoid Transitional Stands To Adjacent Non-Forest	Promotes PSME	Promotes PSME	Promotes PSME, PIPO
	PSME/CAGE		Promotes PSME	Promotes PSME, PIPO	Promotes PIPO
Ponderosa Pine	PIPO/SYAL		Promotes PIPO	Promotes CARU	Promotes CARU
	PIPO/SYOR	X - Avoid Transitional Stands To Adjacent Non-Forest	Promotes PIPO	Promotes CARU	Promotes CARU
	PIPO/FEID	X - Non-Commercial	Promotes Bunchgrass		
	PIPO/AGSP	X - Non-Commercial	Promotes Bunchgrass		
	PIPO/PUTR	X - Non-Commercial	Promotes Shrub-grass		

Table G-2 (Continued)
TREATMENT RESPONSE - FORESTED PLANT ASSOCIATIONS OF THE WALLOWA-SNAKE PROVINCE

Series	Plant Associations	Clearcut	Patch Clearcut	Underburn
Whitebark Pine	PIAL			Stimulate New Regen
Mountain Hemlock	TSME/VASC, TSME/VAME	Promotes PICO		Fire Resistant
Subalpine fir	ABLA2/MEFE	Promotes PICO, MEFE		Fire Resistant
	ABLA2/VASC	Promotes PICO	Promotes PICO	Promotes PICO
	ABLA2/VAME	Promotes PICO	Promotes PICO	Promotes PICO, LAOC
	ABLA2/CLUN	Promotes VAME	Promotes LAOC	Promotes LAOC
	ABLA2/LIBO2	Promotes VAME	Promotes LAOC	Promotes LAOC
Grand Fir	ABGR/TABR/CLUN	Damages PIEN, TABR	Damages TABR	Kills TABR
	ABGR/CLUN	Promotes LAOC	Promotes PIEN, ABGR, LAOC	Promotes LAOC, PSME
	ABGR/VAME	Promotes VAME	Promotes LAOC, PSME	Promotes LAOC, PSME
	ABGR/LIBO2	Promotes PSME, PICO	Promotes PSME, PICO	Promotes PICO, LAOC
	ABGR/ACGL	Induces Shrubfield	Promotes ACGL	Fire Resistant
	ABGR/SPBE	Promotes Shrub-grass	Promotes PIPO	Promotes PIPO
	ABGR/CARU	Promotes CARU-CAGE	Promotes PIPO	Promotes PIPO, PSME
	ABGR/ACGL-PHMA	Promotes Shrubfield	Promotes Shrubfield	Promotes PHMA, CARU
	ABGR/ALSI	Promotes ALSI	Promotes Shrubs	Fire Resistant
	ABGR/VASC	Promotes VASC, PICO	Promotes LAOC, PICO	Promotes PICO, LAOC
Douglas-fir	PSME/CARU	Promotes CARU-CAGE	Promotes CARU-CAGE	Promotes CARU-CAGE, PIPO
	PSME/PHMA	Promotes Shrubfield	Promotes PSME, PIPO	Promotes PIPO, Shrubs
	PSME/SPBE	Promotes Shrubfield	Promotes Shrubfield	Promotes PIPO, CARU
	PSME/SYAL	Promotes Shrubfield	Promotes Shrubfield	Promotes PIPO, CARU
	PSME/SYOR	Promotes Shrubfield	Promotes Shrubfield	Promotes SYOR
	PSME/CAGE	Promotes CAGE	Promotes CAGE	Promotes CAGE, PIPO
Ponderosa Pine	PIPO/SYAL	Promotes CARU	Promotes CARU	Promotes CARU, PIPO
	PIPO/SYOR	Strongly Limits Diversity	Promotes Shrubfield	Promotes SYOR, CAGE
	PIPO/FEID			Stimulates Grass, and Promotes PIPO
	PIPO/AGSP			Stimulates Grass, and Promotes PIPO
	PIPO/PUTR			Stimulates Grass and Promotes PIPO

Table G-3
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn. Code	Principal Species	Species Code
Mountain Hemlock	Mountain Hemlock/Grouse huckleberry	TSME/VASC	*TREE*	
	Mountain hemlock/big huckleberry	TSME/VAME	Mountain hemlock	TSME
			Subalpine Fir	ABLA2
			Englemann spruce	PIEN
			SHRUB	
			Big Huckleberry	VAME
			Grouse huckleberry	VASC
			Prince's pine	CHUM
			Utah honeysuckle	LOUT2
			HERBACEOUS PLANTS	
			Sidebells pyrola	PYSE
			Heart-leaved arnica	ARCO
			Ross' sedge	CARO
Subalpine Fir	Subalpine fir/Fool's huckleberry	ABLA2/MEFE	*TREE*	
			Engelmann spruce	PIEN
			Subalpine fir	ABLA2
			Lodgepole pine	PICO
			SHRUB	
			Fool's huckleberry	MEFE
			Big huckleberry	VAME
			Grouse huckleberry	VASC
			Sitka alder	ALSI
			Prince's pine	CHUM
			HERBACEOUS PLANTS	
			Heartleaf arnica	ARCO
			Sidebells pyrola	PYSE
			Rattlesnake plantain	GOOB
			Sickletop lousewort	PERA

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn. Code	Principal Species	Species Code
Subalpine Fir	Subalpine fir/Grouse huckleberry	ABLA2/VASC	*TREE*	
			Engelmann spruce	PIEN
			Subalpine fir	ABLA2
			Lodgepole pine	PICO
			SHRUB	
			Grouse huckleberry	VASC
			Big huckleberry	VAME
			Utah honeysuckle	LOUT2
			Prince's pine	CHUM
			Birchleaf spiraea	SPBE
			Scouler willow	SASC
			HERBACEOUS PLANTS	
			Round-leaved violet	VIOR2
			Heartleaf arnica	ARCO
			Sidebells pyrola	PYSE
			Sitka valerian	VASI
			Sweet cicely	OSCH
			Skunk-leaved polemonium	POPU
			Sickletop lousewort	PERA
			Western meadowrue	THOC
			Lupines	LUPIN
			Strawberries	FRVE, FRVI
			White-flowered hawkweed	HIAL
	Subalpine fir/grouse huckleberry	ABLA2/VAME	*TREE*	
			Engelmann spruce	PIEN
			Subalpine fir	ABLA2
			Lodgepole pine	PICO
			Western larch	LAOC
			Douglas-fir	PSME
			SHRUBS	
			Big huckleberry	VAME
			Grouse huckleberry	VASC
			Utah honeysuckle	LOUT2
			Prince's pine	CHUM
			Sitka alder	ALSI
			Ribes Spp	RIBES
			Birchleaf spiraea	SPBE

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn Code	Principal Species	Species Code
			HERBACEOUS PLANTS	
			Round-leaved violet	VIOR2
			Heartleaf arnica	ARCO
			Skunk-leaved polemonium	POPU
			Sickleleaf lousewort	PERA
			Sitka valerian	VASI
			Sidebells pyrola	PYSE
			Mountain sweetroot	OSCH
			Western meadowrue	THOC
			Rattlesnake plantain	GOOB
			Bigleaf sandwort	ARMA3
			Strawberries	FRVE, FRVI
	Subalpine fir/Queen's Cup Plant Association	ABLA2/CLUN	*TREE*	
			Engelmann spruce	PIEN
			Subalpine fir	ABLA2
			Western larch	LAOC
			SHRUB	
			Prince's pine	CHUM
			Twinflower	LIBO2
			Utah honeysuckle	LOUT2
			Mountain-ash	SOSC2
			Swamp gooseberry	RILA
			Big huckleberry	VAME
			HERBACEOUS PLANTS	
			Tiarella	TITRU
			Queen's cup	CLUN
			Meadowrue	THOC
			Sweet cicely	OSCH
			Round--leaved violet	VIOR2
			Piper's anenome	ANPI
			Sidebells pyrola	PYSE
			Starry Solomons seal	SMST
			Heartleaf arnica	ARCO
			Fragrant bedstraw	GATR
			Woods strawberry	FRVE
			Rattlesnake plantain	GOOB
			White-flowered hawkweed	HIAL

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn. Code	Principal Species	Species Code
Subalpine Fir	Subalpine fir/Twinflower plant association	ABLA2/LIBO2	*TREE*	
			Engelmann spruce	PIEN
			Subalpine fir	ABLA2
			Western larch	LAOC
			Douglas-fir	PSME
			Lodgepole pine	PICO
			SHRUBS	
			Twinflower	LIBO2
			Big huckleberry	VAME
			Grouse huckleberry	VASC
			Prince's pine	CHUM
			Utah honeysuckle	LOUT2
			Swamp gooseberry	RILA
			Serviceberry	AMAL
			Birchleaf spiraea	SPBE
			Oregon boxwood	PAMY
			HERBACEOUS PLANTS	
			Heartleaf arnica	ARCO
			Round-leaved violet	VIOR2
			Sweet cicely	OSCH
			Sidebells pyrola	PYSE
			Pink wintergreen	PYAS
			Meadowrue	THOC
			Fragrant bedstraw	GATR
			Rattlesnake plantain	GOOB
			Starry false Solomon's seal	SMST
			Woods strawberry	FRVE
			Long-stalked clover	TRLO
Grand Fir	Grand fir/Pacific Yew/Queen's cup	ABGR/TABR/CLUN	*TREE*	
			Engelmann spruce	PIEN
			Grand fir	ABGR
			Douglas-fir	PSME

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn. Code	Principal Species	Species Code
			SHRUB	
			Pacific yew	TABR
			Rocky Mountain maple	ABGL
			Currants gooseberries	RIBES
			Baldhip rose	ROGY
			Utah honeysuckle	LOUT2
			Big huckleberry	VAME
			Prince's pine	CHUM
			Twinflower	LIBO2
			HERBACEOUS PLANTS	
			Round-leaved violet	VIOR2
			Sidebells pyrola	PYSE
			Fragrant bedstraw	GATR
			Starry false Solomon's seal	SMST
			Trail plant	ADBI
			Queen's cup/beadlily	CLUN
			Heartleaf arnica	ARCO
			Sweet cicely	OSCH
			Woods strawberry	FRVE
			Meadowrue	THOC
			Rattlesnake plantain	GOOB
			Columbia brome	BRVU
Grand Fir	Grand fir/Queen's cup	ABGR/CLUN	*TREE*	
			Engelmann spruce	PIEN
			Grand fir	ABGR
			Douglas-fir	PSME
			Western larch	LAOC
			SHRUB	
			Big huckleberry	VAME
			Twinflowers	LIBO2
			Prince's pine	CHUM
			Utah honeysuckle	LOUT2
			Baldhip rose	ROGY
			Mountain-ash	SOSC2
			Current, gooseberries	RIBES
			Oregon-grape	BERE
			Spiraea	SPBE
			Oregon boxwood	PAMY

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn. Code	Principal Species	Species Code
			HERBACEOUS PLANTS	
			Heartleaf arnica	ARCO
			Sidebells pyrola	PYSE
			Queen's cup; beadlily	CLUN
			Fairy bells	DITR
			Sweet cicely	OSCH
			Round-leaved violet	VIOR2
			Woods strawberry	FRVE
			Meadowrue	THOC
			Trail plants	ADBI
			Rattlesnake plantain	GOOB
			Fragrant abedstraw	GATR
			Starry false Solomon's seal	SMST
			Bigleaf sandwort	ARMA3
			White hawkweed	HIAL
Grand Fir	Grand fir/Big huckleberry	ABGR/VAME	*TREE*	
			Grand fir	ABGR
			Douglas-fir	PSME
			Western larch	LAOC
			Engleman spruce	PIEN
			Ponderosa pine	PIPO
			Lodgepole pine	PICO
			SHRUB	
			Big huckleberry	VAME
			Utah honeysuckle	LOUT2
			Prince's pine	CHUM
			Gooseberries, currents	RIBES
			Oregon-grape	BERE
			Baldhip rose	ROGY
			Spiraea	SPBE
			Common snowberry	SYAL
			Oregon boxwood	PAMY
			Serviceberry	AMAL
			Ninebark	PHMA
			Scouler willow	SOSC
			Redstem ceanothus	CESA
			Rocky Mountain maple	ACGL

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn. Code	Principal Species	Species Code
			HERBACEOUS PLANTS	
			Sidebells pyrolla	PYSE
			Fairy bells	DITR
			Rattlesnake plantain	GOOB
			Sweet cicely	OSCH
			Round-leaved violet	VIOR2
			W false Solomon's seal	SMRA
			Woods strawberry	FRVE
			Fragrant bedstraw	GATR
			Mitella	MIST2
			Heartleaf arnica	ARCO
			Bigleaf sandwort	ARMA3
			Trail plant	ADBI
			Meadowrue	THOC
			Hawkweeds	HIAL, HIAL2
			Showy aster	ASCO
			Cusick's peavine	LANEC
Grand Fir	Grand fir/Twinflower	ABGR/LIBO2	*TREE*	
			Engelmann spruce	PIEN
			Grand fir	ABGR
			Douglas-fir	PSME
			Western larch	LAOC
			Lodgepole pine	PICO
			Ponderosa pine	PIPO
			SHRUBS	
			Twinflower	LIBO2
			Big huckleberry	VAME
			Prince's pine	CHUM
			Baldhip rose	ROGY
			Utah honeysuckle	LOUT2
			Oregon-grape	BERE
			Spiraea	SPBE
			Kinnickinnick	ARUV

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn. Code	Principal Species	Species Code
			HERBACEOUS PLANTS	
			Sidebells pyrola	PYSE
			Sweet cicely	OSCH
			Round-leaved violet	VIOR2
			Meadowrue	THOC
			Fragrant bedstraw	GATR
			Fairybells	DITR
			Strawberries	FRVE,FRVI
			Rattlesnake plantain	GOOB
			Starry false Solomon's seal	SMST
			Trail plant	ADBI
			Heartleaf arnica	ARCO
			White hawkweed	HIAL
Grand Fir	Grand Fir/Spiraea Plant Community Type	ABGR/SPBE	*TREE*	
			Grand fir	ABGR
			Douglas0fir	PSME
			Ponderosa pine	PIPO
			SHRUBS	
			Serviceberry	AMAL
			Spiraea	SPBE
			Common snowberry	SYAL
			Rose Spp	ROSA
			Oregon-grape	BERE
			Prince's pine	CHUM
			HERBACEOUS PLANTS	
			Fragrant bedstraw	GATR
			Trail plant	ADBI
			Bigleaf sandwort	ARMA3
			Heartleaf arnica	ARCO
			Sweet cicely	OSCH
			Woods strawberry	FRVE
			White hawkweed	HIAL
			Showy aster	ASCO
			American vetch	VIAM
			Peavines	LANEC, LAPA2

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn. Code	Principal Species	Species Code
Grand Fir	Grand fir/Pinegrass	ABGR/CARU	*TREE*	
			Grande fir	ABGR
			Douglas-fir	PSME
			Ponderosa pine	PIPO
			SHRUB	
			Big huckleberry	VAME
			Spiraea	SPBE
			HERBACEOUS PLANTS	
			Heartleaf arnica	ARCO
			Woods strawberry	FRVE
			Hawkweeds	HIAL, HIAL2
			Yarrow	ACMIL
			Cusick's peavine	LANEC
			Thick-leaved peavine	LALA2
Grand Fir	Grand fir/Rocky Mountain maple-Ninebark	ABGR/ACGL-PHMA	*TREE*	
			Grand fir	ABGR
			Douglas-fir	PSME
			Ponderosa pine	PIPO
			SHRUB	
			Rocky Mountain maple	ACGL
			Ninebark	PHMA
			Baldhip rose	ROGY
			Sticky currant	RIVI
			Utah honeysuckle	LOUT2
			Spiraea	SPBE
			Common snowberry	SYAL
			Oregon-grape	BERE
			Prince's pine	CHUM

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn Code	Principal Species	Species Code
			HERBACEOUS PLANTS	
			False Solomon's seal	SMRA
			Trail plant	ADBI
			Bigleaf sandwort	ARMA3
			Heartleaf arnica	ARCO
			Sweet cicely	OSCH
			Woods strawberry	FRVE
			Meadowrue	THOC
			Rattlesnake plantain	GOOB
			White hawkweed	HIAL
			Mitella, Mitrewort	MIST2
			Showy aster	ASCO
			Cusick's peavine	LANEC
			Few-flowered peavine	LAPA2
			Wilcox's penstemon	PEWI
Douglas-fir	Douglas-fir/Pinegras	PSME/CARU	*TREE*	
			Ponderosa pine	PIPO
			Douglas-fir	PSME
			SHRUB	
			Common snowberry	SYAL
			Spiraea	SPBE
			Serviceberry	AMAL
			HERBACEOUS PLANTS	
			Heartleaf arnica	ARCO
			Bigleaf sandwort	ARMA3
			Strawberry Spp	FRVE, FRVI
			Showy aster	ASCO
			Yarrow	ACMIL
			Long-stalked clover	TRLO
			Lupine Spp	LUPIN
Douglas-fir	Douglas-fir/Ninebark	PSME/PHMA	*TREE*	
			Ponderosa pine	PIPO
			Douglas-fir	PSME

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn. Code	Principal Species	Species Code
			SHRUB	
			Ninebark	PHMA
			Oceanspray	HODI
			Common snowberry	SYAL
			Spiraea	SPBE
			Serviceberry	AMAL
			Baldhip rose	ROGY
			Oregon-grape	BERE
			Scouler-willow	SASC
			Redstem ceanothus	CESA
			HERBACEOUS PLANT	
			Mitella	MIST2
			Big leaf sandwort	ARMA3
			Heartleaf arnica	ARCO
			Woods strawberry	FRVE
			Meadowrue	THOC
			Brittle bladder fern	CYFR
			Showy aster	ASCO
			False Solomon's seal	SMRA
			Sweet cicely	OSCH
			Long-stalked clover	TRLO
			Miner's lettuce	MOPE
			Yarrow	ACMIL
			Cleavers	GAAP
			Harsh paintbrush	CAHI2
Douglas-fir	Douglas-fir/Ninebark	PSME/PHMA	*TREE*	
			Ponderosa pine	PIPO
			Douglas-fir	PSME
			SHRUB	
			Ninebark	PHMA
			Oceanspray	HODI
			Common snowberry	SYAL
			Spiraea	SPBE
			Serviceberry	AMAL
			Baldhip rose	ROGY
			Oregon-grape	BERE
			Scouler willow	SASC
			Redstem ceanothus	CESA

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn. Code	Principal Species	Species Code
			HERBACEOUS PLANT	
			Mitella	MIST2
			Bigleaf sandwort	ARMA3
			Heartleaf arnica	ARCO
			Woods strawberry	FRVE
			Meadowrue	THOC
			Brittle bladder fern	CYFR
			Showy aster	ASCO
			False Solomon's seal	SMRA
			Sweet cicely	OSCH
			Long-stalked clover	TRLO
			Miner's lettuce	MOPE
			Yarrow	ACMIL
			Cleavers	GAAP
			Harsh paintbrush	CAHI2
Douglas-fir	Douglas-fir/Spiraea	PSME/SPBE	*TREE*	
			Ponderosa pine	PIPO
			Douglas-fir	PSME
			SHRUB	
			Spiraea	SPBE
			Common snowberry	SYAL
			Oregon-grape	BERE
			Baldhip rose	ROGY
			Serviceberry	AMAL
			HERBACEOUS PLANT	
			Strawberries	FRVE, FRVI
			Sweet cicely	OSCH
			Heartleaf arnica	ARCO
			Hawkweeds	HIAL, HIAL2
			Lupines	LUPIN
			Peavines	LATHY
			American vetch	VIAM
Douglas-fir	Douglas-fir/Common snowberry	PSME/SYAL	*TREE*	
			Ponderosa pine	PIPO
			Douglas-fir	PSME

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn Code	Principal Species	Species Code
			SHRUB	
			Common snowberry	SYAL
			Spiraea	SPBE
			Serviceberry	AMAL
			Oregon-grape	BERE
			Roses	ROSA
			HERBACEOUS PLANT	
			Blueleaf strawberry	FRVI
			Woods strawberry	FRVE
			Yarrow	ACMIL
			Heartleaf arnica	ARCO
			Hawkweeds	(HIAL,HIAL2)
			Bigleaf sandwort	ARMA3
			Peavines	LATHY
			Cinquefoils	POTEN
Douglas-fir	Douglas-fir/Mountain snowberry	PSME/SYOR	*TREE*	
			Douglas-fir	PSME
			Ponderosa pine	PIPO
			SHRUB	
			Serviceberry	AMAL
			Mountain snowberry	SYOR
			HERBACEOUS PLANT	
			Heartleaf arnica	ARCO
			Sweet cicely	OSCH
			Woods strawberry	FRVE
			Yarrow	ACMIL
			Cleavers	GAAP
			Houndstongue	CYOF
Ponderosa Pine	Ponderosa pine/Common snowberry	PIPO/SYAL	*TREE*	
			Ponderosa pine	PIPO
			SHRUB	
			Common snowberry	SYAL
			Serviceberry	AMAL

01648

Table G-3 (Continued)
PLANT ASSOCIATIONS AND THEIR PRINCIPAL SPECIES

Series	Plant Association	Plant Assn. Code	Principal Species	Species Code
			HERBACEOUS PLANT	
			Blueleaf strawberry	FRVI
			Woods strawberry	FRVE
			Heartleaf arnica	ARCO
			Yarrow	ACMIL
			Lupines	LUPIN
			Long-stalked clover	TRLO
Ponderosa Pine	Ponderosa pine/Idaho fescue	PIPO/FEID	*TREE*	
			Ponderosa pine	PIPO
			SHRUB	
			Common snowberry	SYAL
			Woods rose	ROWO
			Wyeth's buckwheat	ERHE
			HERBACEOUS PLANT	
			Yarrow	ACMIL
			Lupine	LUPIN
			Yellow salsify	TRDU
			Wayside gromwell	LIRU
Ponderosa Pine	Ponderosa pine/Bluebunch wheatgrass	PIPO/AGSP	*TREE*	
			Ponderosa pine	PIPO
			SHRUB	
			Bluebunch wheatgrass	AGSP
			Pine bluegrass	POSC
			Cheatgrass	BRTE
			HERBACEOUS PLANT	
			Lupines	LUCA, LUSE
			Yarrow	ACMIL

Habitat effectiveness indices for elk were estimated assuming harvest of existing mature tree stands at the maximum rate allowed by the harvest dispersion constraints within Areas 1, 2, and 3. As a result, these indices tend to overestimate the impacts of timber harvest on elk habitat to the degree that other younger successional stages or uneconomic lands are interspersed with these mature stands These indices, however, assume no treatment of adjoining mature stands The indices, therefore, underestimate impacts to the degree that the lack of specific cover distribution objectives allows quality of cover to be compromised through salvage or overwood removal programs in Areas 1 and 2. Overall, they appear to be fairly reasonable estimators of habitat effectiveness

In developing these habitat effectiveness indices, recent data of Leckenby 1/ regarding the utilization of different classes of cover were incorporated as suggested by Jack Ward Thomas (personal communication). That is, thermal cover was assigned the weight of 1.0 to reflect the disproportionately heavy use of these areas, hiding cover was assigned a value of 0.5 to reflect lack of substantial use of that cover. Table G-4, summarizes the habitat effectiveness indices for the principle Forest management areas on the Wallowa-Whitman National Forest These indices include cover forage ratios, assessment of quality of cover, and a discounting for roads The geometric mean of these factors is used as suggested by Jack Ward Thomas (personal communication) to incorporate the "compensatory function" This approach has since been published 2/

The habitat indices were calculated for the managed portions of the Wallowa-Whitman National Forest which would vary between alternatives. It was assumed that habitat in Hells Canyon National Recreation Area would not be altered substantially enough to result in changes on the elk herds. Thus, for several game management units, in Hells Canyon NRA and in the Eagle Cap Wilderness, little change in habitat was anticipated

In translating habitat effectiveness indices to Forest-wide estimates of elk habitat effectiveness indexed by elk numbers, it was assumed that those management units that are dominantly in Hells Canyon NRA, or Eagle Cap Wilderness would be little affected for the foreseeable future. Therefore, approximately 8,000 elk were projected to retain static populations while the elk numbers on the remaining Forest (approximately 14,000 elk) were projected to vary over time in direct proportion to changes in the habitat effectiveness index. This assumption tended to dampen the variation in the Forest-wide habitat effectiveness indices, but appropriately reflects the fact that much of the elk habitat in those areas will be little affected by management Spreadsheets incorporating these assumptions are available for review in the Forest Supervisor's office in Baker City, Oregon.

Table G-4 displays projected habitat effectiveness by management area/decade and by alternative/decade.

1/ Leckenby, Donavin A. Elk Use and Availability of Cover and Forage Habitat Components in the Blue Mountains, Northeast Oregon, 1976-1982 Wildlife Research Report Number 14, Oregon Dept. of Fish and Wildlife, Portland, OR 1984

2/ Thomas, et al Habitat - Effectiveness Index for Elk on Blue Mountain Winter Ranges. USDA Forest Service, General Technical Report PNW-GTR-218, August 1988

Table G-4
Elk Habitat Effectiveness Index
by Management Area

All alternatives except B-Departure and F

Decade	Mgt Area 1	Mgt. Area 2	Mgt Area 3 & 18
1	73	79	79
2	63	78	78
3	56	75	75
4	63	74	75
5	63	72	75
6	68	73	76
7	73	74	74
8	75	74	75

Alternative B-Departure

Decade	Mgt Area 1	Mgt Area 2	Mgt Area 3 & 18
1	73	79	na
2	63	78	na
3	56	75	na
4	62	74	na
5	60	68	na
6	66	69	na
7	62	67	na
8	57	68	na

Alternative F

Decade	Mgt Area 1	Mgt Area 2	Mgt Area 3 & 18
1	na	na	84
2	na	na	82
3	na	na	80
4	na	na	80
5	na	na	79
6	na	na	80
7	na	na	78
8	na	na	79

na = not applicable

Overall HEI by Alternative

Decade	A	B	B-Dep	C	C-Dep	D	E	F	G	H
1	77	75	75	76	74	76	76	84	75	76
2	74	69	69	70	71	69	70	82	69	71
3	70	63	63	65	67	64	65	80	63	67
4	72	67	67	68	70	68	68	80	67	70
5	71	66	63	68	69	68	67	79	66	69

APPENDIX H

Potential Research Natural Areas

APPENDIX H

POTENTIAL RESEARCH NATURAL AREAS

Following are recently identified potential research natural areas on the Forest and the principal ecologic cells represented in each Figure H-1 shows the approximate location of each area

Table H-1
AREA DESCRIPTIONS

Map Key	Name of Area	Approximate Acreage	Cells Represented
A	Indian Creek 1/	990	Mountain hemlock
B	Lightning Creek	2,100	Idaho fescue-bluebunch wheatgrass Idaho fescue/prairie/junegrass Idaho fescue/Hood's sedge
C	Pleasant Valley	1,400	Sand dropseed Bluebunch wheatgrass/prickly pear Bluebunch wheatgrass/snow buckwheat Idaho fescue/prairie Junegrass Slenderbush buckwheat Smooth sumac/bluebunch wheatgrass Red three-awn Snowberry-rose Low elevation stream Ninebark-ocean spray shrublands Douglas-fir/ninebark
D	Bill's Creek	40	Sand dropseed Red three-awn Hackberry
E	Alum Beds	600	Snake River greenbush rims *Low elevation stream* Hydrothermal community

1/ Existing RNA

Table H-1 (continued)
AREA DESCRIPTIONS

Map Key	Name of Area	Approximate Acreage	Cells Represented
F	Little Granite	6,000	Subalpine fir/grouse huckleberry
			Douglas-fir/ponderosa pine/-snowberry
			Spruce-subalpine fir/false huckleberry
			Snake River greenbush rims
			Low elevation stream
			Mid-elevation stream
			High elevation stream
			Ponderosa pine/bluebunch wheat-grass
G	Boner Flat	1,700	Ponderosa pine/Idaho fescue
			Green fescue/Parry's rush
			Subalpine fir-whitebark pine
H	Craig Mountain Lake	170	High elevation permanent pond and meadow
I	West Razz Pond and West Half of Razz Lake	50	High elevation permanent pond
			Black sedge meadow
			High elevation stream
J	Mount Joseph	700	Tundra (cushion-plant communities)
			Whitebark pine communities
K	Duck Lake	500	Low elevation permanent pond
			Low elevation vernal pond
			Old-growth ponderosa pine
			Douglas-fir/pinegrass
			White fir/big huckleberry
L	Vance Knoll	500	Biscuit scabland
			Sandberg's bluegrass/one-spike oatgrass
M	Government Draw	200	Stiff sagebrush/Sandberg's bluegrass
N	Glacier Lake	100	High elevation lake, arctic willow

Table H-1 (continued)
AREA DESCRIPTIONS

Map Key	Name of Area	Approximate Acreage	Cells Represented
O	Lake Fork	500	Bluebunch wheatgrass/Wyeth's buckwheat communities Cusick's camas seepage plant communities
P	Horse Pasture Ridge	250	Idaho fescue/prairie junegrass ridgetop/communities Idaho fescue/bluebunch wheatgrass ridgetop/communities Idaho fescue/bluebunch wheatgrass/arrowleaf balsamroot communities
Q	Basin Creek	400	Idaho fescue/prairie junegrass (low elevation) communities Bluebunch wheatgrass/Sandberg's bluegrass/Snake River phlox communities
R	Haystack Rock	400	Idaho fescue/bluebunch wheatgrass/arrowleaf balsamroot communities Bluebunch wheatgrass/Sandberg's bluegrass/narrow-leaved skullcap communities Talus garland plant communities
S	Point Prominence	700	Subalpine fir/big huckleberry communities Subalpine fir/queen's cup communities
T	Cougar Meadow	50	Tufted hairgrass - wet sedge meadows Quaking aspen plant communities
U	Bob Creek	100	Smooth sumac/bluebunch wheatgrass communities

There are several additional upland plant communities in need of representation in the Blue Mountains. To date no candidate research natural areas have been identified for them. The communities are as follows.

Western juniper/stiff sagebrush

Ponderosa pine/bunchgrass

Ponderosa pine/bitterbrush/bunchgrass

Grand fir/beargrass

Subalpine fir/false huckleberry

Lodgepole pine/grouse huckleberry/pinegrass

Idaho fescue/Hood's sedge

Basin big sagebrush/bunchgrass

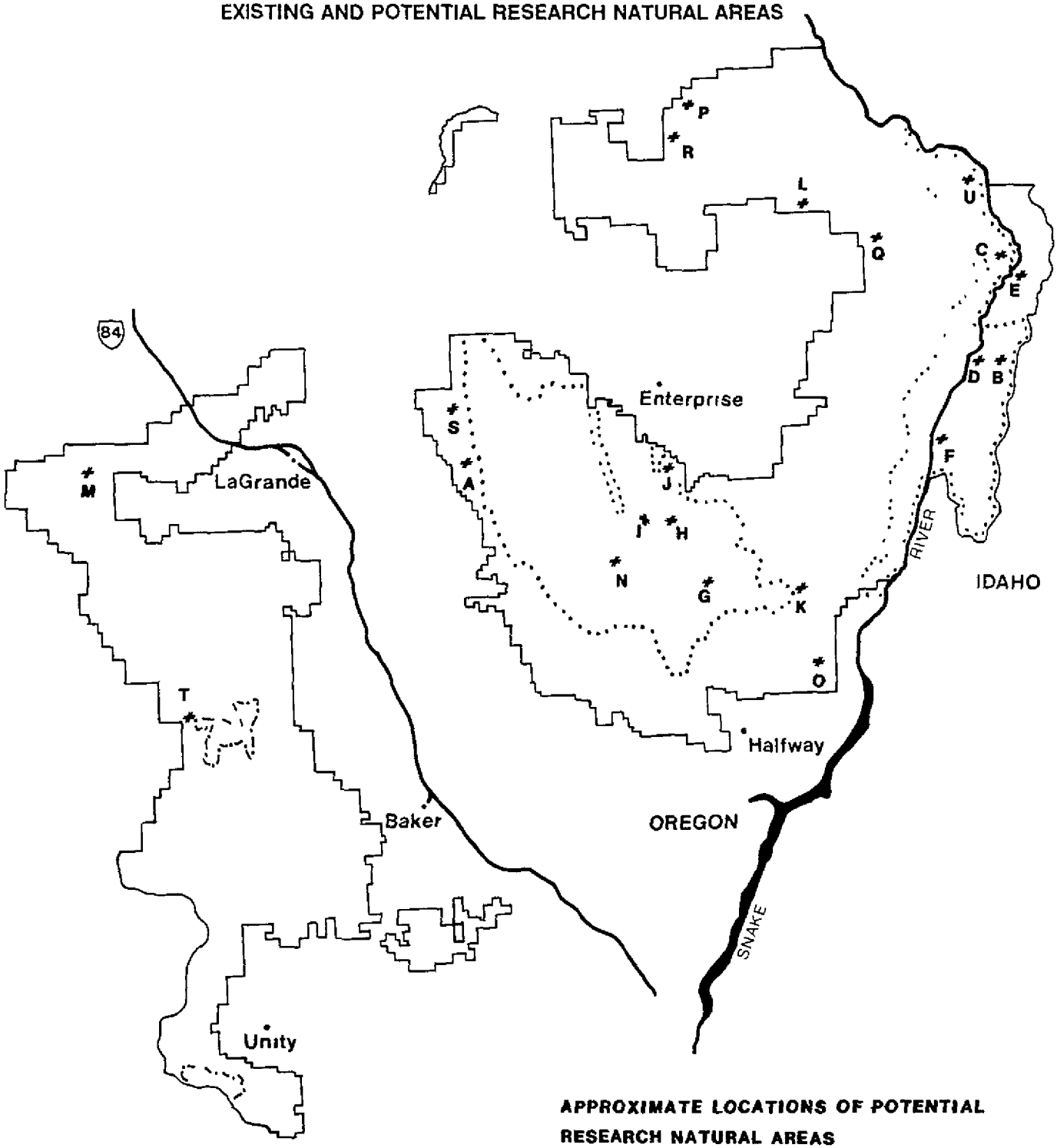
Bitterbrush/bluebunch wheatgrass

Western redcedar/Devil's club

Green fescue

Riparian (wetland) communities need better representation in the RNA system in the Blue Mountains Following the completion of the Riparian Classification (1993), other communities will be identified for RNA establishment needs

FIGURE H-1
EXISTING AND POTENTIAL RESEARCH NATURAL AREAS



APPROXIMATE LOCATIONS OF POTENTIAL RESEARCH NATURAL AREAS

LEGEND

A	Indian Creek (existing RNA)
B—N	Potential RNA
.....	Wilderness Boundary

Table H-2
POTENTIAL RESEARCH NATURAL AREAS
(Summary of Resource Conflicts)

Map Key	Area	Wildlife	Minerals	Livestock Grazing	Timber	Recreation	Water
A	Indian Creek 1/	N	N	L	M	N	N
B	Lightning Creek	N	N	M	N	N	N
C	Pleasant Valley	L	N	H	N	N	N
D	Bill's Creek	N	N	M	N	N	N
E	Alum Beds	N	N	L	N	L	N
F	Little Granite	N	N	L	N	L	N
G	Boner Flat	N	N	M	N	N	N
H	Craig Mtn. Lake	N	N	N	N	L	N
I	West Razz Lake & Pond	N	N	N	N	L	N
J	Mount Joseph	N	N	N	N	N	N
K	Duck Lake	N	N	L	L	L	N
L	Vance Knoll	N	N	L	N	N	N
M	Government Draw	N	N	N	M	N	N
N	Glacier Lake	N	N	N	N	L	N
O	Lake Fork	N	N	M	N	N	N
P	Horse Pasture Ridge	N	N	L	N	N	N
Q	Basin Creek	N	N	L	N	N	N
R	Haystack Rock	N	N	L	N	N	N
S	Point Prominence	N	N	N	L	N	N
T	Cougar Meadow	N	M	N	N	N	N
U	Bob Creek	N	N	N	N	N	N

Legend

N = No significant conflict
L = Possible conflicts but easily mitigated with little resource tradeoff
M = Definite conflicts which can be mitigated with moderate resource tradeoff
H = Conflicts which can be mitigated with difficulty and/or significant resource trade-off

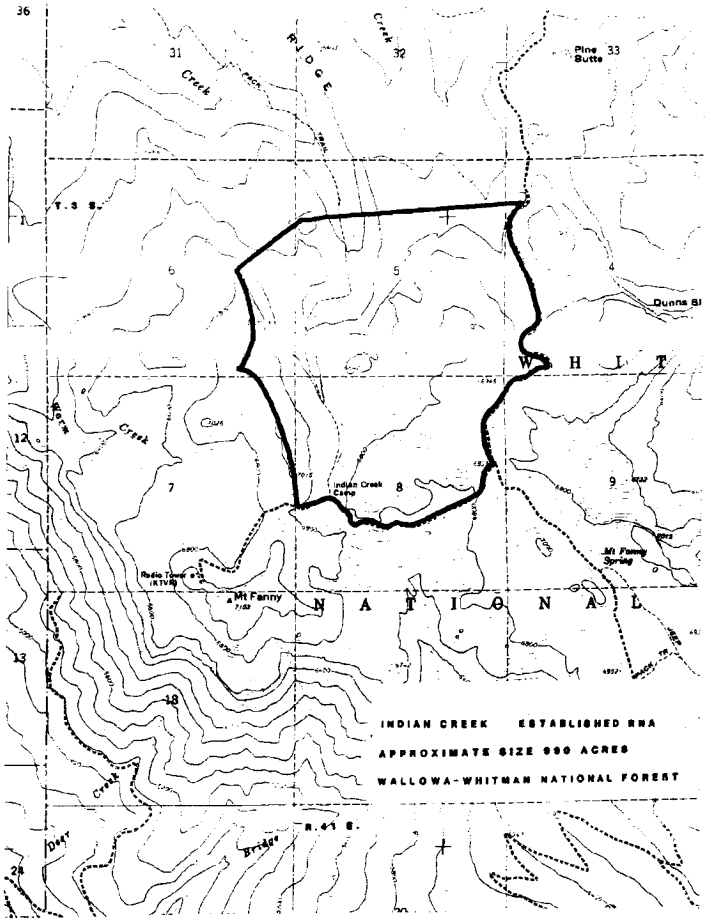
1/ Existing

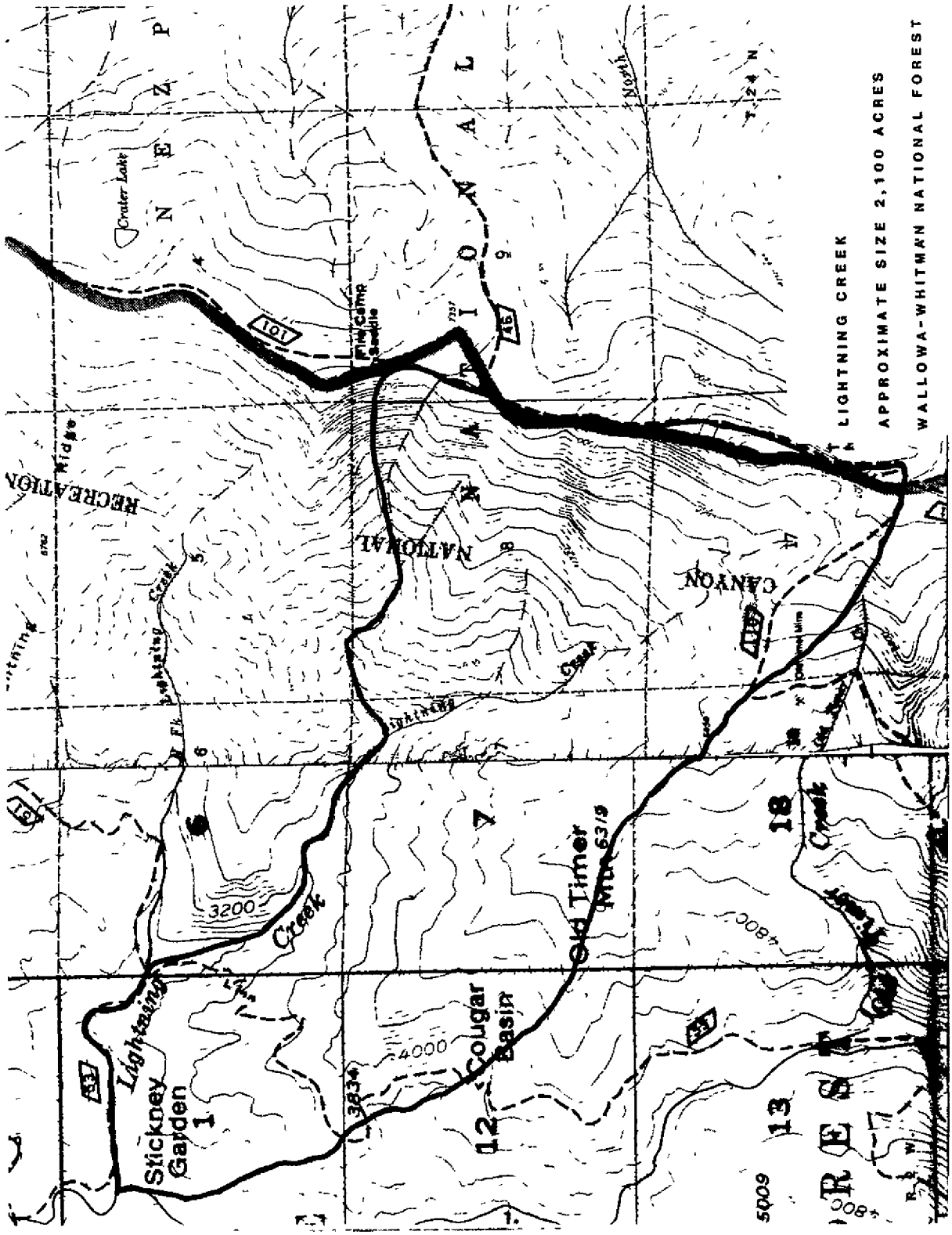
Narrative Description

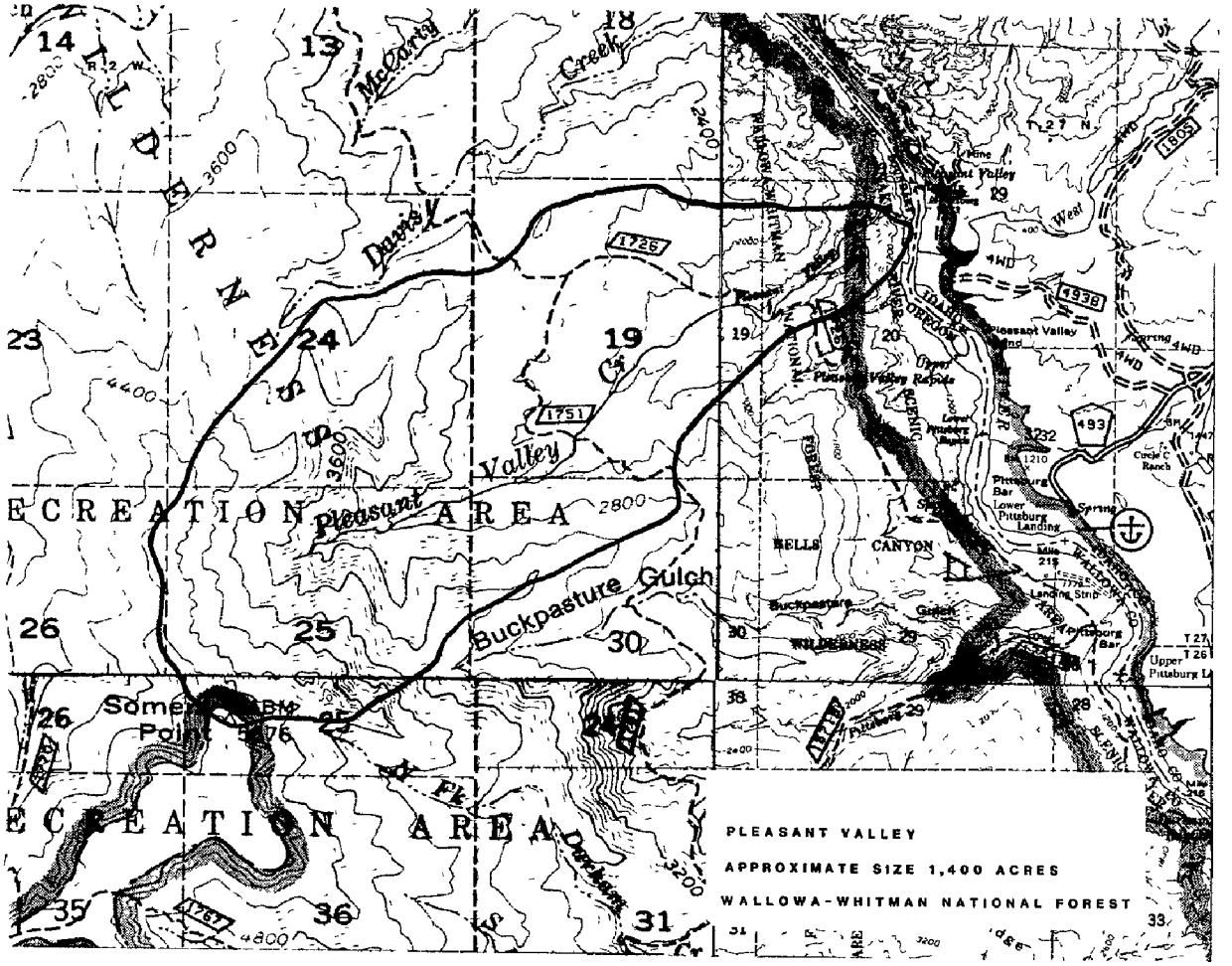
A	Indian Creek	Currently established research natural area Grazing capacity of approximately 40 AUM's livestock (sheep) can be easily routed around the area if needed for protection. Contains some 882 acres of commercial forest land with approximately 2 6 MMBF standing timber volume
B.	Lightning Creek	Lies in current domestic sheep grazing allotment and produces 80 AUM's Contains two mining claims that could become active and if so, would have to be provided for. No apparent recreation use that could not be accommodated within the research natural area
C	Pleasant Valley	Grazing capacity of about 120 AUM's is currently not used. Contains two sheep campsites which would probably have to be eliminated if the RNA were established. A stock driveway through the area would be necessary Popular elk hunting area Current relatively heavy elk use would apparently not be compatible with an RNA No serious recreation conflicts are apparent
D.	Bill's Creek	Located in a bench 100 feet in elevation above the Snake River This small area currently provides approximately six AUM's grazing for domestic sheep. A recreation and livestock trail passes through the area Conflicts would arise only if sheep were permitted to "camp" in the area
E.	Alum Beds	Boundary could be set back from river shoreline so conflict with boating public would be negligible Placing lower boundary above the Snake River Trail would avoid grazing conflict if the RNA were to be confined specifically to the immediate vicinity of the Alum Bed outcrop
F.	Little Granite	Area not presently grazed by livestock or planned for domestic grazing, but contains potential of 200 AUM's which could be effectively used by sheep Upper portion is popular recreation area and this use could continue to be accommodated within the RNA concept. Popular trails traverse the area.
G	Boner Flat	Grazing capacity is approximately 280 AUM's. Grazing conflicts could be greatly reduced if northern half of the area were removed from consideration. No other conflicts foreseen.
H.	Craig Mtn. Lake	Recreation use now low and there is no intent to encourage a higher rate of use through wilderness planning Conflicts are unlikely unless recreation use were to substantially increase, which is unlikely due to the obscure location of the lake.
I.	West Razz Pond and West Half of Razz Lake	Similar situation to that of Craig Mtn Lake The portion of Razz Lake that is included in the proposed RNA does not include the east end of the lake which receives relatively heavy visitor use

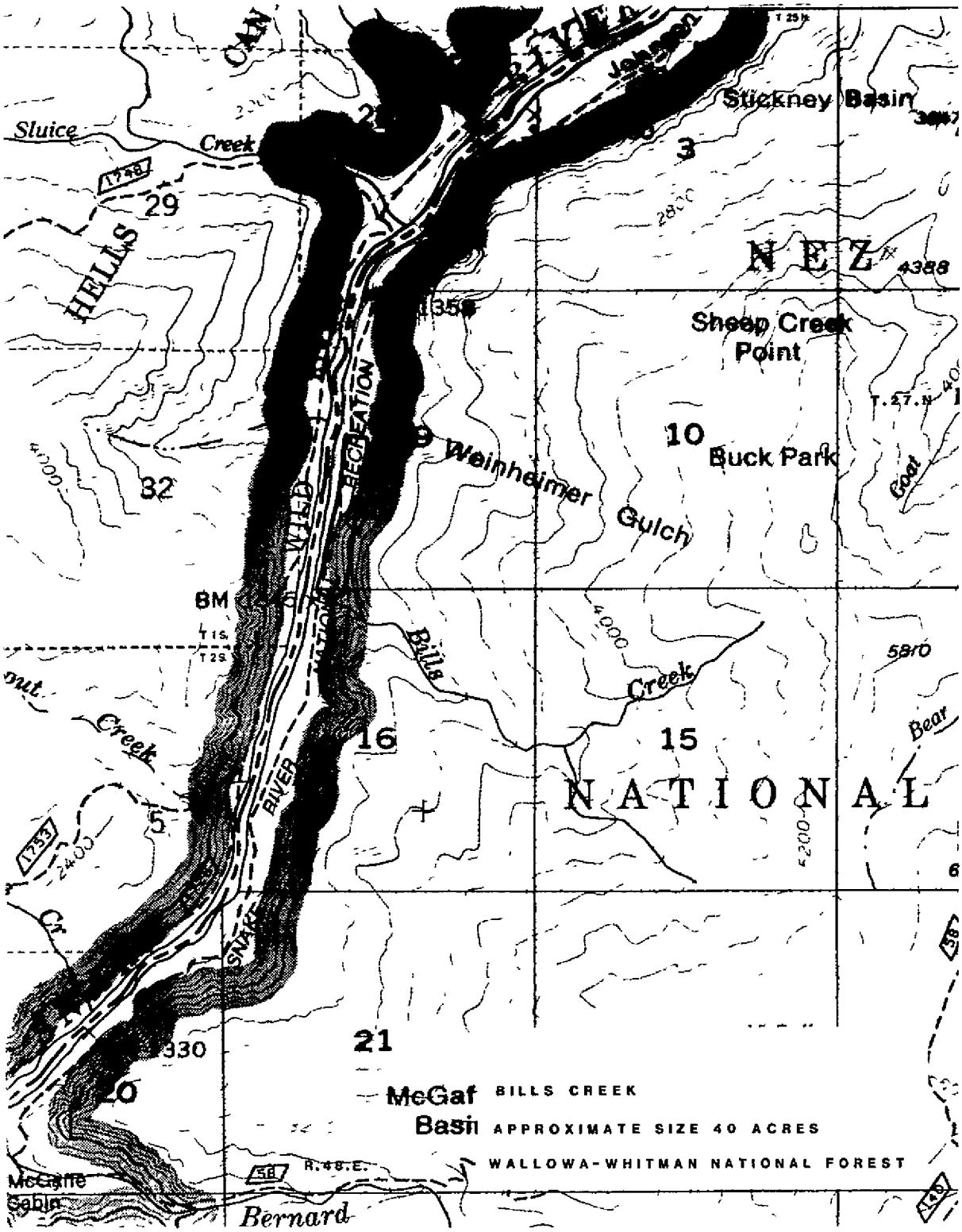
J.	Mount Joseph	Area excluded from grazing and, other than recreation livestock use, it is unlikely to be included in a grazing allotment in the future. No apparent conflicts foreseen
K	Duck Lake	Although this lake receives considerable recreation use, it appears that such use would not be incompatible with the research natural area if the campground area were excluded. It provides approximately 80 AUM's of forage The boundary of the area can be adjusted to avoid conflicts with sheep grazing although a driveway may have to be provided through a portion of the area.
L	Vance Knoll	Livestock grazing capacity of approximately 100 AUM's would be eliminated from the capacity of the grazing allotment. Best examples of the desired cells lie on private land. A part of the RNA establishment would be an attempt to acquire this private land parcel and include it with the larger piece of National Forest land.
M	Government Draw	Contains approximately 1.5 MMBF of timber on 150 acres of commercial forest land. No recent use by livestock and not currently within a grazing allotment Area contains several on-going studies by scientists from the PNW Range and Wildlife Habitat Laboratory in La Grande.
N.	Glacier Lake	No apparent conflicts The proposal is to include only the west half of the lake which receives minor recreation use.
O	Lake Fork	Located partially within the Hells Canyon National Recreation Area and partially on the Pine Ranger District Although the area is partially forested, timber management activities are planned Grazing capacity is approximately 50 aum's, currently used by cattle.
P	Horse Pasture Ridge	Current grazing capacity approximately 25 AUM's, currently used by cattle Dominantly grassland but includes approximately 30 acres of productive forest land tentatively suitable for timber management No apparent other conflicts.
Q.	Basin Creek	Located within the Hells Canyon National Recreation Area. No significant mineral or timber resources present. Approximate grazing capacity is 40 AUM's
R	Haystack Rock	Entirely within the Wallowa Valley Ranger District The area has no commercial timber lands and no known mineral potential. Approximate grazing capacity is 40 AUM's, currently used by cattle
S	Point Prominence	Located entirely within the La Grande Ranger District. This heavily-forested area has no significant grazing capacity and is not know to have any mineral potential. Timber resources consist dominantly of subalpine fir, a low-valued species
T	Cougar Meadow	Located entirely on the Baker Ranger District along the congressionally designated (recreational) North Fork John Day River. No significant conflicts with timber on grazing resources, but the area has possible potential for mineral development

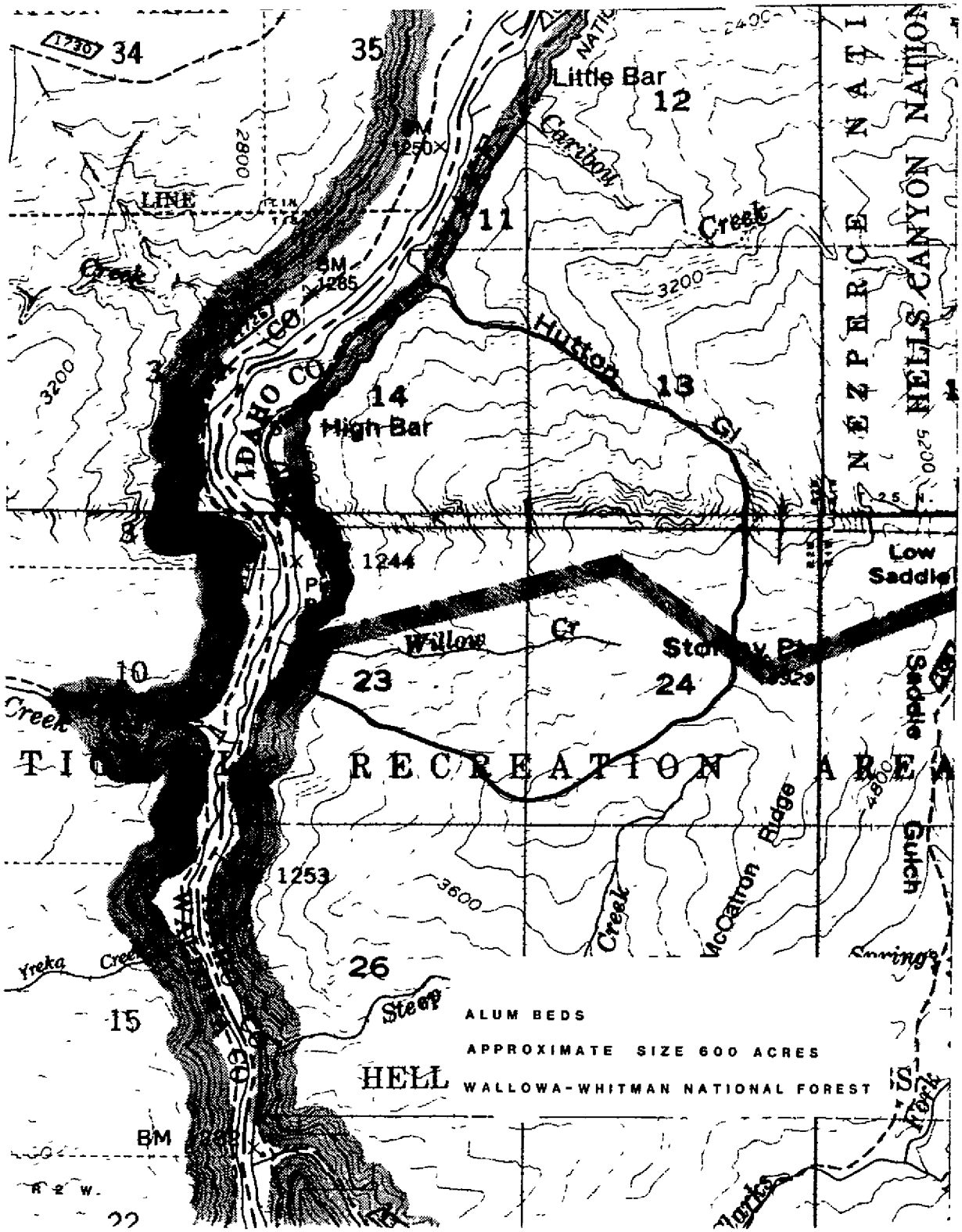
U	Bob Creek	Entirely within the Hells Canyon National Recreation Area. This proposed RNA is larely inside the Hells Canyon Wilderness with a small portion in the Snake Scenic River Corridor No conflicts with recreation are anticipated. Grazing capacity is approximately 10 AUM's

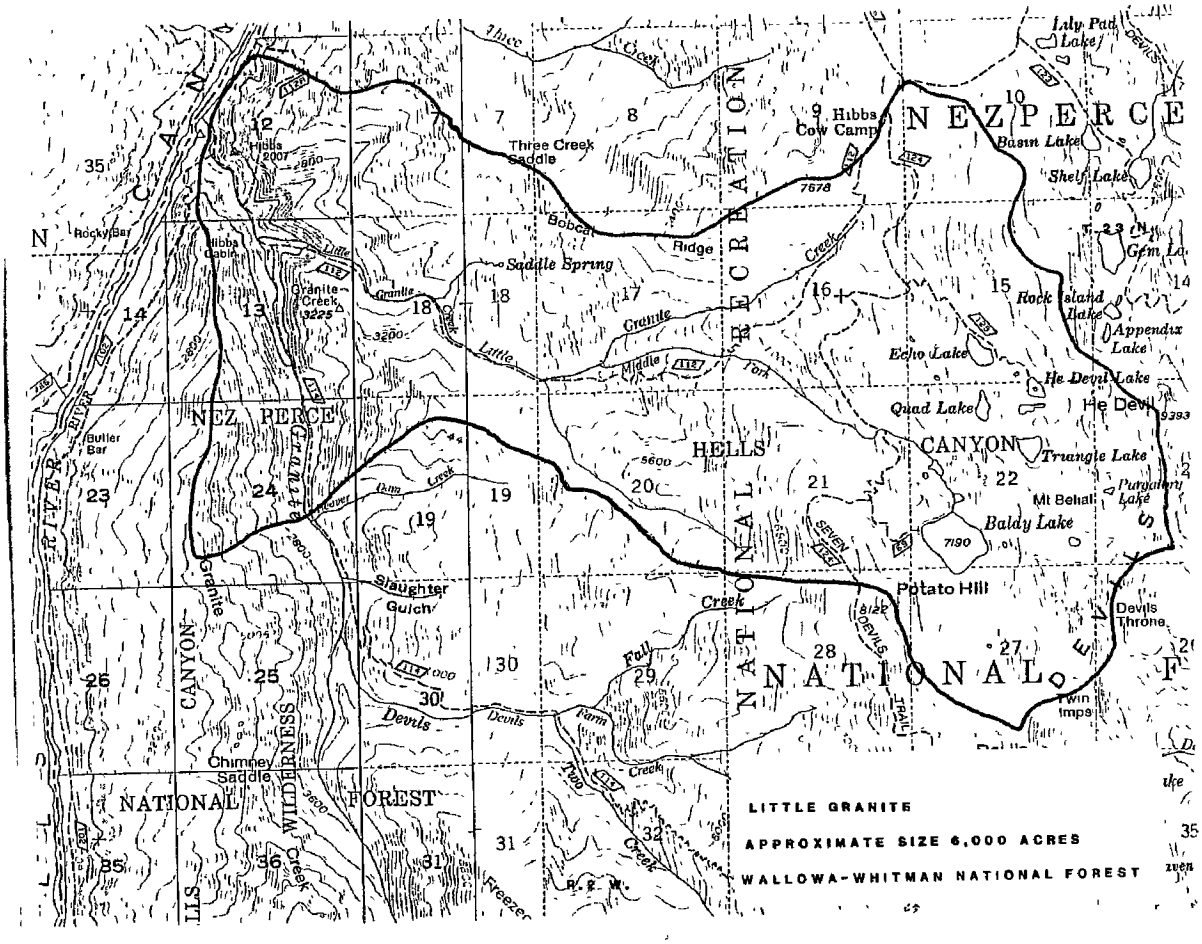

INDIAN CREEK ESTABLISHED RNA
APPROXIMATE SIZE 990 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
Mt Fanny
Indian Creek Camp
Pine Butte
Dunns Sl
T. 3 S.
R. 41 E.
N A T I O N A L

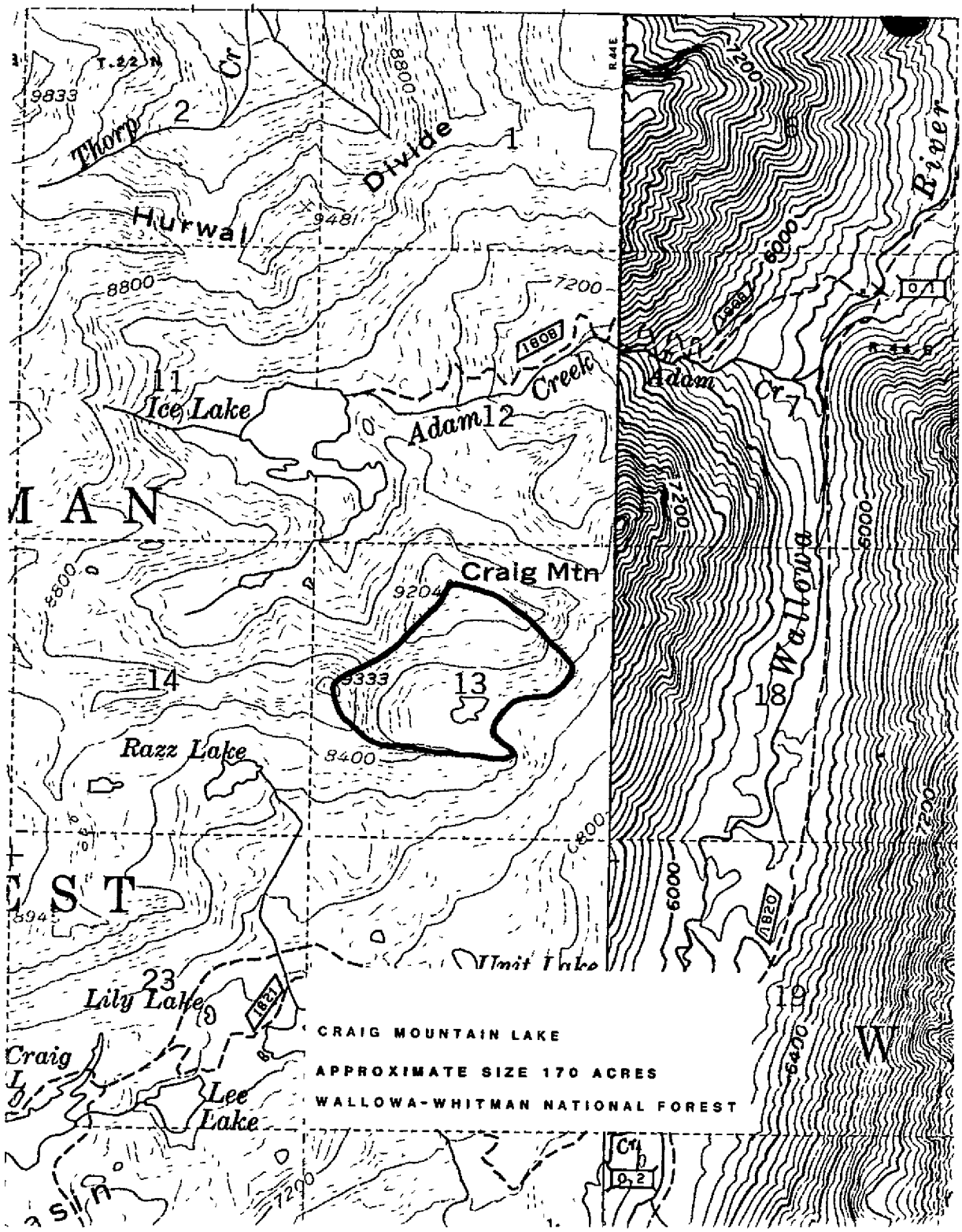

LIGHTNING CREEK
APPROXIMATE SIZE 2,100 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
Crater Lake
Flicktime Saddle
Lightning Creek
Stickney Garden
Cougar Basin
Old Timer Mtn.
Creek
CANYON
NATIONAL
RECREATION
3200
4000
5009
6319
101
45
83

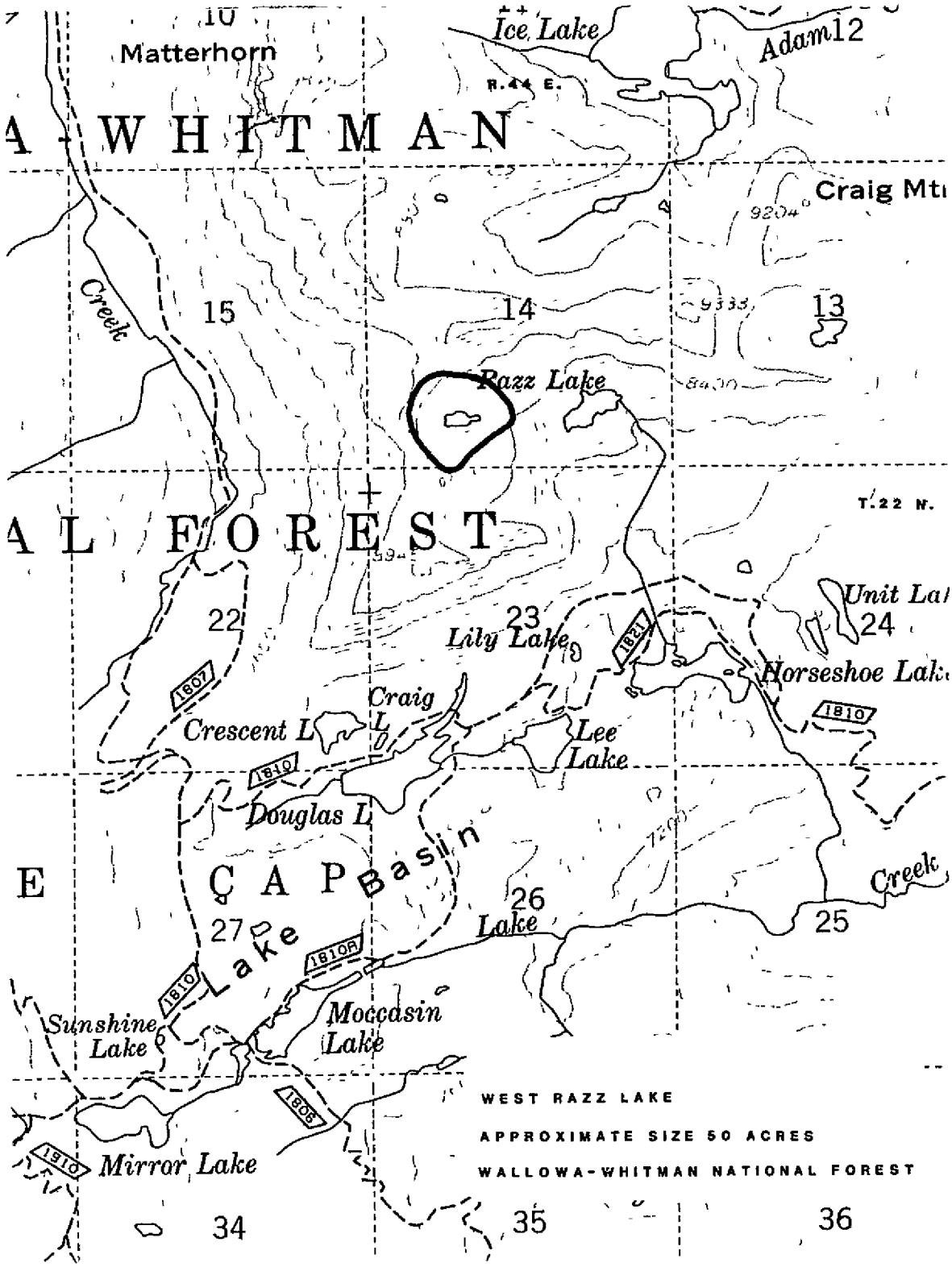

PLEASANT VALLEY
APPROXIMATE SIZE 1,400 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
Pleasant Valley
Buckpasture Gulch
McCarty Creek
Davis
Somers Point
Pittsburg Landing
Lower Pittsburg Landing
Pittsburg Bar
Upper Pittsburg L
Pleasant Valley Ranch
Pleasant Valley Campground
Pleasant Valley Airstrip
Pleasant Valley Trail
Pleasant Valley Rapids
Pleasant Valley Rapids Campground
Pleasant Valley Ranch Airstrip
Wells Canyon
Buckpasture Gulch
Pittsburg Landing Airstrip
Circle C Ranch
Hells Canyon Scenic Byway
Hells Canyon National Recreation Area
Hells Canyon Wilderness
Forest Boundary
Wallowa-Whitman National Forest
Snake River
Pittsburg Creek
Pittsburg Saddle
Pittsburg Campground
Pittsburg Landing Campground
Pittsburg Bar Campground
Pittsburg Landing Airstrip
Pittsburg Bar Airstrip
Pittsburg Landing Boat Ramp
Pittsburg Landing Boat Ramp
Pittsburg Landing Boat Ramp

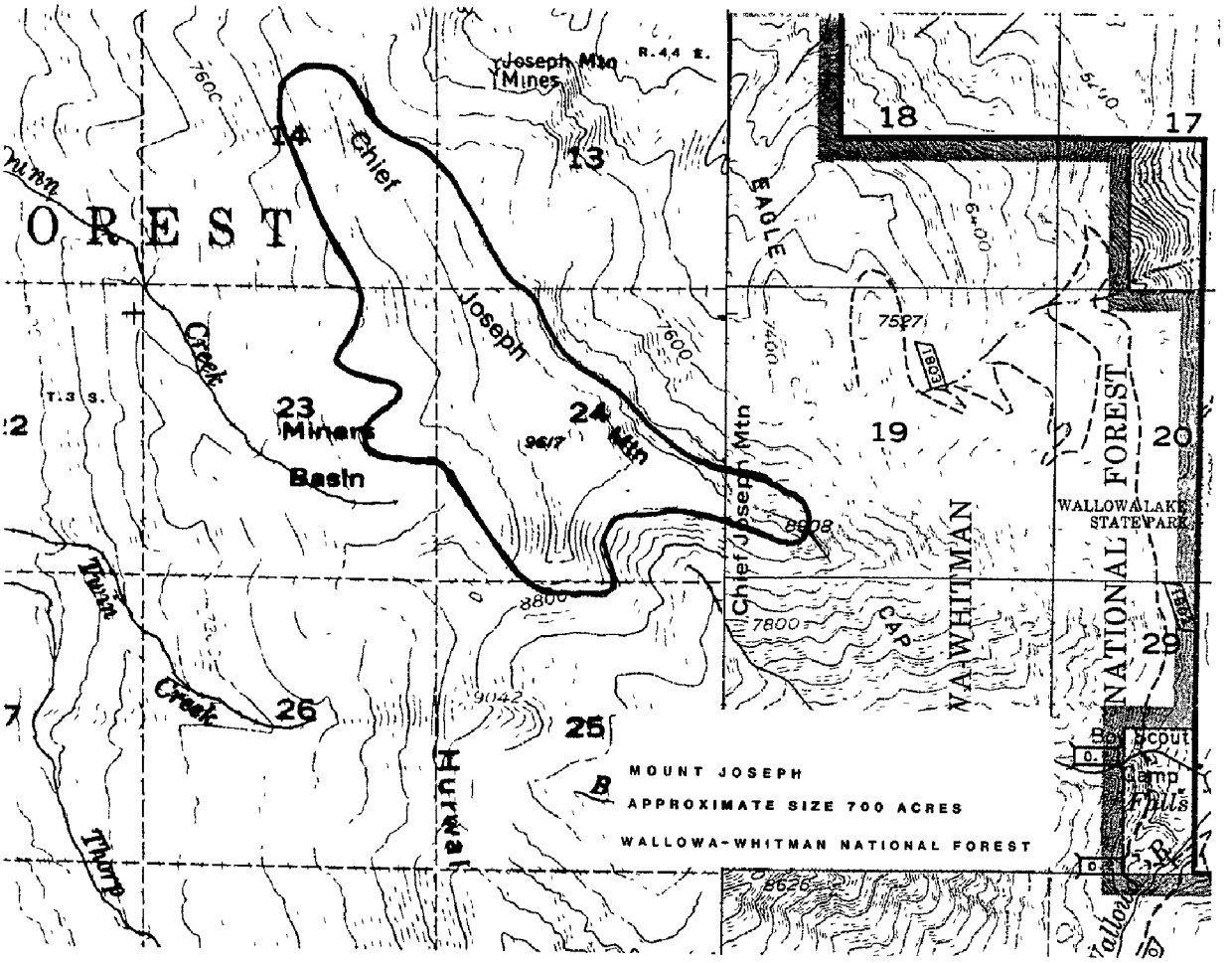

Sluice
Creek
HELLS
29
32
Stuckney Basin
3
NEZ
4388
Sheep Creek
Point
10
Buck Park
Weinheimer
Gulch
Goat
BM
Bills
Creek
5870
Bear
16
15
NATIONAL
5
SNAKE
RIVER
21
McGaf
Basin
BILLS CREEK
APPROXIMATE SIZE 40 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
McGaffie
Cabin
Bernard

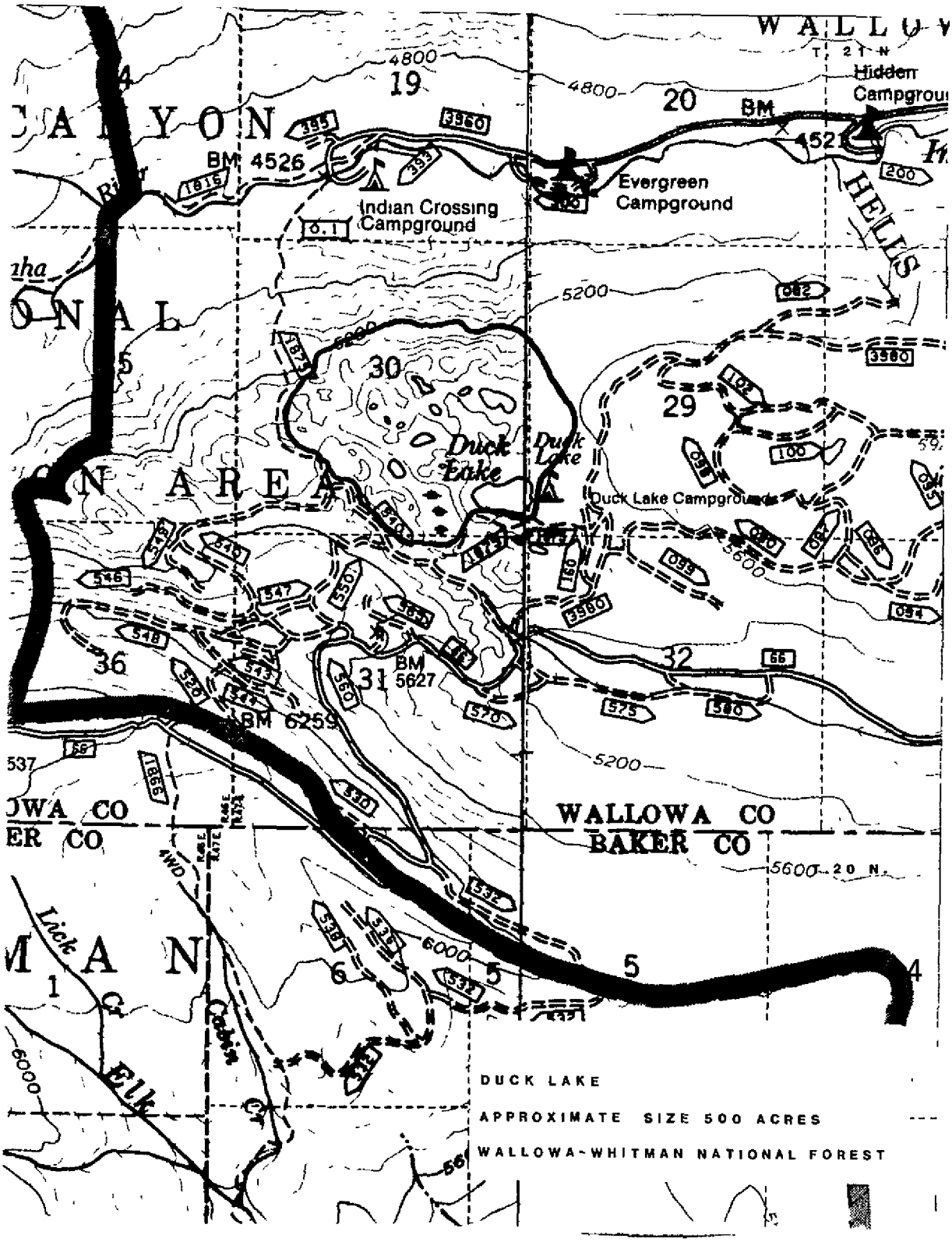

Little Bar
Corridon
Creek
Hutson
High Bar
IDAHO CO
NEZPERCE NATIONAL
NELS CANYON NATION
Low Saddle
Willow Cr
Saddle
Gulch
McCallon Ridge
Creek
Yreka Creek
Steep
HELL
ALUM BEDS
APPROXIMATE SIZE 600 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
RECREATION
LINE
BM
34
35
12
11
14
13
23
24
26
15
10
1244
1253
2800
3200
3600
4800

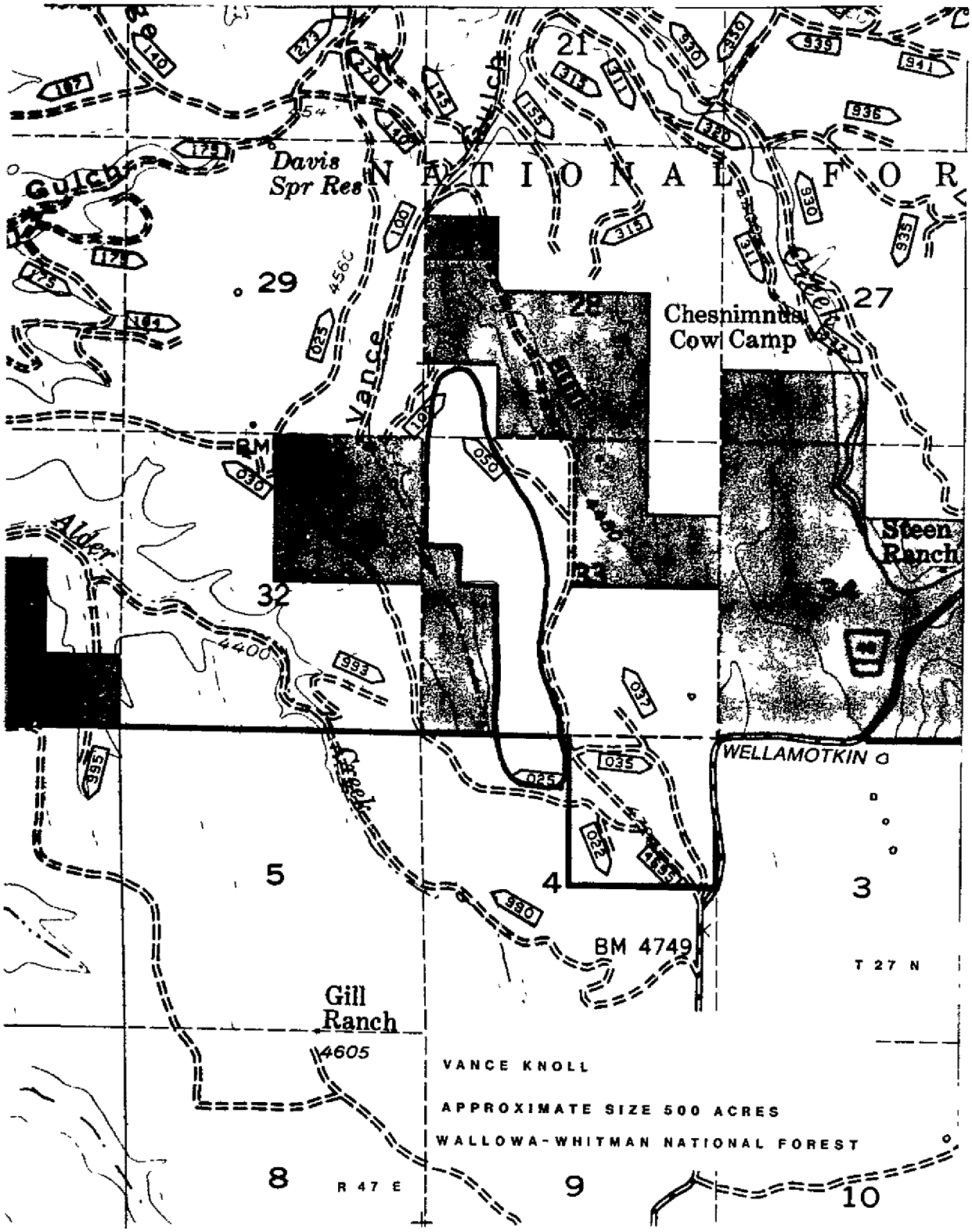

LITTLE GRANITE
APPROXIMATE SIZE 6,000 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
NEZ PERCE
HELLS CANYON
NATIONAL RECREATION
NATIONAL FOREST
Three Creek Saddle
Hibbs Cow Camp
Saddle Spring
Granite Creek
Little Granite Creek
Slaughter Gulch
Chimney Saddle
Potato Hill
Devils Throne
Mt Behal
Baldy Lake
Quad Lake
Echo Lake
Rock Island Lake
Basin Lake
Shelf Lake
Lily Pad Lake
He Devil Lake
Appendix Lake
Triangle Lake
Purgatory Lake
Twin Imps
Rocky Bar
Butler Bar
Hibbs Cabin
Granite Creek
Devils Run
Devils Throne Trail
Seven Devils
Freezer
Snake River

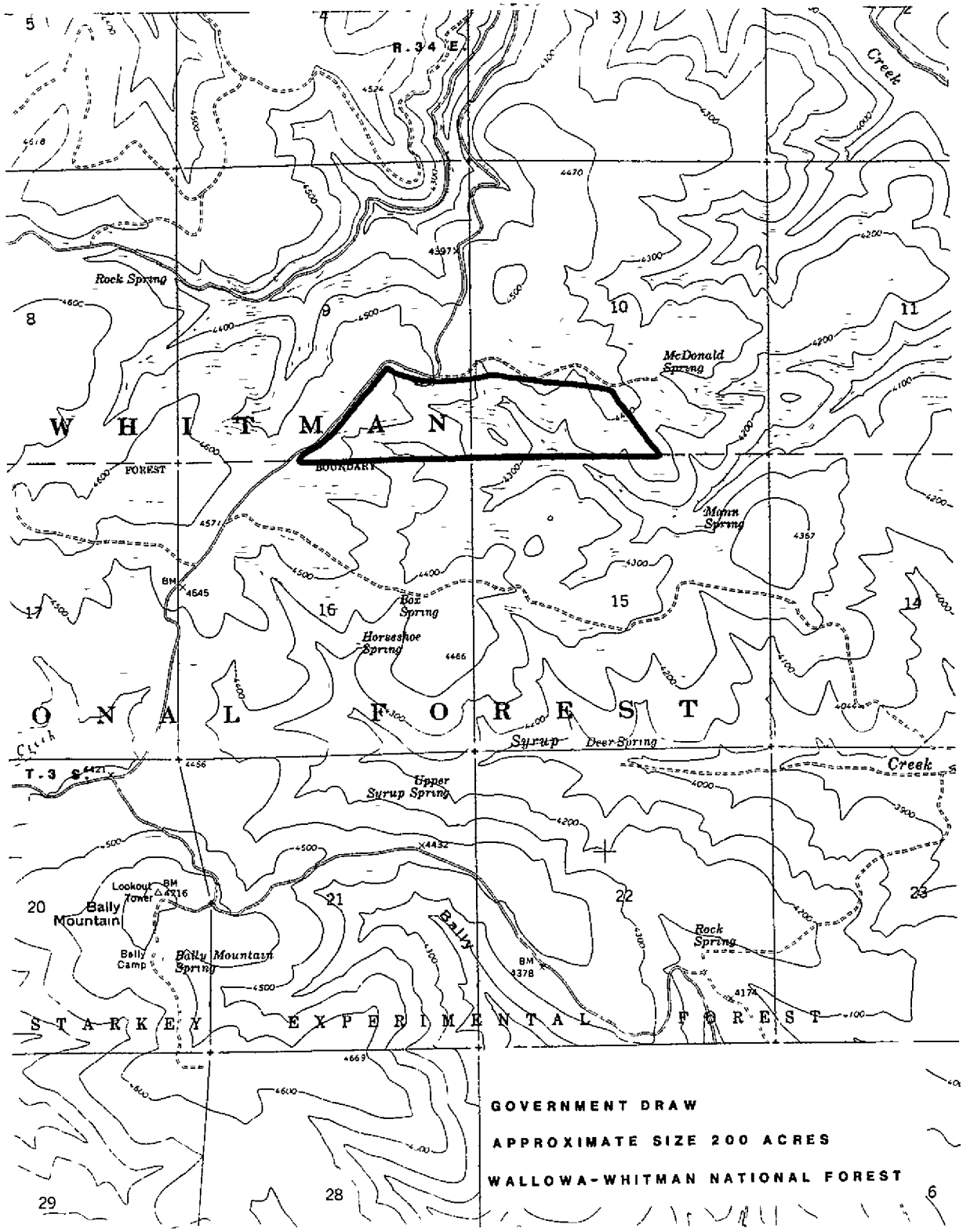

CRAIG MOUNTAIN LAKE
APPROXIMATE SIZE 170 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
Craig Mtn
Ice Lake
Razz Lake
Lily Lake
Lee Lake
Craig Lk
Adam Cr
Wallowa
Divide
Hurwal
Thorp Cr
Creek
River
T.22 N
R.44E

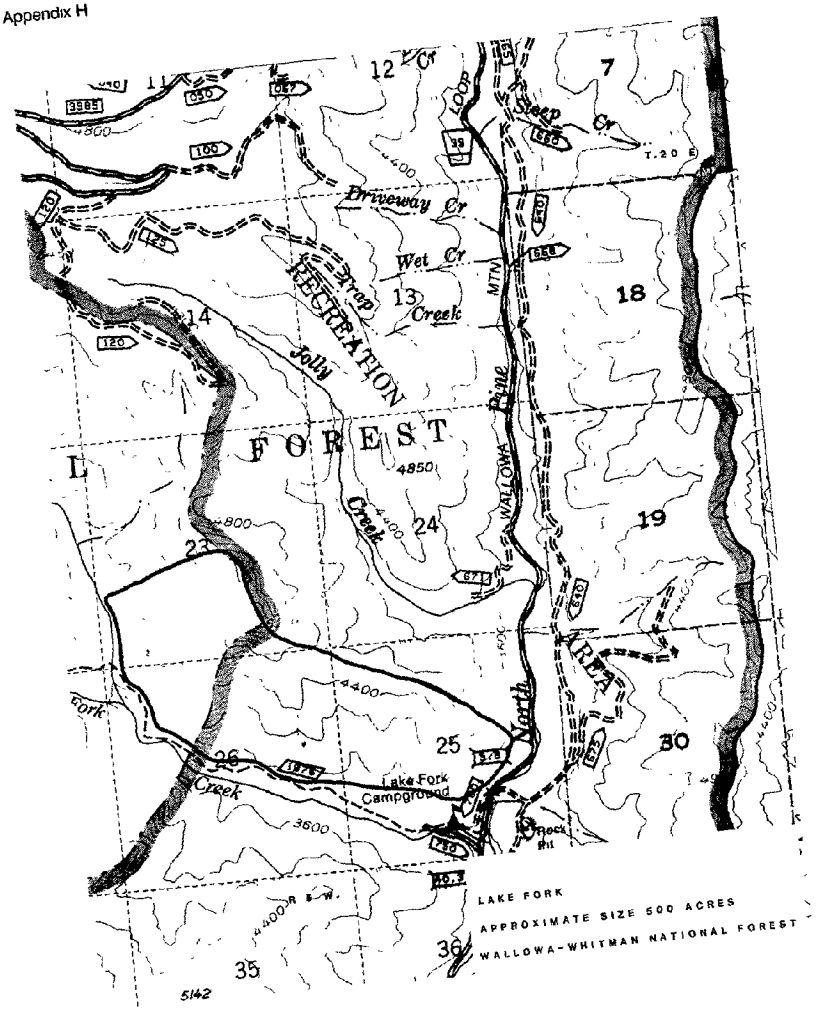

Matterhorn
Ice Lake
Adam
R.44 E.
A WHITMAN
Craig Mt
9204
Creek
15
14
13
9333
Razz Lake
T.22 N.
AL FOREST
22
23
Lily Lake
24
Unit La
Horseshoe Lak
1821
1807
Craig L
Crescent L
Lee Lake
1810
Douglas L
E CAP Basin
Creek
26
27
Lake
25
Lake
1810A
1810
Sunshine Lake
Moccasin Lake
1805
1810
Mirror Lake
WEST RAZZ LAKE
APPROXIMATE SIZE 50 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
34
35
36

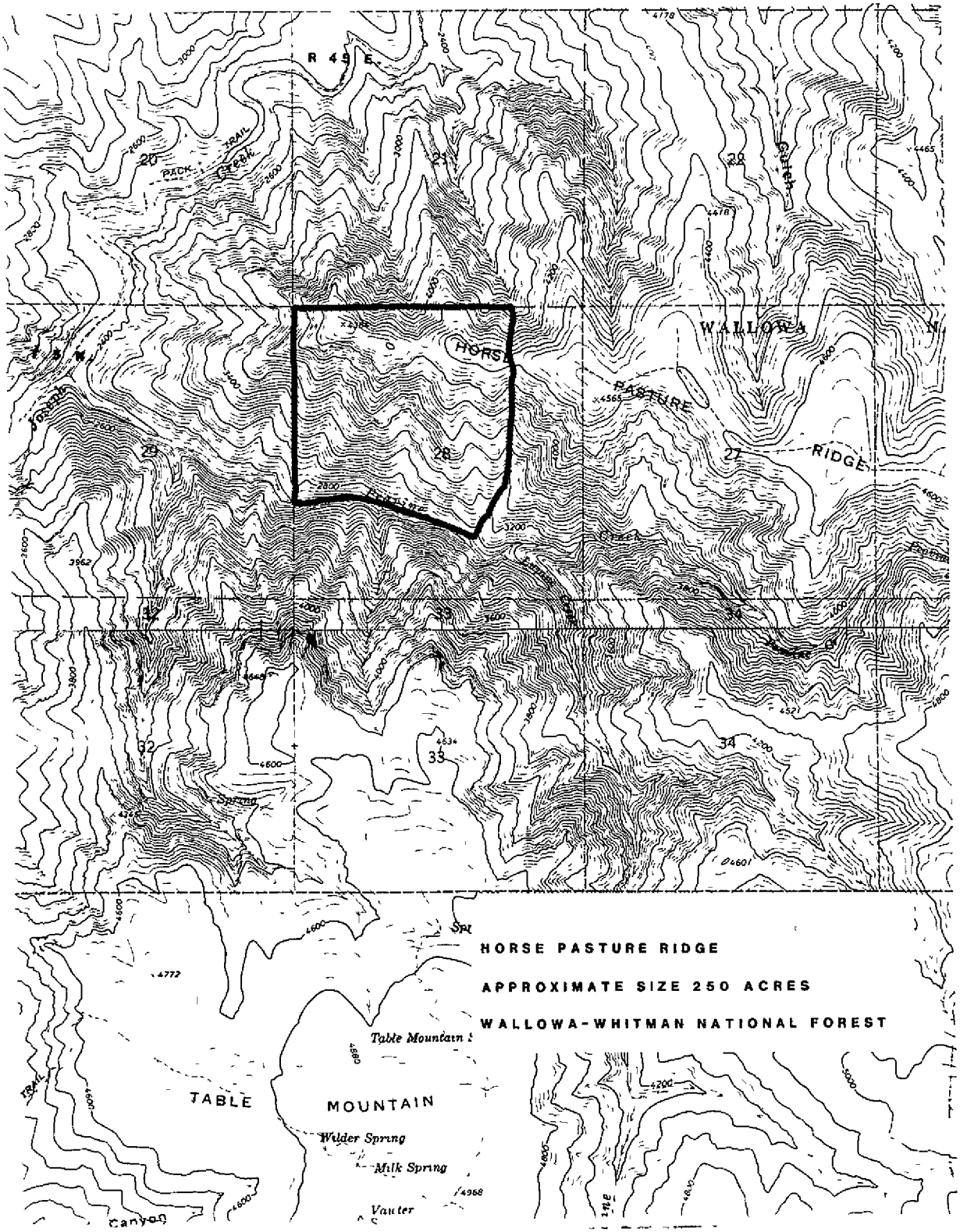

Joseph Mtn
Mines
R.44 E.
18
17
13
Chief
Joseph
EAGLE
7527
TRAIL
7600
7400
6400
Creek
T.3 S.
23
Miners
Basin
24
Mtn
9617
19
20
Chief Joseph Mtn
8808
WALLOWA LAKE
STATE PARK
NATIONAL FOREST
WALLOWA-WHITMAN
8800
7800
CAMP
TRAIL
Twin
Creek
26
9042
25
Hurwal
Scout
Camp
Falls
MOUNT JOSEPH
APPROXIMATE SIZE 700 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
5626
Thorn

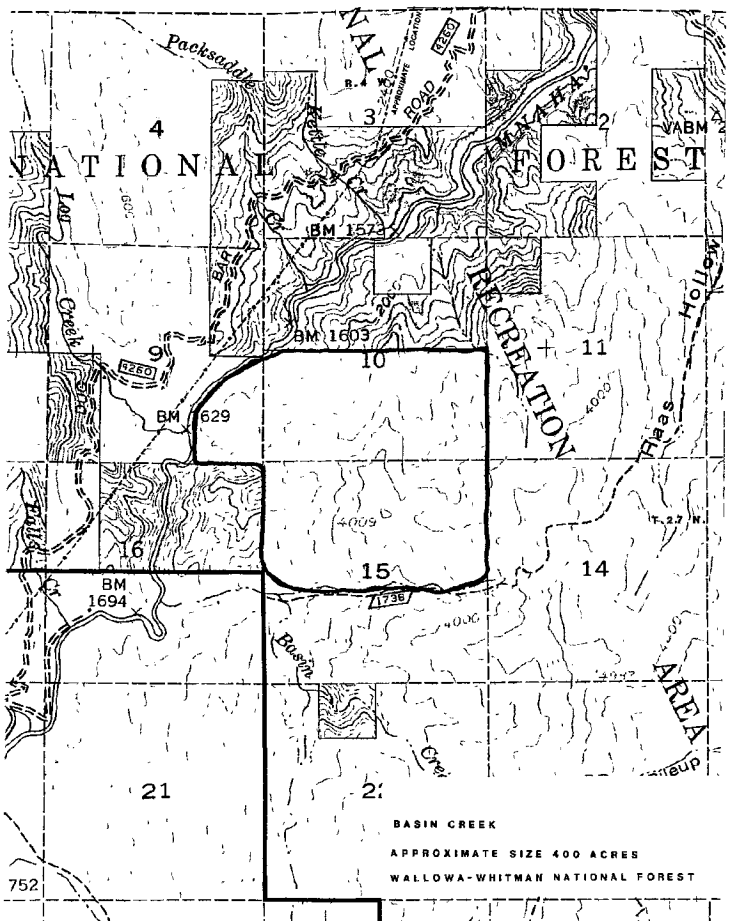

Indian Crossing Campground
Evergreen Campground
Duck Lake Campground
Hidden Campgrou
BM 4526
BM 5627
BM 6259
Duck Lake
WALLOWA CO
BAKER CO
DUCK LAKE
APPROXIMATE SIZE 500 ACRES
WALLOWA-WHITMAN NATIONAL FOREST

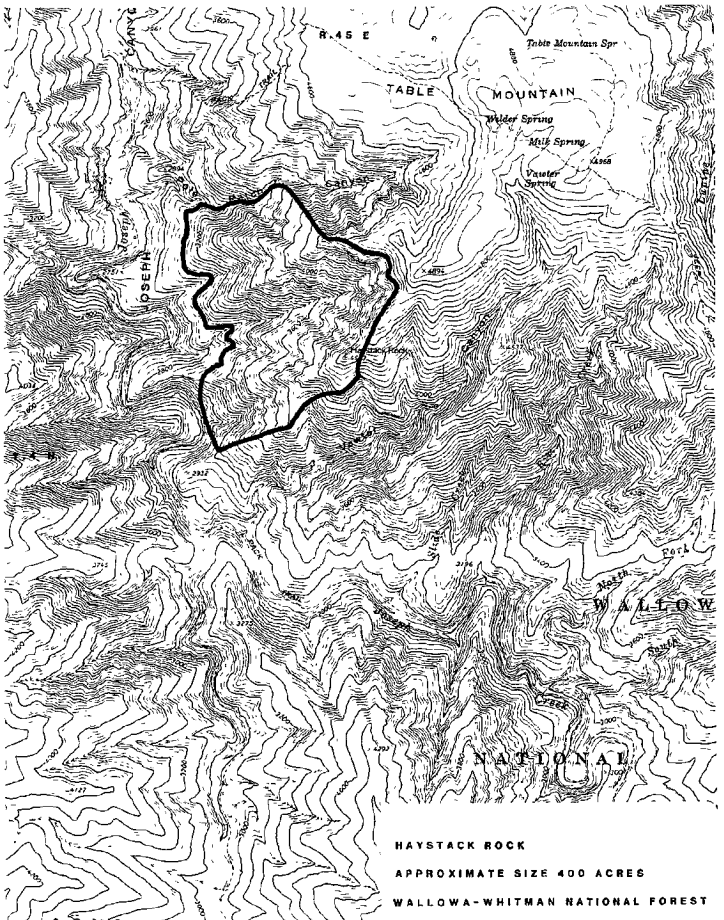

Davis Spr Res
NATIONAL FOR
Chesnimnus Cow Camp
Steen Ranch
Vance
Alder
WELLAMOTKIN
BM 4749
Gill Ranch
4605
4400
VANCE KNOLL
APPROXIMATE SIZE 500 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
T 27 N
R 47 E
21
29
28
27
32
5
4
3
8
9
10

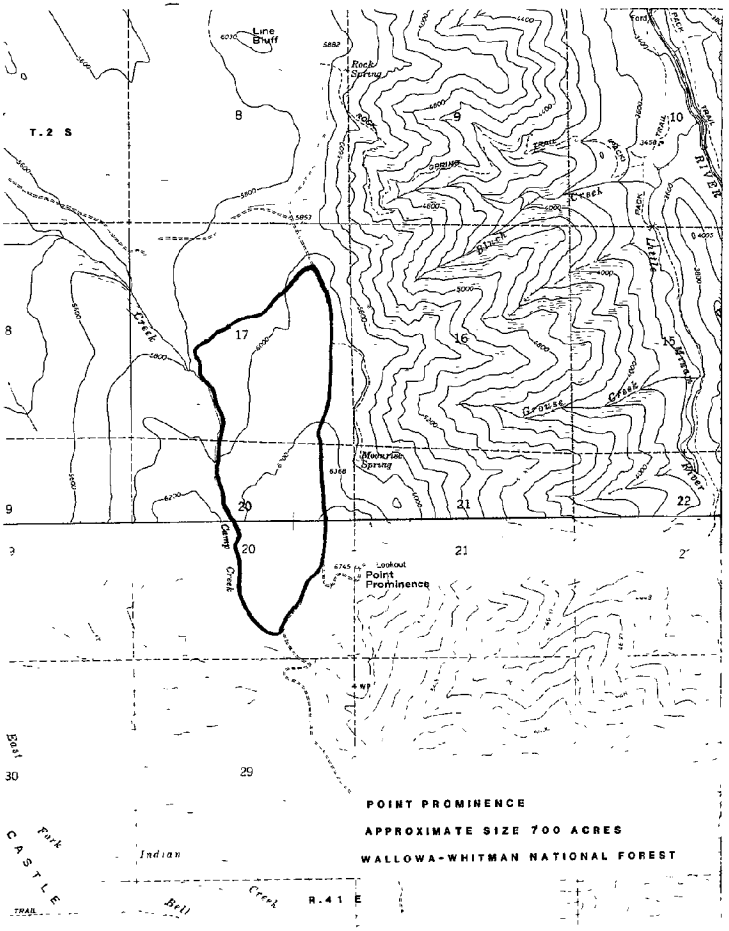

R. 34 E.
Rock Spring
McDonald Spring
W H I T M A N
FOREST
BOUNDARY
Mann Spring
Box Spring
Horseshoe Spring
O N A L F O R E S T
Syrup
Deer Spring
Upper Syrup Spring
Creek
T. 3 S.
Lookout Tower
Bally Mountain
Bally Camp
Bally Mountain Spring
Bally
Rock Spring
S T A R K E Y E X P E R I M E N T A L F O R E S T
GOVERNMENT DRAW
APPROXIMATE SIZE 200 ACRES
WALLOWA-WHITMAN NATIONAL FOREST

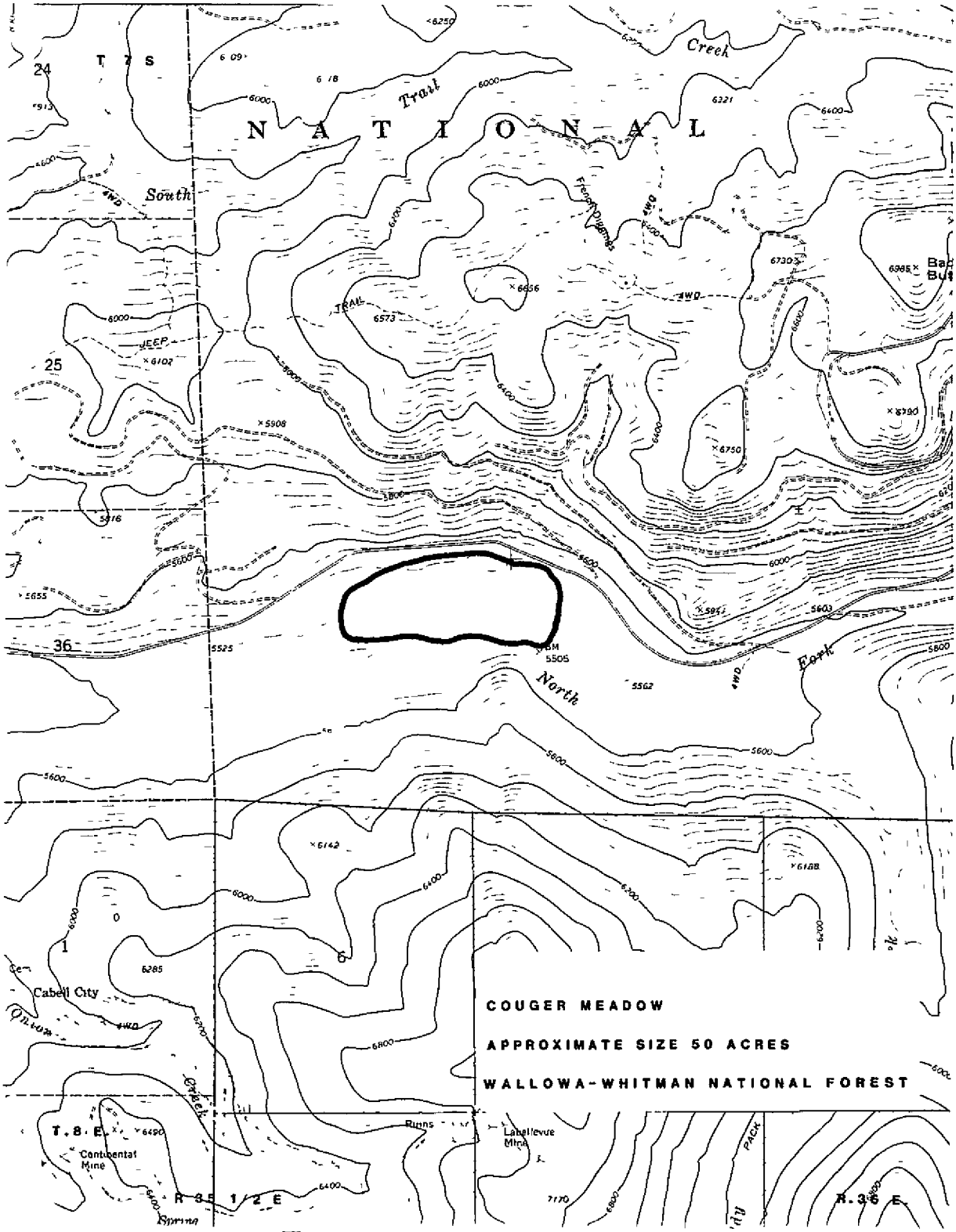

12
Cr
7
Cr
Driveway Cr
Wet Cr
Creek
18
13
14
Jolly
Creek
FOREST
4850
24
19
23
Creek
WALLOWA
Pine
North
Fork
25
30
26
Lake Fork
Campground
Creek
3600
Rock
Pit
LAKE FORK
APPROXIMATE SIZE 500 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
35
36
5142

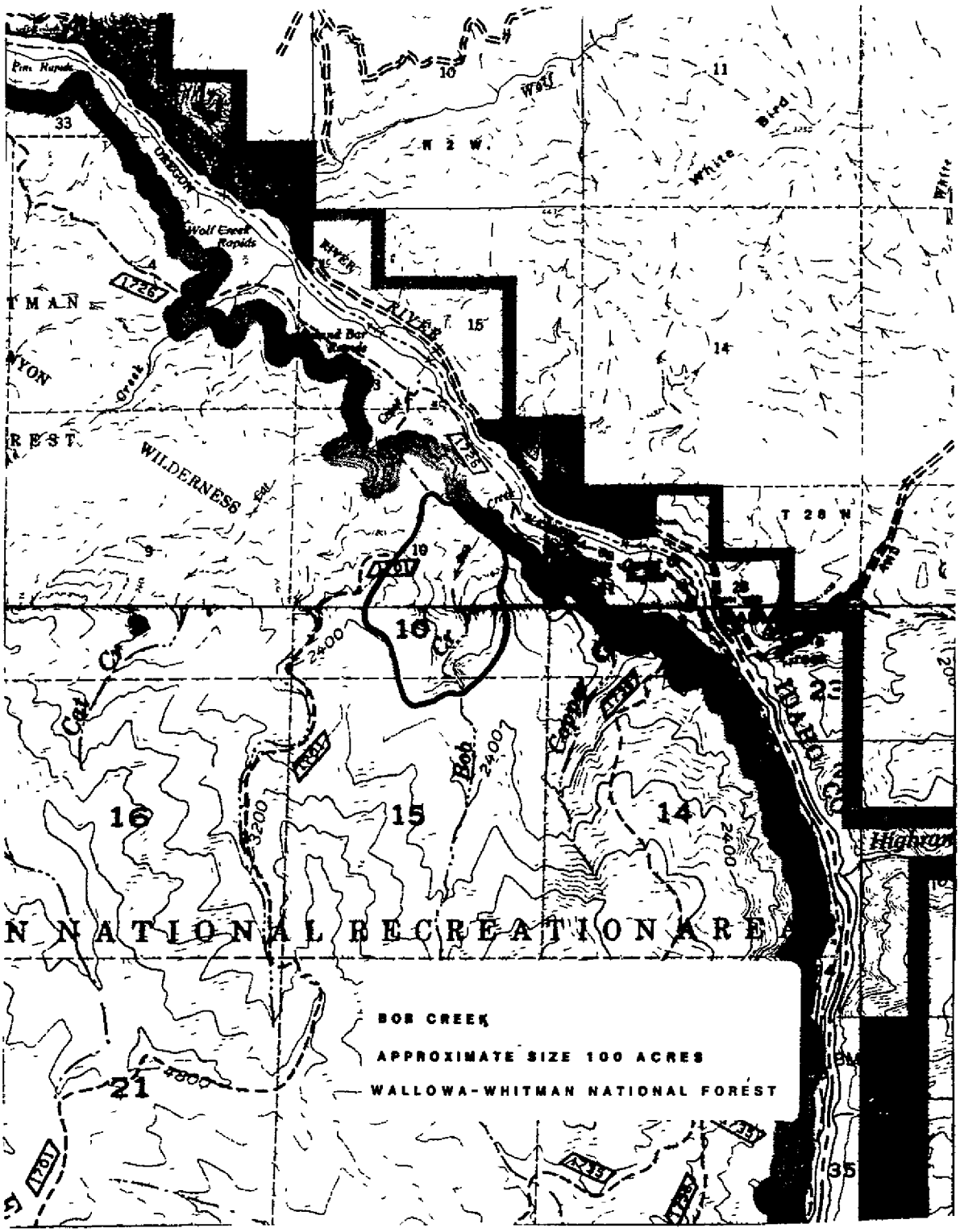

HORSE PASTURE RIDGE
APPROXIMATE SIZE 250 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
R 45 E.
T 3 N.
HORSE PASTURE
WALLOWA
RIDGE
TABLE MOUNTAIN
Wilder Spring
Milk Spring
Table Mountain
Canyon
PACK TRAIL CREEK
Spring

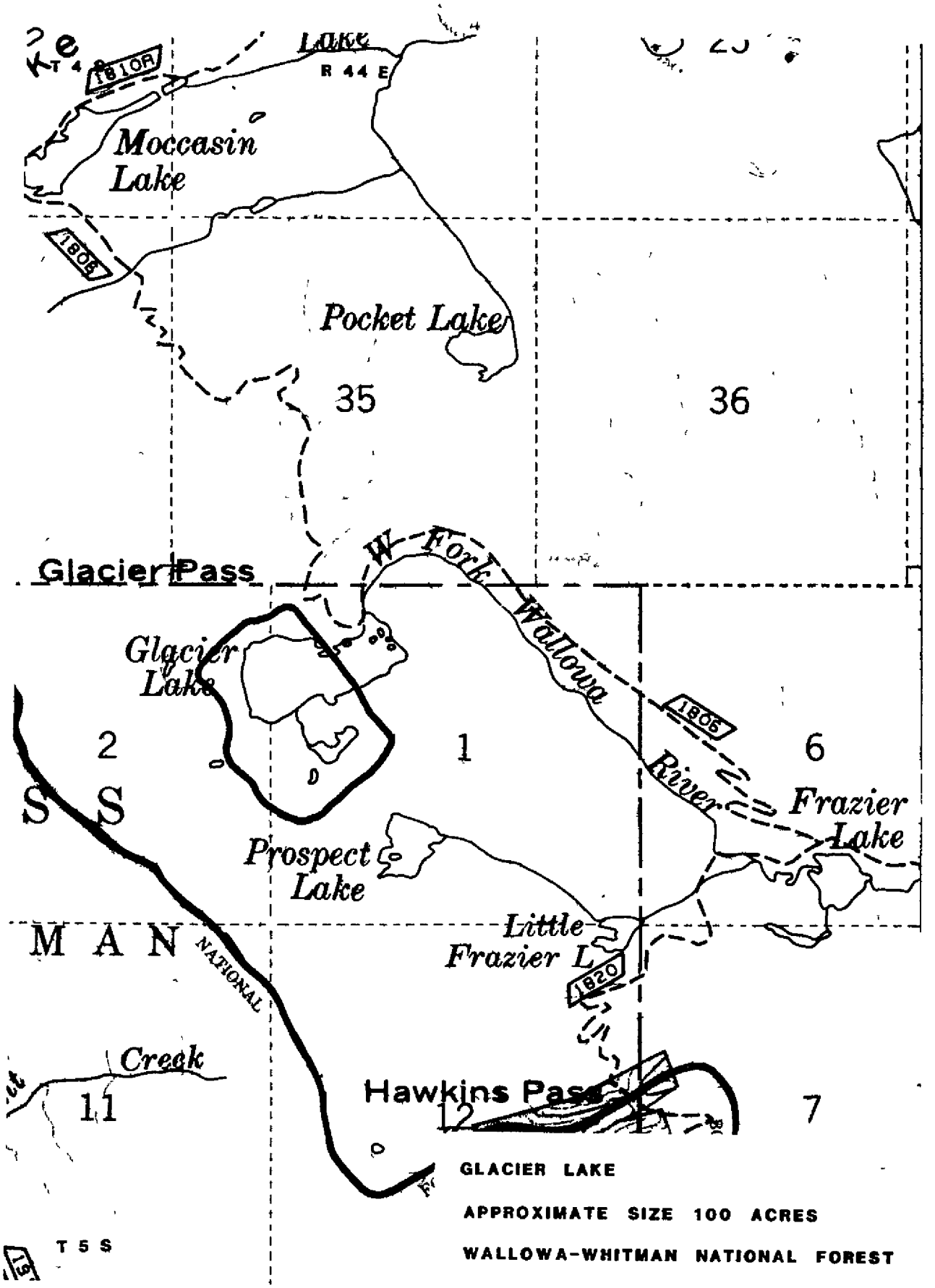

Packsaddle
4
NATIONAL
FOREST
3
2
ABM
Low
BM 1574
BM 1603
RECREATION
Hollow
Creek
9
10
11
BM 629
Haas
16
15
14
BM
1694
Basin
Creek
AREA
21
2
BASIN CREEK
APPROXIMATE SIZE 400 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
752

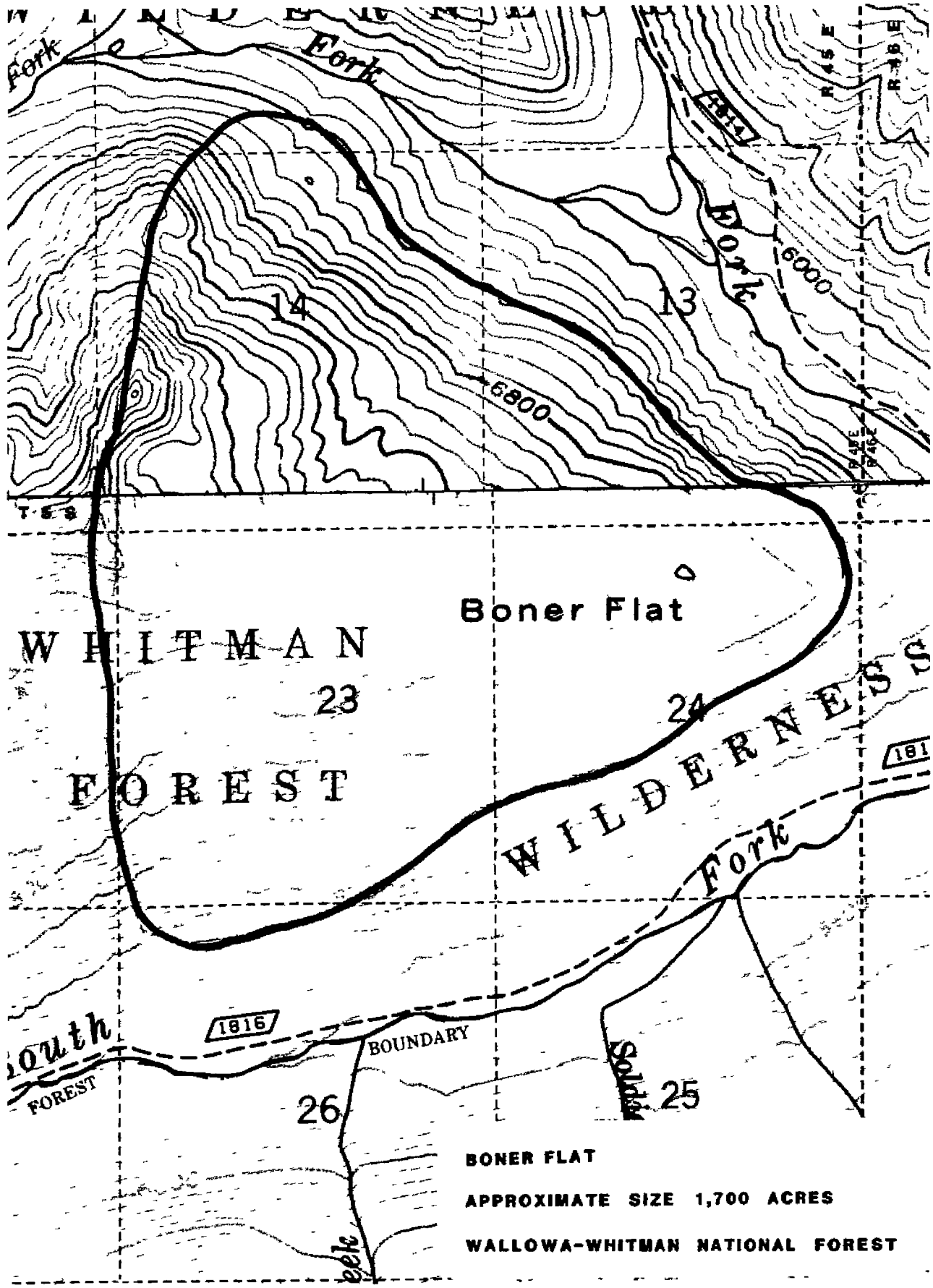

R.45 E
TABLE
MOUNTAIN
Table Mountain Spr
Milder Spring
Milk Spring
Vautier Spring
Lake
JOSEPH
Canyon
Creek
North
Fork
WALLOW
South
NATIONAL
HAYSTACK ROCK
APPROXIMATE SIZE 400 ACRES
WALLOWA-WHITMAN NATIONAL FOREST


T. 2 S
R. 41 E
Line Bluff
Rock Spring
Mackinaw Spring
Lookout
Point Prominence
Grouse Creek
Indian Creek
Bell Creek
Eagle Fork
CASTLE TRAIL
RIVER
POINT PROMINENCE
APPROXIMATE SIZE 700 ACRES
WALLOWA-WHITMAN NATIONAL FOREST


COUGER MEADOW
APPROXIMATE SIZE 50 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
N A T I O N A L
Trail
South
North
Fork
Creek
Cabell City
Continental Mine
Labellevue Mine
T. 8 S.
T. 8 E.
R. 35 1/2 E.
R. 36 E.
24
25
36
1
6


BOB CREEK
APPROXIMATE SIZE 100 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
WILDERNESS
RIVER
T 28 N
N NATIONAL RECREATION ARE
Bob
Cow
Highway


Lake
R 44 E
1810R
Moccasin Lake
1805
Pocket Lake
35
36
Glacier Pass
W Fork Wallowa
Glacier Lake
1805
River
2
1
6
Frazier Lake
Prospect Lake
Little Frazier L
1820
NATIONAL
Creek
11
Hawkins Pass
12
7
GLACIER LAKE
APPROXIMATE SIZE 100 ACRES
WALLOWA-WHITMAN NATIONAL FOREST
T 5 S


Fork
Fork
6000
6800
14
13
T 5 S
R 4 E
R 5 E
Boner Flat
WHITMAN
23
24
FOREST
WILDERNESS
181
Fork
1816
BOUNDARY
FOREST
26
25
BONER FLAT
APPROXIMATE SIZE 1,700 ACRES
WALLOWA-WHITMAN NATIONAL FOREST

APPENDIX I

Potential Wild and Scenic Rivers

APPENDIX I

POTENTIAL WILD AND SCENIC RIVERS

This appendix for the Draft Environmental Impact Statement contained descriptions and eligibility determinations for streams on the Wallowa-Whitman, outside wilderness and the Hells Canyon National Recreation Area, which the Forest Service considered eligible for possible additions to the National Rivers System Shortly thereafter, congressional consideration of a Wild and Scenic Rivers Act for Oregon began and these deliberations included all of the streams that had been shown in this appendix as well as others in wilderness and the Hells Canyon NRA.

The Omnibus Oregon Wild and Scenic Rivers Act, which was signed by the President on October 28, 1988, added nine streams within the Forest to the system They are all or portions of the North Powder, North Fork John Day, Grande Ronde, Minam, Lostine, Joseph Creek, Imnaha, south Fork Imnaha, and Eagle Creek These additions, plus the Snake River which was added to the system in 1975, accounts for ten wild and scenic rivers on the Forest - a total of 269 miles As required by the Wild and Scenic Rivers Act, river corridor boundaries and river management plans will be established via separate NEPA analyses tiered to the Forest Plan.

Because of the foregoing, detailed descriptions of the river segments are no longer necessary. This explanation is provided to maintain continuity between the draft and final documents For further information, see Chapters III and IV of the Final Environmental Impact Statement.

APPENDIX J

Minerals

APPENDIX J

MINERALS

ISSUES, CONCERNS, OPPORTUNITIES

Although limited in areal extent, the surface disruption caused by the extraction of mineral resources sometimes causes a great controversy on the National Forest. The considerable undeveloped mineral potential of the region provides a significant employment opportunity.

Concern about the possible environmental damage that could occur from mineral development (particularly open-pit or placer mining) has been repeatedly voiced by the public. Today, mineral developers are confronted with a number of environmental protection laws and must restore the land to a usable form on completion of their operations Environmental protection is monitored by federal and state agencies.

The Mining and Minerals Policy Act of 1970 states

> " it is the continuing policy of the Federal Government to foster and encourage private enterprise in (1) the development of economically sound and stable domestic mining [and] minerals ... industries, [and] (2) the orderly and economic development of domestic mineral resources [and] reserves ... to help assure satisfaction of industrial [and] security needs "

Many support this position based on a desire to maintain a favorable balance of trade, to provide for the national defense, and to support the local economy. Since the economics of mineral extraction is based almost entirely on external factors, there is little the Forest can do to encourage development other than to keep areas of mineral potential open and to make administrative processing of mineral activities as efficient as possible

A continuing concern of Forest management is mining law compliance. Occupancy of structures on mining claims provides a case in point Under existing law, the holder of a valid claim may erect structures necessary for mineral development However, there have been instances of structures being built and occupied on mining claims and being used for purposes unrelated to mining Abuses of this sort have been greatly reduced in recent years, and the effort is still underway to correct them

Mineral resources are frequently located in areas which are valued for timber production, recreation, wildlife, and scenery The axiom that "gold is where you find it" applies to all other minerals as well. As long as there is a demand for minerals, there will be pressure to explore for and develop them. As a land management agency, the Forest Service must make sure adequate surface protection measures are included for the extraction of minerals and subsequent reclamation of National Forest land.

CURRENT SITUATION

Locatable Minerals

Locatable mineral deposits on public domain lands may be prospected for and extracted under the 1872 mining law, as amended and supplemented Administration of the general mining laws is the responsibility of the Bureau of Land Management, within the Department of the Interior. A 1957 Memorandum of Understanding between the Bureau of Land Management and Forest Service provides for joint administration of the mining laws on National Forest System lands Regulations covering surface use of the National Forests under the mining laws were promulgated in 1974 to provide for orderly development of locatable mineral resources and for subsequent reclamation of the land.

The Forest is in the heart of the most productive gold and silver region in the State of Oregon Other metals including copper, lead, zinc, chrome, mercury, and antimony have also been produced in the Forest vicinity Nonmetallics including chemical grade limestone and perlite occur in significant quantities, and have been produced. Other nonmetallics which may have potential include bentonite, diatonite, and talc. Table J-1 lists metals and minerals found on the Forest and indicates their potential for development Table J-2 shows mineral production estimates for northeastern Oregon and the general area of the Wallowa-Whitman National Forest (including administered lands on the Idaho side of Hells Canyon). Both lode and placer mines have made substantial contributions to total production figures. At 1983 prices, northeastern Oregon's historic mineral production would be worth over $1.5 billion. Historic mineral production from the vicinity of the Forest would be worth nearly $800 million.

Although metallic mineralization occurs in numerous areas across the Forest, the most productive deposits have been found in pre-Tertiary rocks on the margins of Mesozoic granitic intrusives, including the Bald Mountain batholith, the Wallowa batholith, the Cornucopia stock, and the Vinegar Hill stock. The most productive lode gold mine in the state of Oregon, the Cornucopia Mine, is located 12 miles north of the town of Halfway on the south side of the Wallowa Mountains, on the southeast margin of the Cornucopia stock The North Pole-Columbia lode at the old townsite of Bourne on the southeastern margin of the Bald Mountain batholith supported several mines The lode was the largest single gold producing structure in Oregon

Most of the mining activity in the area was stopped in 1942 when War Production Board Order L-208 closed all precious metals mines Increased operating costs and a fixed gold price, together with the substantial expenditures necessary to reactivate mines neglected for several years prevented the reopening of all but a few precious metals mines after the war Only recently, with the increase in gold and silver prices, has the area re-emerged as a focus of mining interest There are currently thousands of lode and placer claims in the mineral belt of northeast Oregon and western Idaho

Nonmetallics including chemical grade limestone and perlite occur in significant quantities, and have been produced. Other nonmetallics which may have potential include bentonite, diatonite, and talc.

All lands on the National Forest are open to mining except those areas specifically withdrawn from mineral entry The Wilderness Act of 1964 allowed prospecting for locatable minerals and location of mining claims until December 31, 1983 The passage of that date has withdrawn the Eagle Cap Wilderness Area from mineral entry, and the Oregon Wilderness Act of 1984 has withdrawn considerable additional acreage A total of 965,100 acres of the Forest are now withdrawn for wilderness areas, administration and recreation sites, and roadside zones Of these, 193,600 are of known mineral potential.

Major withdrawn areas include:

Hells Canyon National Recreation Area	596,400 acres
Eagle Cap Wilderness Area	345,900 acres
Monument Rock Wilderness Area	7,300 acres
North Fork John Day Wilderness -	
Baldy Creek Unit	15,200 acres
North Fork Unit	300 acres
	965,100 acres

Mining claims which predate withdrawal, including those within wilderness, may continue to be worked under the mining laws if they contain a valid discovery of a valuable mineral.

Table J-3 displays evaluation criteria used to delineate and categorize mineralized areas in the Forest vicinity. Figure J-1 shows the mineralized areas identified with this process New discoveries could change the assessment of potential, as well as identify new areas outside those shown in this assessment.

Leasable Minerals

Oil and Gas The Forest Service has no statutory responsibility to issue leases or permits on lands reserved from the public domain The Mineral Leasing Act of 1920 reserves this authority for the Secretary of the Interior The Federal Onshore Oil and Gas Leasing Reform Act of 1987 provides the Secretary of Agriculture with consent authority for issuance of oil and gas leases on National Forest lands This Act also provides that no permit to drill on an oil and gas lease may be granted without the analysis and approval of the responsible Forest Service official On acquired National Forest System lands, the Mineral Leasing Act for Acquired Lands of 1947 requires consent by the Secretary of Agriculture prior to leasing of the mineral estate

The Forest has not historically been considered favorable for oil and gas exploration Only recently has there been interest in obtaining leases in the vicinity. Recently, leases and lease applications covered a significant part of the Forest, including land outside the area considered favorable by the U. S. Geological Survey (Figure J-2). However, interest in obtaining oil and gas leases has waned considerably, many applications were withdrawn, and most leases were terminated after one year.

Coal. In respect to coal, the Mineral Leasing Act of 1920 was amended by the Federal Coal Leasing Amendments Act of 1975. Subsequent to that Act, a coal exploration license or lease may not be issued without the consent of the surface managing agency, and without a listing of the terms and conditions under which consent is given.

A new, possibly extensive, coal field has been found near the communities of Flora and Paradise in northern Wallowa County Lignite coal seams occur in tuffaceous lacustrine and fluviatile sedimentary rocks between basalt flows of the Columbia River Group. Most of the coal-bearing strata have been found off Forest land. (Ferns, 1985)

FIGURE J-1
NONENERGY MINERAL AREAS

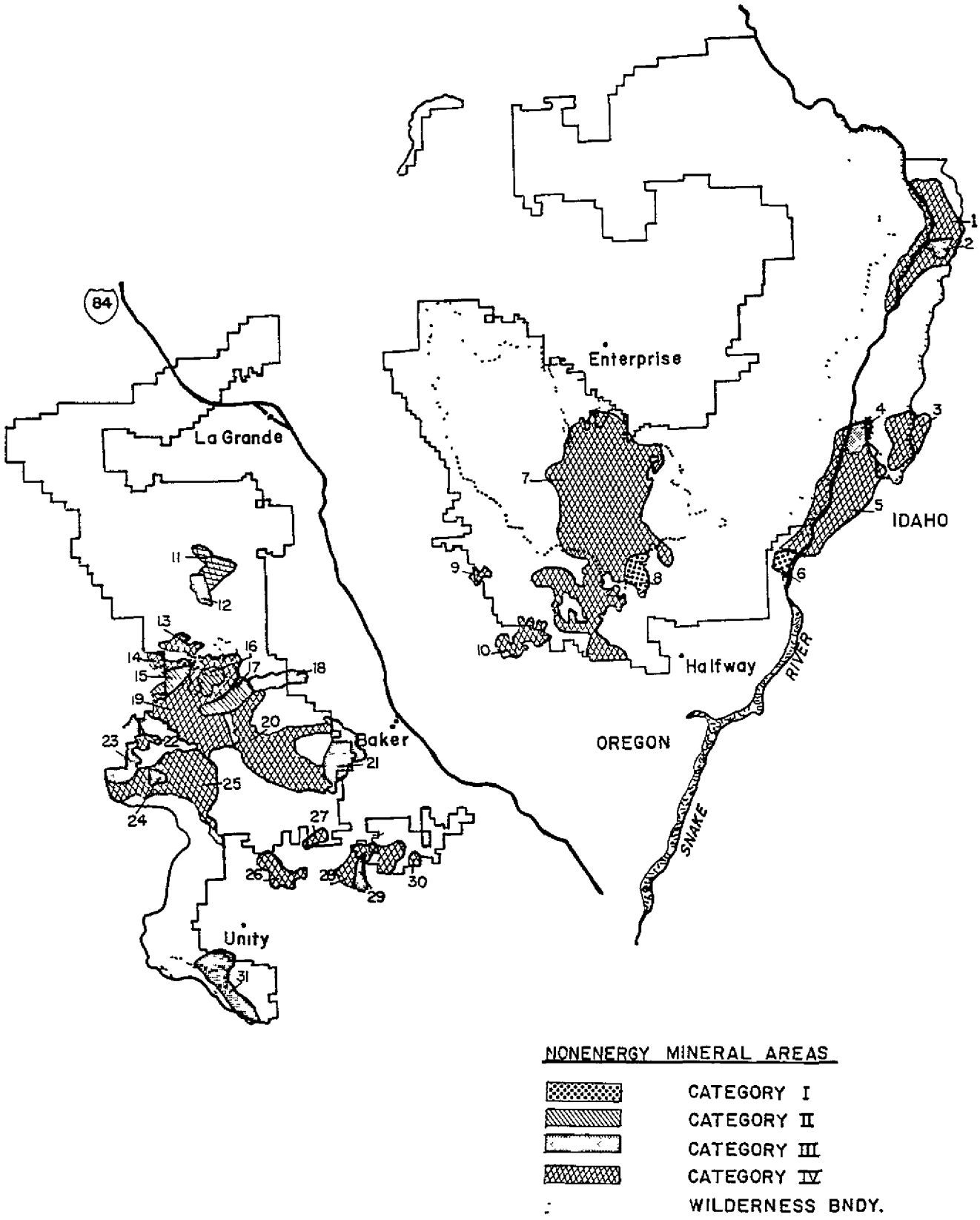
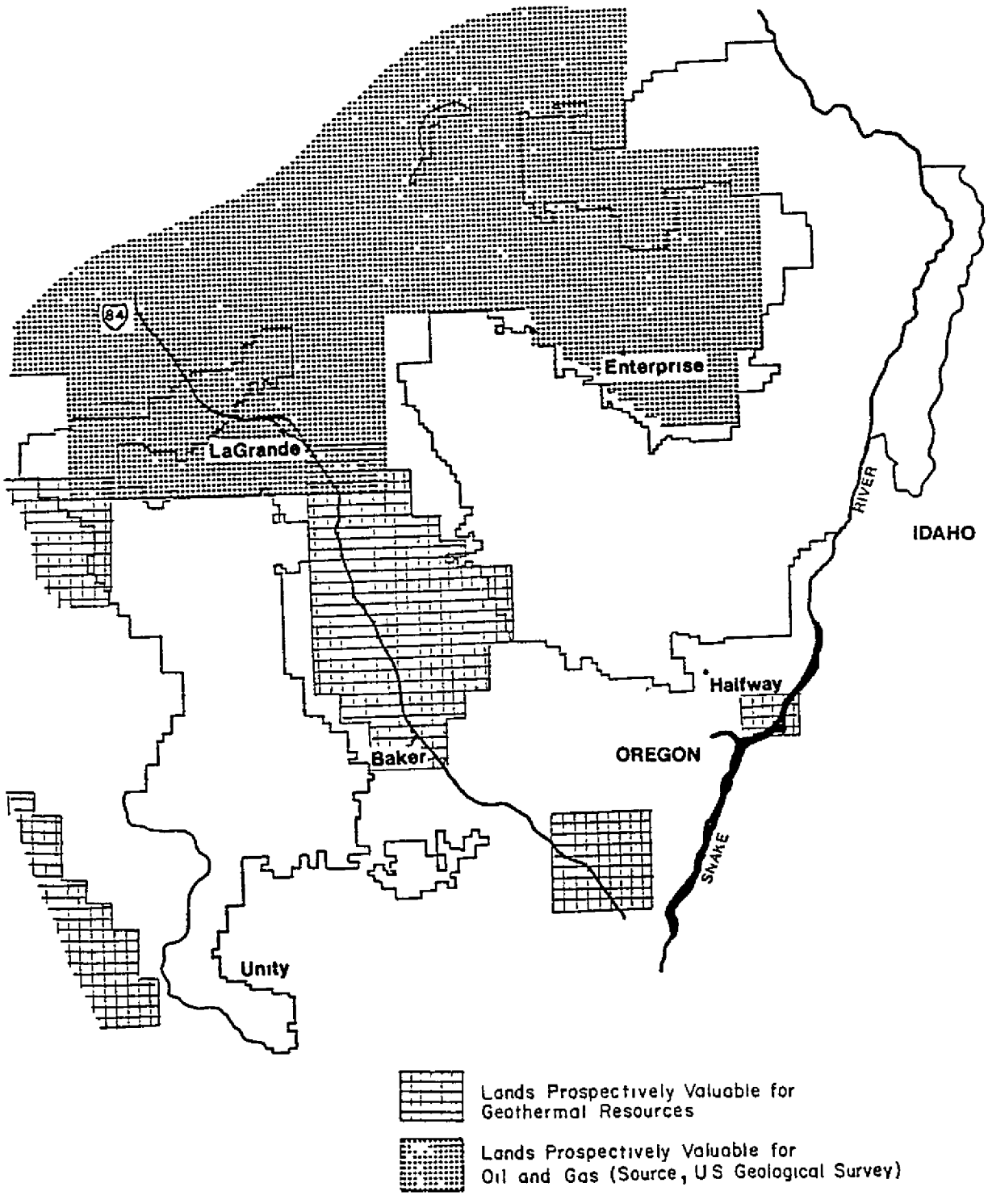


FIGURE J-2
LANDS PROSPECTIVELY VALUABLE FOR
GEOTHERMAL, OIL, AND GAS RESOURCES



A large program of exploratory drilling, sampling, analysis, and geologic mapping needs to be done before any assessment can be made as to the feasibility of extracting the coal Given a marketable deposit, environmental concerns of aquifer disruption and loss of topsoil productivity would still have to be addressed

Geothermal. Although a few hot springs are known to occur in and near the Forest, there does not presently appear to be a high potential for geothermal resource development There currently are no geothermal leases or lease applications within Forest boundaries The U S. Geological Survey considers some lands prospectively valuable for geothermal resources in the vicinity, some of which overlap the Forest boundaries (Figure J-2). Should an interest in geothermal exploration develop, the Geothermal Steam Act of 1970 requires that geothermal leasing on National Forest System lands be subject to the consent of, and conditions prescribed by the Secretary of Agriculture

Mineral Materials

The Forest Service may dispose of obviously common varieties of mineral materials such as cinders, building stone used for construction purposes, river rock, and rock or sand to be used for aggregate or road construction

Sand, gravel, crushed rock, building stone, limestone, clay, and similar materials occur within the Forest boundaries These are all low-unit-value materials which must be near transportation routes, and usually the point of consumption, to be utilized. A continuing need for some quantities of these materials can be anticipated, with increased demand during periods of growth The region has a history of producing very large amounts of cement

MANAGEMENT DIRECTION

Within the existing framework of the law, current management direction appears adequate, though action could be taken to better inform the public as to the rights of claim and lease holders, and of the benefits of mineral extraction However, this might increase the level of tension between those who advocate more mineral development and those who advocate less

It would be beneficial to better educate the public about the positive aspects of mining and to help counter the negative impressions left by some past operations As a land managing agency, the Forest Service is open to public scrutiny for administration of surface resource protection laws and under direction to keep land open to mineral exploration as much as possible

Table J-1
MINERALS AND METALS FOUND ON THE WALLOWA-WHITMAN FOREST

Mineral or Metal	Net Import Reliance	Major Foreign Source	Status on Forest
Manganese	98%	South Africa, Gabon, Brazil, France	Past test shipments small potential
Chromium	90%	South Africa, USSR, Zimbabwe, Turkey, Phillippines	Known occurrences, small potential
Cobalt	90%	Zaire, Belgium, Luxembourg, Zambia, Finland, Canada	Occurrence known
Platinum Group	89%	South Africa, USSR, United Kingdom	Minor placer byproduce
Asbestos	85%	Canada, South Africa	Known occurrence, small potential
Mercury	62%	Algeria, Spain, Italy, Canada, Yugoslavia	Few prospects, small potential
Zinc	62%	Canada, Mexico, Honduras, Spain	Production byproduct from precious metals mining
Tungsten	59%	Canada, Bolivia, Rep of Korea	Numerous prospects, small past production
Gold	56%	Canada, USSR, Switzerland	Over 3 5 million ounces produced in NE Oregon, much from W-W, considerable future potential
Silver	45%	Canada, Mexico, Peru, United Kingdom	Over 5 million ounces produced in NE Oregon, much from W-W, considerable future potential

Table J-1 (Cont.)
MINERALS AND METALS FOUND ON THE WALLOWA-WHITMAN FOREST

Mineral or Metal	Net Import Reliance	Major Foreign Source	Status on Forest
Antimony	43%	South Africa, China, Mexico, Bolivia	Small past production, limited potential
Vanadium	25%	South Africa, Chile, USSR	Minor occurrence in gold-quartz veins, insignificant potential
Copper	13%	Canada, Chile, Zambia, Peru	Nearly 10,000 tons produced in NE Oregon, most from W-W vicinity, limited potential
Cement	10%	Canada, Mexico, Bahamas	Past production, future potential
Lead	8%	Canada, Peru, Mexico, Honduras, Australia	Production by-product from precious metals mining
Molybdenum	Net Export		Numerous occurrences significant future potential

Table J-2
AREA MINERAL PRODUCTION

Total Production from Northeastern Oregon

3,526,300 oz. gold
5,111,900 oz silver
18,940,000 lb copper
312,000 lb. lead
41,000 lb zinc
20,000 lt. chrome ore
7,705,900 t cement
390,000 t lime
122 fl. mercury
Value at 1983 prices* $1,926 6 million

Total Production in the Vicinity of the Wallowa-Whitman National Forest and Administered Areas in Idaho

1,853,500 oz. gold
3,754,200 oz. silver
18,712,000 lb copper
312,000 lb. lead
41,000 lb zinc
390,000 t lime
3 fl. mercury
Value at 1983 prices*· $818 7 million

*1983 Prices

Gold·	$399.72/oz (Handy & Harman Average)
Silver·	$ 11.45/oz (Handy & Harman Average)
Copper·	$ 0 793/lb.
Lead:	$ 0.2167/lb
Zinc·	$ 0.4138/lb
Cement:	$ 54.83/ton
Lime.	$ 50 96/ton
Mercury	$322 44/flask
Chrome ore.	$ 50.00/long ton

Table J-3
EVALUATION CRITERIA FOR NONENERGY MINERALS

CATEGORY		I	II	III	IV	V
1	Potential for Substantial Development/ Production Within Ten Years	High	Moderately high	Moderate	Low knowledge	Very low based on current
2	Current Activity Level	Production or development in progress or pending investment decision	Comprehensive exploration, development likely May include some small scale production	Exploration programs which may include sampling, geochemical and geophysical surveys, geologic mapping, reconnaissance drilling May include some hobby-size producers	Sporadic exploration with occasional isolated intense programs by companies or prospectors	Occasional interest by prospectors
3	Land Position	Long-term maintenance of claims by established mineral companies/ individuals	Long-term	Intermittent by established mineral companies/ individuals, long-term by prospectors	Short-term by established companies/individuals Intermittent by prospectors	Sporadic
4	Geology	Known and favorable for development of significant ore deposits	Known and considered favorable from comparison with other producing districts	Not well known, but appears to have favorable characteristics	Not well known, some favorable characteristics	Either unknown or unfavorable
5	Reserve/Resource	Ore reserves established Will sustain significant production	Presence of, or strong potential for, substantial resource May include small reserves.	Potential for large resource is unknown Small resources, possibly some very small pockets of reserves	Some mineral occurrences, but not enough information to establish resources	Unknown

DESCRIPTIONS

The following descriptions apply to areas delineated on Figure J-1. Area boundaries were drawn on the basis of information gathered from the references at the end of the text Factors taken into consideration include the geology, historical production information, available sample data, and present mining claim records derived from Bureau of Land Management files. See Table J-3 for an explanation of the derivation of categories Note that Category V includes "all other" areas, both unknown and unfavorable for mineral deposits. It would be difficult to differentiate these areas on a map, since new discoveries sometimes result in mines being located in areas previously considered unfavorable

Auburn Creek - Category IV (Map No. 30)

This is a small area of perlite occurrences on Auburn Creek, southeast of Dooley Mountain within rhyolite of Tertiary age. (Gilluly, 1927; Evans, 1986) The perlite has been prospected in the past and is currently being surface mined

Baker - Category III (Map No. 21)

This area is located on the east slopes of Elkhorn Ridge, just west of Baker City, and includes the old Baker mining district. It is largely underlain by argillite and chert of late Paleozoic to Triassic age on the southeastern margin of the Jurassic or Cretaceous Bald Mountain batholith. Also included are areas of Permian gabbro and Jurassic or Cretaceous porphyry dikes. (Brooks and others, 1976) This has been primarily a placer gold area, although numerous lode gold prospects are known to exist. Known lode mineralization is confined to pockets along narrow northwesterly trending quartz veins and northeasterly striking shear zones (Gilluly, 1937)

Estimated past production -

Mine	Location	Production	(Refs)
Nelson Placer	Sec 8, T 9 S , R. 39 E.	$400,000	Brooks & Ramp, 1968
Tom Paine	Sec. 7, T. 9 S , R. 39 E.	70,000	Ibid.
Misc. Lode	2 or 3 other mines	30,000	Ibid
Total		$500,000	

Estimated metal output
24,000 oz. gold, 6000 oz of silver.

Hobby-size and commercial scale placer operations are seasonally active, and some lode prospects are being explored and developed on a small scale. Most of the present placer mining activity is along Elk Creek, with other more sporadic operations along California Gulch, Washington Gulch, and Griffin Gulch. Small scale exploration continues for high grade pockets on the lode deposits with limited success. Placer deposits remain the most likely target for serious mining ventures in the area.

Bald-Dooley - Category IV (Map No. 28)

This area covers a variety of mineral occurrences including gold, uranium, manganese, molybdenum, perlite, talc, asbestos, and building stone along the crest and south slope of a ridge which includes Bald Mountain and Dooley Mountain Country rock includes late Paleozoic- to-Triassic phyllite, chert,

01697

gabbro, and serpentinite, and Tertiary rhyolits Placer gold has been produced from Tertiary and Quaternary gravel deposits. Lode mineralization is associated with quartz stringers and lenses in the pre-Tertiary rocks. Numerous prospects are located in the area, but none have recorded any production The presence of placer gold in the streams and terraces indicates that the lodes or their eroded upper portions contained gold No production figures are available for the placer deposits

Low grade molybdenum occurrences have been identified in large alteration zones (Znanom, Evans, 1986) within the Tertiary rhyolite, along with a few uranium anomalies (Bernrd, Robbins, 1982) Gold-bearing gravels along Cow Creek were worked in the past, and the gravels along and above Pine Creek (covered separately) are still being mined It is likely that sporadic exploration will continue on the lode prospects, but development and production are unlikely in the near term Building stone, perlite, talc, and manganese are also present

Beaver Creek - Category IV (Map No. 22)

This small area is located between the settlements of Greenhorn and Granite, and is on the north margin of the old Greenhorn mining district It covers part of two separate limonitic quartz breccia zones in chert and argillite of late Paleozoic to Trassic age, and two patches of Tertiary gravel which are potentially gold-bearing (Brooks & others, 1982b, Ferns & others, 1983). There are prospects on the breccia zones, and at least one outcrop sample shows slightly anomalous gold values (0 7 ppm - Ore. Dept Geol files) There is little evidence of placer mining on the gravel deposits.

There is no indication of any past mineral production and there are presently only a few placer claims in the area. The indications of mineralization and the proximity to the Greenhorn area make it likely that the area will receive attention from lode and placer prospectors

Beaverdam - Category IV (Map No. 26)

This area is largely south of the Forest boundary in the vicinity of the town of Hereford Most of the area is underlain by Tertiary volcaniclastics and flows (Brown and Thayer, 1966) Exploration for epithermal gold deposits has recently been conducted in the area Occurrences of antimony and mercury minerals and some disseminated chalcopyrite are known to exist, but sufficient data are not available to estimate the mineral potential (DOGAMI file) There has been no mineral production from this area, but continued exploration may be expected Most activity will undoubtedly be outside the Forest boundaries

Blue Jacket - Category III (Map No. 2)

This area contains part of the old Crooks Corral mining district and is within the much larger Kirkwood Creek mineralized zone (described separately) It is located in the Kirkwood Creek and upper parts of the Kirby Creek and Corral Creek drainages on the Idaho side of Hells Canyon. The Blue Jacket Mine is the focus of attention, having a considerable resource blocked out in volcanogenic veins and lenses Company figures indicate 2 25 million tons of silver-copper-zinc ore (Wilden, 1979)

Past Production:

Mine	Location	Production	(Refs)
Blue Jacket	Sec 27, T. 26 N , R. 1 W	$3,100	Close & others, 1982, U S Bur Mines file

Estimated metal output
1 oz of gold; 1255 oz. of silver; 16,525 lb of copper.

The Blue Jacket Mine and adjacent area under active claims contain a substantial resource It is likely that an attempt will eventually be made to develop the deposit

Bourne - Category I (Map No. 17)

This area encompasses the old mining camp of Bourne, north of Sumpter, and includes the heart of the old Cracker Creek mining district. Most of this area is underlain by argillite and chert of late Paleozoic to Triassic age (Brooks and others, 1982a; Ferns and others, 1982) Jurassic or Cretaceous quartz diorite is exposed along the northern margin, and masses of Permian gabbro outcrop in the southeastern portion

Mineralization occurs near the margin of the quartz diorite intrusive along steep, northeast-trending vein-fault zones Included is a highly productive structure known as the North Pole-Columbia Lode which has an average width of 25 feet and is traceable for 4 1/2 miles (Brooks and others, 1982)

Past Production:

Mine	Location	Production	(Refs)
Bald Mtn.-Ibex	Secs 3&4, T. 9 S., R 36 E	$240,000	Ferns & others, 1982
Belle of Baker	Sec 35, T. 8 S , R 36 E	$400,000	Brooks & Ramp, 1968
Buckeye	Sec 27, T 8 S., R. 37 E	6,000	Ibid
Columbia	Sec. 32, T 8 S., R 37 E.	3,640,000	Ibid.
E and E	Sec 32, T. 8 S , R 37 E	1,065,000	Ibid
Golconda	Sec 32, T 8 S., R 37 E	550,000	Ibid.
Mammoth	Sec 35, T 8 S., R 36 E	40,000	Ibid
Mountain View	Sec. 17, T 8 S , R. 37 E	100,000	Ibid.
North Pole	Secs 28&29, T 8 S. R. 37 E	2,120,000	Ibid
Taber Fraction	Sec. 32, T 8 S , R 37 E.	296,000	Ibid
Miscellaneous	Several other properties (est)	543,000	Ibid.
Total		$9,000,000	

Estimated metal output·
425,700 oz. of gold, 425,700 oz of silver

Considerable recent work has been done on the North Pole-Columbia Lode, the Bald Mountain-Ibex vein, and some of the smaller structures Projects are currently on hold or at a reduced level due to economic conditions The area has potential for development of ore along the North Pole-Columbia lode, Bald Mountain-Ibex vein, and other persistent structures

Cable Cove - Category II (Map No. 16)

This area coincides approximately with the old Cable Cove mining district, including a high cirque valley at the head of Silver Creek northwest of Sumpter and extending into the headwaters of the North Fork of the North Powder River. The area is in glaciated terrain underlain primarily by Jurassic or Cretaceous quartz diorite with some late Paleozoic to Triassic argillite and chert in the northwestern portion.

Gold mineralization occurs in northeasterly trending vein-shear zones containing pyrite, arsenopyrite, and somsphalerite and galena. Zones of Porphyry-type copper-molybdenum mineralization are found (Fern and others, 1981, Brooks and others, 1982a) Although several mines in the area were rather extensively developed in the past, relatively little ore was shipped

Past production estimates:

Mine	Location	Production	(Refs)
California	Secs 14&15, T 8 S , R 36 E	$ 40,000	Brooks & Ramp 1968
Imperial-Eagle	Sec 14, T. 8 S , R. 36 E	100,000	Ibid
Last Chance	Sec 14, T. 8 S , R 36 E	5,000	Ibid
Mile High	Sec 22, T. 8 S , R 36 E	1,000	Ibid
Total		$146,000	

Estimated metal output
7,900 oz. of gold, 71,500 oz. of silver

Considerable recent exploration activity on the numerous lode prospects in the area together with high silver and gold values shown by samples taken from dumps and outcrops combine to indicate a relatively high probability for the development of high grade vein-type deposits

Cornucopia - Category I (Map No. 8)

This area of high mineral potential, at the southeastern edge of the Wallowa Mountains, includes the gold veins of the Cornucopia Mine. Other prospects are included, but have contributed little to the overall production from the area

Mineralization is largely confined to quartz veins and mineralized shear zones which cut granodiorite, schist, and greenstone. Ore minerals include pyrite, arsenopyrite, chalcopyrite, galena, and sphalerite with a little free gold and gold tellurides (Brooks and Ramp, 1968).

Past production figures:

Mine	Location	Production	(Refs)
Cornucopia	Secs 27&28, T 6S , R 45E	$15,000,000	Brooks & Ramp, 1968
Simmons	Secs 15&16, T 6S , R 45E	9,000	Ibid
	Total	$15,009,000	

Estimated metal output.
317,500 oz of gold; 1,268,000 oz. of silver, 672,000 lbs. of copper; 122,000 lbs. of lead.

A recent exploration and development program has reopened part of the Cornucopia Mine Further development awaits financial support and more favorable precious metals prices. Active mining claims cover most of the area which extends into the Eagle Cap Wilderness. Below the Cornucopia Mine, Pine Creek has been worked for placer gold A high boulder content has prevented a thorough working of the deposit, and it still attracts interest from placer miners.

Considerable potential exists for the production of additional precious metals from the vein systems of the Cornucopia Mine Portions of these veins extend into the Eagle Cap Wilderness, which would be unaffected because access and mining would be underground Some recent interest has also been shown in the mineral potential of other mines in the vicinity, including the Simmons and Norway properties

Elkhorn - Category IV (Map No. 20)

This zone includes a large area on the north side of the Sumpter Valley, extending up Cracker Creek and adjoining the Bourne and areas on the north, and up Baboon Creek, over the Elkhorn Crest, down Marble and Salmon Creeks, and adjoining the Baker City area on the east. Most of this area is underlain by argillite and chert of late Paleozoic to Triassic age (Brown and Thayer, 1966).

Lenses of chemical grade limestone which occur within the argillite have been quarried commercially at sites on Marble Creek and Baboon Creek.

Included within this zone are numerous gold-bearing Tertiary gravel deposits and Quaternary stream and bench gravel deposits including the gravels of the Sumpter Valley A few lode gold deposits also occur in the area, but little is known about them High grade pockets exist in the old Minersville area around Lake Creek

Past production:

Mine	Location	Production	(Refs)
Chemical Lime Co.	Marble Cr. & Baboon Cr.	Not Available	Not Available
Cracker Creek placers	Cracker Creek	$ 3,000,000	Ore. Dept Geo
Sumpter Valley placers	Sumpter Valley	10,483,000	Brooks & Ramp, 1969
Total		$13,483,000	

Estimated mineral output:
441,200 oz. of gold; 107,000 oz. of silver; 383,000 tons lime.

Numerous placer and a few lode claims are currently held in the area Activity is confined to prospecting and hobby-size to small-scale commercial placer and some lode production. Some areas of unworked gravels still have a potential for gold production, and there may be a potential for recovering gold by reworking some of the large valley deposits Lode potential is unknown, but there are some seasonal operation of small high grade gold deposits

Geiser - Category III (Map No. 24)

This area includes the old mining camp of Geiser and covers the eastern part of the old Greenhorn mining district. Lode gold prospects are found in exposures of pre-Tertiary rocks including late Paleozoic to Triassic argillite, amphibolite, metavolcanics, serpentinite, and serpentinite matrix melange Tertiary volcaniclastics and flows and gold-bearing Tertiary gravels overlie the older rocks locally (Ferns and others, 1983) Lode mineralization generally occurs in northwest trending quartz veins and shear zones Placer mines have been developed in the Tertiary gravels resting on pre-Tertiary bedrock.

Past production figures:

Mine	Location	Production	(Refs)
Bonanza	Sec. 10, T. 10 S. R. 35 E.	$1,750,000	Brooks & Ramp, 1968
Diamond Jack & Winterville Placers	Sec 14, T 10 S R 35 E	55,000	Ferns & others, 1983
Parkerville Placer	Sec. 16, T. 10 S. R. 35 E.	150,000	Ibid
Total		$1,955,000	

Estimated metal output·
93,100 oz of gold, 57,700 oz of silver

Numerous lode and placer claims are currently active in the area. The principal lode deposit, the Bonanza Mine, and the Tertiary gravel deposits undergo periodic exploration and development Given favorable metal prices, more intense activity can be expected.

Granite - Category II (Map No. 15)

This area covers a portion of the old Granite mining district lying north and east of the town of Granite The southeastern third of the area is underlain by Jurassic or Cretaceous quartz diorite while most of the remainder is underlain by argillite and chert of late Paleozoic to Triassic age (Brooks & others, 1982b).

Lode gold mineralization occurs in northeast-trending veins and shear zones in the argillite, chert, and quartz diorite (Koch, 1959). Post-mineral Tertiary volcanic flows and clastics to the southwest may cover similar deposits. Some Tertiary and recent gold-bearing placer deposits also occur in the area

Production from mines within and adjacent to the Wallowa-Whitman National Forest

Mine	Location	Production	(Refs)
Ajax	Sec 22, T. 8 S., R 35 E	$ 40,000	Brooks & Ramp, 1968
Buffalo	Sec 14, T. 8 S , R 35 E.	1,150,000	Ibid, Koch, 1959
Continental	Sec. 12, T 8 S , R. 35 E	50,000	Ibid; Ibid.
Cougar-Independence	Secs 22&27, T. 8 S , R 35 E.	767,000	Koch, 1959
LaBelleview	Secs 6&7, T. 8 S., R 36 E	500,000	Brooks & Ramp, 1968
Monumental	Secs 18&19, T. 8 S., R 36 E	100,000	Ibid.
New York	Sec 27, T 8 S., R. 35 E	8,000	Ibid
Standard	Sec 12, T. 8 S., R 35 E	1,000	Ore Dept Geol Bull. 14-B
Total		$2,616,000	

Estimated metal output:

74,600 oz of gold; 868,500 oz. of silver, 49,000 lbs of copper, 190,000 lbs of lead, 41,000 lbs of zinc.

Several mining companies and numerous individuals have been actively exploring and, in some cases, developing and working mines and prospects in the area Placer production has been small, but there are numerous placer claims and a few hobby-size placer mining operations The main potential for the area lies with the possibility of developing minable grades and tonnages on the lode deposits Given favorable gold and silver prices, continued exploration, development, and possibly *production may be expected.*

Greenhorn - Category III (Map No. 23)

This area includes the main portion of the old Greenhorn mining district, encompassing the townsite of Greenhorn and extending into the Clear Creek drainage to the north The Wallowa-Whitman National Forest contains a little over half of this area, which extends onto the Umatilla and Malheur National Forests as well

A wide variety of rock types underlie the area, including late Paleozoic-to-Triassic argillite, gabbro, metavolcanics, serpentinite, and serpentinite matrix melange; Jurassic or Cretaceous quartz diorite and granodiorite intrusives; Tertiary volcanic flows, volcaniclastics, and gravel deposits, and Quaternary glacial and alluvial sediments.

Lode gold mineralization occurs in narrow quartz veins and shear zones striking northwest to northeast in the pre-Tertiary rocks Placer gold is found in Tertiary gravels and modern stream channel and bench deposits (Ferns and others, 1983, Brooks and others, 1983).

Past production from properties within or adjacent to the Wallowa-Whitman National Forest

Mine	Location	Production	(Refs)
Banzette	Sec. 16, T. 10 S , R 35 E	$ 5,000	Brooks & others, 1983
Diadem/Brindle Horse	Sec 17, T 10 S., R 35 E	1,800	Ibid
Don Juan	Sec 15, T 10 S., R 35 E	2,000	Ore. Dept Geol files
Golden Eagle	Sec 15, T. 10 S , R 35 E	75,000	Ferns & others, 1983
IXL	Sec 10, T 10 S , R 35 E	20,000	Ibid
Owl	Sec 10, T. 10 S., R. 35 E	14,000	Ibid
Paramount	Sec. 16, T 10 S , R 35 E	500	Brooks & others, 1983
Phoenix	Sec 15, T 10 S., R 35 E.	2,800	Ore Dept Geol files
Psyche	Sec 17, T. 10 S , R. 35 E	90,000	Brooks & others, 1983
Pyx	Sec. 1 , T 10 S., R 35 E.	300,000	Ferns & others, 1983
Rabbit	Sec. 10, T. 10 S , R. 35 E	40,000	Ibid
Red Bird	Sec. 10, T 10 S , R 35 E	12,000	Ibid
Roberts	Sec 21, T 10 S., R 35 E.	10,000	Brooks & others, 1983
Royal White	Sec 3 , T. 10 S , R 35 E	7,500	Ferns & others, 1983
Snow Creek	Sec 16, T 10 S., R 35 E.	52,000	Brooks & others, 1983
Virginia	Sec. 10, T 10 S , R 35 E	20,000	Ferns & others, 1983
Total		$647,800	

Estimated metal output:
31,600 oz. of gold; 42,300 oz. of silver; 3 flasks of mercury

The large number of lode and placer gold occurrences keep prospectors interested, but the indicated size of the targets has generally discouraged larger companies from conducting substantial exploration programs in the area. Several small placer mines and at least one small lode prospect have been seasonally active.

Prospecting can be expected to continue, both by individuals and by larger mining companies conducting regional exploration programs. Small pocket mines will probably be developed and operated as economic conditions permit Several small, but relatively rich placer deposits will be operated seasonally

Greenhorn-Whitney - Category IV (Map No. 25)

This is a large area of placer gold deposits and some lode gold prospects which extends onto the Malheur National Forest on the southwest, adjoins the Greenhorn area on the northwest, surrounds the Geiser area and is contiguous with the Elkhorn area on the north The western portion of the area includes part of the old Greenhorn mining district

Much of the area is covered by Tertiary volcaniclastics and flows, and Quaternary gravels mantle much of the Whitney Valley in the southeastern portion. Late Paleozoic to Triassic argillite is exposed in the northeastern part, and argillite, gabbro, and serpentinite of similar age occur in isolated patches in the western part of the area

Some lode mineralization is found in the older rocks, in north-to-north-westerly trending quartz veins and shear zones (Pardee and Hasett, 1941, Brown and Thayer, 1966, Ferns and others, 1983) Placer deposits are found in patches of older gold-bearing Tertiary gravels and in Quaternary gravels derived from the Tertiary gravels (Pardee and Hasett, 1941, Brown and Thayer, 1966, Ferns and others, 1983) Small manganese deposits are known to exist in the argillite (Appling, 1959)

Estimated past placer production

Mine	Location	Production	(Refs)
Misc. stream & bench placers	N. Fk. Burnt River and tributaries	$1,519,000	Brooks & Ramp, 1968, Ferns & others, 1983

Estimated metal output:
70,000 oz. of gold; 14,500 oz. of silver.

Very little is known about the few lode prospects of the area There is periodic exploration on small lode prospects in the area

The area contains numerous placers which have been only partially exploited in the past. Bench placers along the North Fork of the Burnt River are being worked seasonally, and there are on-going testing operations on some of the high Tertiary gravel deposits It is likely that, given an adequate gold price, there will be continued placer exploration, development, and production.

Homestead - Category I (Map No. 6)

This area covers part of the old Homestead mining district, and is located at the southwestern end of a mineralized zone extending from Homestead, Oregon to Cliff Mountain in Idaho. It is a zone of high mineral potential centered around the currently active Iron Dyke Mine which is adjacent to the Hells Canyon National Recreation Area. Gold-copper-silver mineralization is found in irregular lenses of disseminated pyrite and chalcopyrite in sheared greenstone which was originally a volcanic mudflow (Vallier and Brooks, 1970)

Production from 1910 to present·

Mine	Location	Production	(Refs)
Iron Dyke	Sec. 21, T 6 S , R 48 E	$13.5 million	Brooks & Ramp, 1968, Wise, 1983

Estimated metal output.
50,000 oz of gold, 281,500 oz of silver, 16,900,000 lbs of copper

The Iron Dyke Mine has been operated sporadically in recent years, due to fluctuations in metal prices, and difficulties in developing reserves in the irregular lenses of ore-grade mineralization Ore from the mine is trucked 22 miles up out of the Snake River canyon to a mill at Cuprum, Idaho, and from there concentrates are shipped to a smelter

Land within the National Forest is covered with unmineralized Tertiary basalt flows, and is withdrawn from mineral entry by PL 94-199 which created the Hells Canyon National Recreation Area The mineralized zone probably extends onto National Forest land, beneath the basalt cover.

Homestead-Cliff Mountain - Category IV (Map No. 5)

This area of gold, silver, and copper mineralization includes most of the old Homestead mining district in Hells Canyon of the Snake River in Oregon and Idaho and the Seven Devils mining district in the Seven Devils Mountains of Idaho Areas of higher mineral potential at the northern (Red Ledge) and southern (Homestead) ends are discussed separately The Copper Cliffs Mine at Cuprum, Idaho is within this zone, but is completely within the Payette National Forest

The only production has come from the Iron Dyke Mine at Homestead, and the Copper Cliffs, Peacock, and South Peacock Mines near Cuprum Most of the recent exploration activity has been concentrated in these areas, as well as around the Red Ledge Mine. All of the lands within or administered by the Wallowa-Whitman National Forest in this zone are withdrawn from mineral entry by PL-94-199.

The area has potential for the development of volcanogenic sulfide deposits, like those at the Iron Dyke, Copper Cliffs, and Red Ledge Mines. Tactite deposits in this zone have produced in the past, but are small and difficult to explore if they do not outcrop (Close and others, 1982).

Jackley Mountain - Category IV (Map No. 3)

This mineralized zone is centered around Jackley Mountain in Idaho, and includes the old Mountain View mining district The mineral deposits are essentially all gold and silver-bearing fissure veins or mineralized shear zones in volcanics intruded by diorite

Past production figures for area mines within Hells Canyon NRA:

Mine	Location	Production	(Refs)
Bald Eagle Maid of Erin Summit	Sec. 10, T 22 N , R 2 W Sec. 2, T 21 N , R 2 W. Sec. 3, T. 21 N., R 2 W.	$150,000	Close & others, 1982

Estimated metal output.
7,200 oz of gold, 1,500 oz. of silver.

All of the land administered by the Wallowa-Whitman National Forest in this area is within the Hells Canyon National Recreation Area, and is therefore withdrawn from mineral entry There are no mining claims within this area.

The area has the potential for the development of additional vein-type deposits. Resources undoubtedly exist at undeveloped properties as well as on down-dip extensions of known deposits (Close and others, 1982)

Keating - Category IV (Map No. 10)

This area includes a portion of the old Eagle Creek mining district lying northeast of the settlement of Keating. Most of the area is southwest of the Forest boundary. Bedrock over most of the area is Permian or Triassic greenstone and Triassic quartz diorite. A few patches of Tertiary basalt cover the older rocks in the eastern portion of the area (Brooks and others, 1976).

Mineralization occurs as stringers and disseminations of sulfides in sheared and fractured greenstone. Metal values are primarily in copper and gold Ore minerals include pyrite and chalcopyrite

Past production adjacent to the Forest

Mine	Location	Production	(Refs)
Poorman	Sec. 32, T.7 S , R 43 E	$380,000	Brooks & Ramp, 1968

Estimated metal content:
8100 oz of gold; 4000 oz of silver, 1,047,000 lbs. of copper.

All of the past production from this area has come from outside the Forest The area is currently heavily claimed, with only a few claims extending onto the Forest The irregular nature of the sulfide deposits makes exploration difficult. However, the area has potential for development of additional copper-gold ore bodies

Kirkwood Creek - Category IV (Map No. 1)

This mineralized zone is at the eastern-most end of the Hells Canyon National Recreation Area, and is largely in Idaho It covers pre-Tertiary volcanogenic lenses and veins containing copper, zinc, silver, and some included gold mineralization (Close and others, 1982).

Past production for mines in the area:

Mine	Location	Production	(Refs)
Crooks Corral	Sec 12, T. 25 N , R. 2 W	$ 4,000	Close & others, Placer 1982
Duncan	Secs 23&24, T 26 N., R 1 W.	5,500	Ibid; U S Bur Mines file
Snake River	Secs 19&20, T 26 N , R 1 W	5,500	Close & others, placers 1982
Total		$15,000	

Total metal output of record
540 oz of gold, 10 oz. of silver; 27,400 lbs of copper.

All of the active mining claims in this zone are clustered in the general vicinity of the Blue Jacket Mine (covered separately) and the NRA is withdrawn from further mineral entry

Limber Jim-Meadow Creek - Category IV (Map No 11)

This zone includes part of the old Camp Carson mining district, covering tributaries of the upper part of the Grande Ronde River, and is known primarily as an area of placer deposits Bedrock in much of the area is Jurassic or Cretaceous quartz diorite with some Tertiary volcaniclastics and basalt flows covering the northern and the northeastern portions (Walker, 1973)

Production information

Mine	Location	Production	(Refs)
Rainbow (placer)	Secs 1&2, T 6 S , R 36 E	Few thous yds	Brooks & Ramp, 1968, Ore. Dept. Geol. files
Stibnite (lode)	Sec. 5, T 6 S., R 37 E.	3 cars antimony ore	Ore Dept Geol files

Several gold placer and a few lode prospects are included in the area, but there are no definitive production records for any of them. There are numerous placer claims and a few lode claims actively held within this zone

Very little is known about this area, but there are numerous exposures of gold-bearing Tertiary gravel of unknown grade as well as small present day stream placers formed from reworking the older gravels Lode mining potential appears to be limited because of the narrow widths of veins and shears which cut the intrusives, but little exploration and development has been done other than by individual prospectors

Medical Springs - Category IV (Map No. 9)

This area includes a portion of the old Medical Springs mining district, just northeast of the settlement of Medical Springs It is a small area of Triassic greenstone and Jurassic or Cretaceous granodiorite, surrounded by unmineralized Tertiary basalt flows Gold mineralization is confined to narrow veins and shear zones in the greenstone (Gilluly and others, 1933)

Past production for the area.

Mine	Location	Production	(Refs)
Twin Baby	Sec 20, T. 6 S , R 42 E	Few thousand dollars	Brooks & Ramp, 1968

Several lode and placer claims are currently held in the area Mineralization is narrow and spotty, and most production came from high grade pockets. Other ore-grade material may exist, but the limited size potential reduces the likelihood of extensive exploration and development

Mt. Ireland - Category IV (Map No. 19)

This is a large mineralized area east of Granite and northwest of Sumpter which surrounds and adjoins areas of higher estimated mineral potential including Granite, Cable Cove, and Bourne. It includes portions of the old Granite, Cable Cove, and Cracker Creek mining districts. On the southeast, it is contiguous with the Greenhorn-Whitney area.

Much of the central portion of the area is underlain by Jurassic or Cretaceous quartz diorite. Argillite and chert of late Paleozoic to Triassic age underlie the extreme northwestern portion, and are included with Permian gabbro, Triassic serpentinite-matrix melange, small Jurassic or Cretaceous intrusives, and Tertiary basaltic to dacitic flows and intrusives on the northeastern and the southern margins

Lode gold-silver mineralization is generally confined to veins and shear zones Zones of talc and talc car. rocks are associated with common rocks in the area Placer gold deposits are found in Tertiary gravels and present day stream and bench gravels (Ferns and others, 1982; Grooks and others, 1982b; Pardee and others, 1941).

Past production data:

Mine	Location	Production	(Refs)
Argonaut	Sec. 19, T 8 S., R. 37 E.	Small(unk)	Brooks & Ramp, 1968
Buck Gulch Pl. Griffith Pl. Weaver Pl.	Sec. 26, T 9 S , R 36 E. Secs 16&17, T 9 S., R. 36 E Sec 25, T 9 S., R. 36 E.	Considerable yardage of unknown grade	Ore. Dept. Geol. Bulls. 14-A & B; Pardee & others, 1941
Granite placers*	Granite, Bull Run, & Clear Crs	$2,422,000	Brooks & Ramp, 1968, Ore Dept Geol. files

Total estimated metal production:
89,200 oz of gold, 20,900 oz of silver.

* Includes Umatilla Forest area production

Many active lode and placer claims are included in this area Most of the activity is confined to exploration of lode prospects by individuals, with some regional reconnaissance by mining companies, and exploration and development of hobby size and small commercial placer deposits.

Onion Creek - Category IV (Map No. 14)

This area is contiguous with the Crane Creek area on the Umatilla National Forest, which is in turn contiguous with the North Fork area which extends along the North Fork of the John Day River and some of its tributaries to the settlement of Dale It adjoins the north end of the Granite District and includes both lode and placer gold prospects Bedrock is predominantly argillite and chert of late Paleozoic to Triassic age with some Tertiary volcanic and Quaternary glacial cover in the northwestern portion of the area (Pardee and others, 1961).

Production from adjacent area on the Umatilla National Forest:

Mine	Location	Production	(Refs)
Klopp Placer	Sec. 34, T. 8 S , R 35 E.	$342,000	Ore. Dept Geol Bull 14-B

Estimated metal output
16,400 oz of gold, 7,000 oz of silver

The Klopp Placer is an auriferous glacial moraine of very low grade which was worked by hydraulic methods (Parks and Swartley, 1916) It is unlikely that similar material could be worked profitably today while meeting water quality and reclamation standards. Some potential for small placer operations undoubtedly exists in small pockets of unworked material untouched by glaciation Numerous prospects and the proximity of the Granite district make the area favorable for continued exploration for lode deposits.

Pine Creek - Category III (Map No. 29)

This is a gold placer mining area along and in benches above Pine Creek, which flows into the Burnt River east of Hereford. Much of this area is located off the National Forest Bedrock on the Forest portion is late Paleozoic to Triassic phyllite and chert, with lesser amounts of gabbro, and serpentinite Gold-bearing gravels mantle much of the older rock within the Pine Creek drainage Small-to-medium size commercial placer operations are active on the more extensive gravel deposits on BLM and private land below the Forest boundary (Brooks and others, 1976; DOGAMI files).

Deposits on the Forest are the subject of periodic exploration ventures, but have not been actively mined for several years. This drainage has produced a considerable (but unrecorded) amount of nugget gold in the past. Continued exploration and some production is likely in the near term.

Red Ledge - Category III (Map No. 4)

This mineralized zone surrounds the Red Ledge Mine on Deep Creek in Idaho, and barely extends onto the Hells Canyon National Recreation Area The Red Ledge Mine was excluded from the NRA because of its known mineral potential

There has been no production from this zone, but company figures list 42 million tons of reserves containing gold, silver, copper, and zinc at the Red Ledge Mine (Juhas, 1980) This volcanogenic sulfide deposit consists of blebs and stingers of pyrite, chalcopyrite, sphalerite, bornite, and chalcocite associated with quartz in andesite and silicic volcanic rocks of Permian to late Triassic age

The Red Ledge Mine and adjacent property are currently being explored and evaluated Steep terrain makes access and development difficult

Rock Creek - Category III (Map No. 18)

This area is located in the Rock Creek and Pine Creek drainages northwest of Baker City The northern half is underlain by Jurassic or Cretaceous quartz diorite and the southern half is underlain by argillite and chert of late Paleozoic to Triassic age. Gold-silver mineralization occurs in northeasterly striking quartz veins and shear zones near the argillite-intrusive contact (Pardee and Hewett, 1917)

Past production figures:

Mine	Location	Production	(Refs)
Baisley-Elkhorn	Secs 20&21, T. 8 S., R. 38 E.	$ 950,000	Brooks & Ramp, Ramp, 1968
Highland-Maxwell	Secs 19&20, T 8 S , R 38 E.	625,000	Ibid.
Maxwell Total		$1,575,000	

Estimated metal output:
60,400 oz of gold, 544,200 oz. of silver

Most of the old mines and prospects are currently under claim but there are no intensive exploration/ development programs underway This area appears to have additional potential for ore development on and adjacent to the old lode properties

Trail Creek - Category IV (Map No. 13)

This area includes the old Trail Creek mining district, covering parts of the South and the Middle Forks of Trail Creek and lesser tributaries of the North Fork of the John Day River. This is primarily an area of gold placers in Tertiary gravels and some reworked modern stream gravels. Areas disrupted by Pleistocene glaciation are generally devoid of placer gold potential Bedrock is Jurassic or Cretaceous quartz diorite of the Bald Mountain Batholith over the eastern portion, and Triassic gabbro in the western portion (Pardee and others, 1971).

Mine	Location	Production	(Refs)
French Diggings Placer	Secs 20&29, T. 7 S., R 36 E	$387,000	Pardee & Hewett, 1914

Estimated metal output:
18,600 oz of gold; 4,300 oz of silver.

Currently active placer claims cover the old French Diggings Placer, similar deposits, and portions of Trail Creek.

There reportedly is a considerable volume of gold-bearing gravel left around French Diggings, and there may be a potential for other, smaller deposits in areas not affected by Pleistocene glaciation

Unity - Category III (Map No. 31)

This area is located at the south end of the Forest, and extends from Mine Ridge on the northwest, past Murray Hill to the southeast. This large mineralized zone is located along a trend of Cretaceous diorite and quartz diorite stocks which intrude late Paleozoic to early Mesozoic ultramafic rocks and

serpentinite matrix melange, and Jurassic sedimentary rocks (Brooks and Ferns, 1979, Brooks and others, 1979).

Rocks in the mineralized zone have been hydrothermally altered, and contain some disseminated copper and molybdenum Gold prospects are found in the northern part of the zone.

Past production estimates for mines in and adjacent to the National Forest

Mine	Location	Production	(Refs)
Bull Run Creek placers	Sec. 36, T 13 S , R 36 E & Sec. 1, T. 14 S., R 36 E.	$76,000	Brooks & Ramp, 1968
Bull Run Mine	Sec 2, T 14 S , R 36 E	10,000	Ibid.
Record	Sec. 1, T 14 S , R 36 E	103,000	Ibid
Thomason	Sec. 6, T 14 S , R 37 E	unavailable	Ore Dept. Geol. files
Total		$189,000	

Estimated metal output
7,500 oz. of gold, 800 oz of silver

One small gold mine, the Thomason, is worked seasonally on a small scale. Much of the area is claimed by one company which has maintained an interest in the area for several years

Current economic conditions make a copper-molybdenum property unattractive However, continued exploration, possible development, and some small scale mining of the gold occurrences in the northern part of the zone can be expected

Upper Grande Ronde - Category III (Map No. 12)

This area adjoins the Limber Jim - Meadow Creek area, and includes the heart of the old Camp Carson mining district It is assigned a higher rank due to recent attempts to reactivate the old Camp Carson placer mine Aside from a relatively small patch of Tertiary volcaniclastic rocks, bedrock in the area is Jurassic or Cretaceous quartz diorite (Walker, 1973)

Production information:

Mine	Location	Production	(Refs)
Aurelia	Sec 26, T. 7 S , R 36 E.	"some high grade (gold-silver) ore"	Ore Dept Geol Bull 14-A & files
Camp Carson	Sec. 22, T 7 S , R 36 E	Few hund thousand yards	Ore Dept Geol. Bull. 14-A
Indianna	Sec 9, T 7 S., R 36 E.	Few thous. tons. 28 tons develop	Ore. Dept Geol files
	ore. 0.15 oz/t Au, 35.2 oz/t Ag, 2 4% Pb; 1 5% Zn		

Most of the claims in the area cover gold-bearing Tertiary gravels - either in situ, or in reworked deposits along present day drainages. Very little is known about the lode prospects in the area, but there are some interesting indications of mineralization.

The Camp Carson and other placers in the area have substantial yardages of resources of unknown grade which will continue to be explored and may possibly be developed, if economic conditions warrant. Since very little is known about the lode deposits, it is difficult to estimate their potential The available information does indicate some potential for silver and gold with associated base metals

Wallowa Mountains - Category IV (Map No. 7)

This area includes an irregular band of metallic mineral occurrences which pass through the eastern portion of the Wallowa batholith and includes tactites, igneous-sedimentary and igneous-metavolcanic contact zones, shear zones, fissure veins, and disseminations extending from near the Forest boundary south of Enterprise and Joseph on the north, through the Sparta area on the south Included are portions of the old, unorganized Wallowa Range, Eagle Creek, Sparta, Sanger, and Keating mining districts Also included are drainages with small yardage placer gold potential. The Wallowa Mountains contain a significant percentage of the known limestone resources of Oregon. Limestone has been quarried in the Lostine Valley and on Murray Creek, to the north of this area Major resources are located in Lostine Valley, Hurricane Creek Valley, East Eagle Creek, and the headwaters of the Imnaha River (Wells and others, 1976). These deposits are of limited economic interest at this time due to their poor location in regard to transportation and points of utilization

Past production figures for mines within and adjacent to the National Forest

Mine	Location	Production	(Refs)
Black Marble Lime Quarry	S. 19, T 2 S., R 44 E.	Unknown	Moore, 1937
Dolly Varden	S. 19&30, T. 7 S , R 44 E	$115,000	Brooks & Ramp, 1968
Eagle Creek (placers)	Parts of T. 6&7S R. 44 E.	150,000	Ore. Dept. Geol. files
Sanger (lode)	S 2, T. 7 S , R 43 E.	1,500,000	Brooks & Ramp, 1968
Sanger (placer)	S 10, T. 7 S , R. 43 E	500,000	Ibid
Sheep Rock	S 32, T. 6 S , R. 44 E	30,000	Ibid.
Total		$2,295,000	

Estimated mineral content·
110,000 oz. of gold, 27,500 oz of silver, 7,000 tons of quicklime.

Much of this zone is within the Eagle Cap Wilderness, and is therefore withdrawn from mineral entry. Many mineral occurrences have been prospected in the past, but, due to small size and difficulty of access, very few have produced ore. Without the restrictions of Wilderness designation, this area would undoubtedly have received much greater mineral exploration emphasis in recent years

Most existing claims are in the area south of the Wilderness boundary, extending off the Forest and covering part of the old Sparta District Most mineral activity consists of individuals prospecting lode deposits, and operating hobby-size placers along Eagle Creek and some of its tributaries

Tactite deposits and vein/shear zones containing copper, tungsten, molybdenum, gold, and silver are the best known and most clearly defined deposits, but the greatest potential undoubtedly lies with large tonnage disseminated copper-molybdenum deposits, possibly with precious metals credits.

Whipple Gulch - Category IV (Map No. 27)

This area is centered around Whipple Gulch in the Big Creek drainage north of the town of Hereford Most of this area is underlain by argillite, chert, and phyllite of late Paleozoic to Triassic age Tertiary volcaniclastics outcrop in the southwestern portion (Brown and Thayer, 1966). Lode mineralization is found in quartz veins and lenses, and in shear zones in the older rocks. Portions of Whipple Gulch have been worked for placer gold in the past

Very little is known about this area, and there are no records of any production. It is likely that there will be continued exploration of the lode deposits

REFERENCES

Appling, R. N. Jr., 1959, Manganese deposits of northeastern Oregon: U S Bur Mines Report of Investigations 5472, 23 p.

Bernardi, J. L., and Robbins, J W., 1982, National Uranium Research Evaluation, Baker quadrangle, Oregon and Idaho. Report for U. S. Department of Energy by Bendix Field Engineering Corp , 29 p.

Brooks, H. C., 1963, *Quicksilver in Oregon* Oregon Dept Geology and Mineral Ind Bull. 53, 223 p

Brooks, H. C., and Ferns, M. L., 1979, Geologic map of the Bullrun Rock quadrangle, Oregon: Oregon Dept. Geology and Mineral Ind. Map 0-79-6.

Brooks, H C.; Ferns, M. L.; Coward, R. I.; Paul, E K.; and Nunlist, M ; 1982a, Geology and gold deposits of the Bourne quadrangle, Oregon: Oregon Dept. Geology and Mineral Ind. Map GMS 19.

Brooks, H. C.; Ferns, M L.; and Mullen, E D., 1982b, Geology and gold deposits map of the Granite quadrangle, Grant County, Oregon: Oregon Dept Geology and Mineral Ind. Map GMS-25

Brooks, H C.; Ferns, M. L., Nusbaum, R. W , and Kovich, P M , 1979, Geologic map of the Rastus Mountain quadrangle, Oregon: Oregon Dept Geology and Mineral Ind Map 0-79-7.

Brooks, H C.; Ferns, M. L., Wheeler, G. R.; and Avery, D. G., 1983, Geology and gold deposits of the NE quarter of the Bates quadrangle, Baker and Grant Counties, Oregon Oregon Dept. Geology and Mineral Ind Map GMS-29.

Brooks, H. C.; McIntyre, J R.; and Walker, G W., 1976, Geology of the Oregon part of the Baker quadrangle. Oregon Dept. Geology and Mineral Ind Map GMS 7 Scale 1·250,000

Brooks, H. C., and Ramp, L., 1968, Gold and silver in Oregon: Oregon Dept. Geology and Mineral Ind. Bull. 61

Brown, C. E., and Thayer, T. P., 1966, Geologic map of the Canyon City quadrangle, northeastern Oregon· U. S. Geol Survey Misc Geol Inv. Map I-447

Close, T. J.; Federspiel, F. E.; Leszcykowski, A., and Hyndman, P C , 1982, Mineral resources of the Hells Canyon Study Area, Adams, Idaho, and Nez Perce Counties, Idaho, and Wallowa County, Oregon U S. Bur. Mines Open File Report MLA 41-82, 32 p

Conyac, M D , 1983, Mineral investigation of the North Fork John Day River RARE II Area (No B6253), Grant County, Oregon: U. S Bur Mines Open File Report MLA 34-83, 15 p

Cook, R., 1986, Verbal communication on cement production - Oregon Portland Cement Co & Ashgrove Cement Co.

Cook, E. F., 1954, Mining geology of the Seven Devils Region, Idaho. Idaho Bur Mines and Geology Pamphlet 97, 22 p.

Evans, J. G., 1986, Geologic map of the Dooley Mountain quadrangle, Baker County, Oregon: U S Geol. Survey map in preparation.

Evans, J. G , and Conyac, M. D., 1983, Mineral resource potential of the North Fork John Day River Roadless Area, Grant County, Oregon: U S Geol. Survey Map and Summary Report MF-1581A.

Ferns, M L , 1985, Preliminary report on northeastern Oregon lignite and coal resources, Union, Wallowa, and Wheeler Counties Oregon Dept Geology and Mineral Ind. Open File Report O-85-2, 31 p.

Ferns, M. L. Brooks, H. C.; and Avery, D. G., 1983, Geology and gold deposits map of the Greenhorn quadrangle, Baker and Grant Counties, Oregon: Oregon Dept. Geology and Mineral Ind Map GMS-28

Ferns, M. L.; Brooks, H. C ; Baxter, G L ; and Avery, D G , 1984, Geochemical data for the Bourne; Mt. Ireland; Granite; Greenhorn, and the northeast, northwest, and southwest quarters of the Bates quadrangles, Baker and Grant Counties, Oregon Oregon Dept Geology and Mineral Ind Open File Report O-84-3, 20 p

Ferns, M. L ; Brooks, H C., and Ducette, J , 1982, Geology and mineral resources map of the Mt. Ireland quadrangle, Baker and Grant Counties, Oregon Oregon Dept. Geology and Mineral Ind. Map GMS-22.

Ferns, M. L.; Brooks, H. C.; and others, 1986, Geology and mineral resources map of the Elkhorn Peak quadrangle, Baker County, Oregon: Oregon Dept Geology and Mineral Ind. map in preparation.

Gaston, M. P.; and Bennett, E. H., 1979, Geologic map of the Grangeville quadrangle, Idaho Idaho Bur. Mines and Geology map.

Gilluly, J , 1937, Geology and mineral resources of the Baker quadrangle, Oregon U S Geol. Survey Bull. 879, 119 p.

Gilluly, J.; Reed, J. C ; and Park, C F , Jr , 1933, Some mining districts of eastern Oregon U. S. Geol Survey Bull 846-A, 140 p

Juhas, Allan P., 1980, Verbal communication on the Red Ledge Mine

Koch, G. S., Jr., 1959, Lode mines of the central part of the Granite mining district, Grant County, Oregon: Oregon Dept Geology and Mineral Ind Bull 49, 49 p

Lewis, Glen, 1980, Verbal communication on the Iron Dyke Mine

Lindgren, W., 1901, The gold belt of the Blue Mountains of Oregon: U S Geol Survey 22nd Ann. Rept., Pt 2, p 551-776.

Moore, B. N , 1937, Nonmetallic mineral resources of eastern Oregon U S Geol Survey Bull 875, 180 p

Oregon (State of) Dept Geology, and Mineral Industries, 1939, Oregon Metal Mines Handbook, Bulletin 14-A, northeastern Oregon - east half (Baker, Union, and Wallowa Counties), 125 p

Oregon (State of) Dept Geology and Mineral Industries, 1941, Oregon Metal Mines Handbook, Bulletin 14-B, northeastern Oregon - west half (Grant, Morrow, and Umatilla Counties), 157 p.

Oregon Dept Geology and Mineral Industries, 1980-1986, Files and verbal communication

Pardee, J. T., 1910, Placer gravels of the Sumpter and Granite districts, eastern Oregon, : U S. Geol. Survey Bull 430, p 59-66

Pardee, J. T., and Hewett, D F., 1914, Geology and mineral resources of the Sumpter quadrangle Oregon Bur. Mines and Geology, Mineral Res. of Oregon, v. 1, no. 6, p 1-128

Pardee, J. T.; Hewett, D. F , and others, 1941, Preliminary geologic map of the Sumpter quadrangle, Oregon Oregon Dept. Geology and Mineral Ind map, with text Scale 1 96,000

Parks, H. M, and Swartley, A. M , 1916, Handbook of the mining industry of Oregon Oregon Bur Mines and Geology, Mineral Res. of Oregon, v. 2 , no 4, 306 p

Prostka, H J., 1962, Geology of the Sparta quadrangle, Oregon· Oregon Dept Geology and Mineral Ind. map, with text Scale 1 62,500

Ross, C. P., 1938, The geology of part of the Wallowa Mountains Oregon Dept Geology and Mineral Ind. Bull. 3, 74 p

Simmons, G C.,; Gualtieri, J L , Close, T J.; Federspiel, F. E , Leszcykowski, A. M , and Hyndman, P. C , 1983, Mineral resource potential of the Hells Canyon Wilderness and contiguous road-less areas, Wallowa County, Oregon, and Idaho, Nez Perce, and Adams Counties, Idaho: U S. Geol. Survey Open File Report 83-397, 20 p

Taubeneck, W. H., 1957, Geology of the Elkhorn Mountains, northeastern Oregon Bald Mountain batholith: Geol. Soc. America Bull , v. 68, no. 2, p 181-238

U S. Bureau of Mines, undated, File on Blue Jacket Mine

U. S. Forest Service, 1981, Final environmental impact statement, Hells Canyon National Recreation Area Comprehensive Management Plan, Appendix O

Vallier, T. L , 1974, Preliminary report on the geology of part of the Snake River Canyon, Oregon and Idaho: Oregon Dept Geology and Mineral Ind Map GMS-6

Vallier, T. L , and Brooks, H. C , 1970, Geology and copper deposits of the Homestead area, Oregon and Idaho. Oregon Dept. Geology and Mineral Ind , Ore Bin, v. 32, p. 37-57.

Walker, G. W., 1973, Reconnaissance geologic map of the Pendleton quadrangle, Oregon and Washington: U. S Geol Survey Misc Geol Inv Map I-727 Scale 1 250,000

Walker, G W., 1979, Reconnaissance geologic map of the Oregon part of the Grangeville quadrangle, Baker, Union, Umatilla, and Wallowa Counties, Oregon U. S Geol. Survey Map I-1116. Scale 1:250,000

Weis, P. L.; Gualtieri, J. L.; Cannon, W. F ; Tuchek, E. T.; McMahan, A. B and Federspiel, F. E , 1976, Mineral resources of the Eagle Cap Wilderness and adjacent areas, Oregon. U S Geol Survey Bull. 1385-E, 100 p

Weissenborn, A E., 1964, Mineral and Water Resources of Oregon Oregon Dept. Geology and Mineral Ind. Bull 64, 462 p.

Willden, R , 1979, Verbal communication on the Blue Jacket Mine.

_____, 1980, Letter and ore reserve maps on the Blue Jacket Mine

Wise, B., 1983, Verbal communication on the Iron Dyke Mine

APPENDIX K

Sensitivity Level 1 And 2 Travel Routes

APPENDIX K

SENSITIVITY LEVEL 1 AND 2 TRAVEL ROUTES

This appendix identifies and describes the visually sensitive travel routes on the Forest. A map showing Sensitivity Level 1 and Level 2 travel routes is provided in the map packet which accompanies the Environmental Impact Statement The major travel routes are the most sensitive (Sensitivity Level 1) The viewshed number refers to the areas mapped on Figure IV-1 and IV-2 and shown in Table IV-6 and IV-7 of the Environmental Impact Statement Less sensitive viewsheds (Sensitivity Level 2) are listed in Table IV-7 of the EIS.

SENSITIVITY LEVEL 1 & LEVEL 2 TRAVEL ROUTES

Travel Routes	Sensitivity Level	General Description	Viewshed*
Grande Ronde River	1	Grande Ronde River Corridor (between Umatilla and Wallowa-Whitman National Forest	1
Highway 3	1	State Highway 3 north of Enterprise	2
Trail 1653	1	Bear Creek	3
Road 8250	1	Road to Bear Creek Campground	3
Road 8210	1	Lostine Canyon	4
Road 8205	1	Hurricane Creek Road	5
State Highway 82	1	Wallowa Valley	5
Trail 1807	1	Hurricane Creek Trail	5
Trail 1812	1	McCully Creek	5
Tramway	1	Mount Howard Tramway	5
Road 39	1	Wallowa Mountain Loop Road, entire	5,7
Road 3960	1	Ollokot to Indian Crossing Campground	8
County Road 727	1	Imnaha to Neiman Ranch	9
Road 4260	1	Imnaha to Dug Bar	10
Road 493	1	Melhorn Saddle to Pittsburg Landing	11
Idaho Power Road 1039	1	Oxbow to Hells Canyon Dam	12
Road 6610	1	Clear Creek to Trail 1867	13
State Highway 86	1	Richland to Oxbow	14
Road 7740	1	East Eagle Creek	15
Road 7755	1	Eagle Creek - Boulder Park area	16
Road 7015	2	Empire Gulch - Switchback above Eagle Creek	16,31
Road 7015	1	Switchback to Junction with Road 77	16
Highway 203	1	State Highway 203 (Catherine Creek State Park, et al)	17

*Refer to Figure IV-1 and IV-2 and Tables IV-6 and IV-7 in Chapter IV of the EIS.

Travel Routes	Sensitivity Level	General Description	Viewshed*
Road 77	1	Corridor from State Highway 203 through Bald Hill, to Flagstaff Butte, and Junction Empi Gulch Road 7015	17
Trail 1914	1	West Eagle Meadows, (Fake Creek)	17
Road 67	1	Big Creek to Tamarack Campground	18
Road 6220	1	Mill Creek to Moss Springs	19
Summit Springs	1	Summit Springs Viewpoint overlooking Moss Springs	19
Highways 237 & 82	1	Grande Ronde and Cove Valley	20
Road 66	1	Duck Lake and Duck Creek Area	21
Road 66	1	Forest boundary north to Fish Lake	22
I-84	1	Interstate 84 and railroad corridor	23
State Highway 350	1	Lightning Creek to Imnaha (town)	24
State Highway 82	1	La Grande to Enterprise	25
Highway 244	1	State Highway La Grande to Ukiah	26
Road 51	1	Grande Ronde River Road to Tony Vey Meadows	27
Road 73	1	Elkhorn Loop Drive to Anthony Lakes	28,29
Winter Sports Area	1	Anthony Lakes Ski Area, et al	29
Trail 1606	2	Crawfish Lake Area	29
Trail 1606	1	Trail north from Crawfish Lake to Road 73	29
Trail 1611	1	Elkhorn Crest Trail, entire length 29,33,34	
Road 7300380	2	Road from 73 to Peavy Cabin	30
Road 312359	1	Grandview Drive - Mt. Emily	31
Road 3120	2	Forest Boundary northeast to 312350 junction	31
Road 4240	1	Imnaha to Hat Point	32
Trail 1633	2	Trail 1633 to Twin Lakes	33
Road 6550	2	Road from Highway 7 to Trail 1633	33
Highway 7	1	Phillips Lake area	33
Road 7301	2	North Fork North Powder River	34
Trail 1632	2	North Fork North Powder River	34
Trail 1617	2	Killamacue Creek Trail	34
Trail 1621	1	Lost Lake and Meadow Lake	34
Goodrich Road	2	To Goodrich Reservoir	34
Pine Creek Road	2	To Pine Creek Reservoir	34
Trail 1626	2	Rock Creek Lake Trail	34
Trail 1628	2	From Road 5520 to Western Union Mine	34
Road 6510	2	Marble Creek Road	34
Road 5520	2	North Fork Rock Creek	34
Highway 7	1	State Highway 7 to Whitney-Tipton	35
County Road 507	1	North Burnt River (Whitney to King Ranch)	36
Highway 26	1	State Highway 26	37
Road 6005	1	Mammoth Springs, South Fork Burnt River	38

*Refer to Figure IV-1 and IV-2 and Tables IV-6 and IV-7 in Chapter IV of the EIS

Travel Routes	Sensitivity Level	General Description	Viewshed*
Jeep Road 1774	1	Memaloose to Somers Point to Lord Flat	39
Trail 1607	2	Dutch Flat Creek	40
Road 21	2	Spring Creek area	A
Road 21	2	From 244 to Frog Heaven Meadows	B
Road 5160	2	From Highway 244 to Road 51	C
Trail 1853	2	Lookout Creek Trail from Road 5160 to Tower Mountain	C
Trail 1843	2	From 1842 Junction north	P
Road 43	2	From Ladd Canyon to Elkhorn Drive Road	D
Road 5125	2	From Grande Ronde River to Ladd Canyon Road 43	D
Road 51	2	Tony Vey Meadows to North Fork John Day Campground	E
Road 52	2	From Road 51 to Ukiah	F
Road 73	2	North Fork of the John Day to Granite	G
Road 73	2	Sumpter to Granite	H
Road 1042	2	From Highway 7 to Greenhorn	I
Road 2640	2	From Mammoth Springs along Last Chance Creek	J
Road 1689	2	West Fork Camp Creek area	K
Road 1684	2	East Camp Creek	L
Old Highway 7	2	Stices Gulch to Mill Creek on Dooley Mountain	M
County Road 550	2	Road from Sumpter to Bourne	N
Road 73	2	From Badger Butte to North Fork of the John Day Campground	O
Road 3125	2	From Road 51 to Road 5125	D
Trail 1843	2	Five Points Creek to 1842 junction	P
Trail 1859	2	Five Points area	P
Trail 1842	2	Five Points area	P
Road 31	2	From I-84 to Conklin Spring	Q
Road 19	2	Beaver Meadows area	R
Road 62	2	Grey Mountain - Mount Moriah area	S
Road 6220	2	From Road 62 to an area south of Point Prominence	S
Road 600 & 650	2	Along South Fork Catherine Creek to Flagstaff Butte	T
Road 7785	2	North Fork Catherine Creek	T
Trail 1905	2	North Fork Catherine Creek to Catherine Creek Meadows	T
Road 1944	2	Middle Fork Catherine Creek Trail	T
Road 7045	2	Road Corridor from Balm Creek Reservoir to Road 67	U
Road 70	2	Sawtooth Ridge - Balm Creek area	U
Road 7735	2	Forest boundary to Eagle Forks Campground	V
Trail 1878	2	Along Eagle Creek	V

*Refer to Figure IV-1 and IV-2 and Tables IV-6 and IV-7 in Chapter IV of the EIS.

Travel Routes	Sensitivity Level	General Description	Viewshed*
Road 77 and 7715	2	From Highway 86 to McBride Campground and Summit Point Trailhead	W
Road 70	2	From Forshey Meadow to Empire Gulch Road 7015	X
Road 46	2	From State Highway 3 to Crow Creek	Y
Road 46	2	Wallamotkin Drive (All)	Z
Road 4620	2	Crow Creek Road	AA
Road 4625	2	Road 46 to Vigne Campground	BB
Road 420	2	Grave Point to Kirkwood Cow Camp	DD
Road 1819	2	Iron Phone Junction to Low Saddle	DD
Road 3930	2	To Harl Butte	GG
Trail 1640	2	Peavy Cabin to Summit of Elkhorn Ridge	N Fork John Day Wilderness
Road 1434	2	Bull Run Mountain, Table Rock, and Mine Ridge Area	Monument Rock Wilderness
Old Oregon Trail	1	All within Forest	23
Cornucopia Road	1	Carson to Cornucopia	14
Road 493	1	NRA Boundary to Pittsburg Landing	11
Road 420	2	Pittsburg Road to Buckhorn Spring	DD
Imnaha River Road	1	Dug Bar to Indian Crossing	6,9,10
Road 2060	2	Iron Phone Junction to Low Saddle	DD
Road 2060A	2	Saw Pit Saddle Road	DD
Roads 112 and 114	1	Roads to Black lake	41
Road 4240	1	Hat Point Road	32
Road 1774	1	Western Rim Trail (4WD)	39
Road 3965	2	Road 39 to Lookout Mountain	12
Road 490	2	Road 39 to Road 3965	6
Trail 1767	1	From Trail 1774 to Somers Point	39

*Refer to Figure IV-1 and IV-2 and Tables IV-6 and IV-7 in Chapter IV of the EIS.

APPENDIX L

Comparison of Current And Past Timber Inventory Data

APPENDIX L

COMPARISON OF CURRENT AND PREVIOUS TIMBER INVENTORIES AND PLANS

This appendix presents a comparison of the current (1979) timber inventory with the immediately previous (1968) timber inventory. It follows with the adjustment of the timber inventory data necessary for this Forest Plan

Reconciliation of the 1968 and 1979 Timber Inventories

Two comparisons are made between the 1968 and 1979 timber inventories in Table L-1 The first is based on the 1968 volume-per-acre figures expanded by the 1979 mapped inventory acres This attempts to avoid problems encountered when using plots to estimate both acres and volume The second compares the two inventories using the 1968 plot expansion volume as the starting point, adjusted to remove the plots which fell within the 1972 Eagle Cap Wilderness additions and Lower Minam Wilderness study area. It was necessary to remove these plots as they were not part of the 1979 inventory.

Step two shown in Table L-1, corrects the 1968 volume for changes in the procedure used to estimate net defect This reduces the apparent green volume of the 1968 inventory by 368 million cubic feet Mortality and harvest between 1968 and 1979 (steps 3 and 5, respectively) are subtracted, and growth (step 4) is added, to complete the update of the 1968 inventory to 1979. When this volume is compared to the 1979 inventory volume, an unaccounted difference of 5 and 44 million cubic feet remains using the two comparisons This represents a 0 2 to 1.9 percent unaccounted difference between the two inventories.

Adjustments to the 1979 Timber Inventory

The 1979 timber inventory was adjusted prior to its incorporation into the FORPLAN model These adjustments include acres removed from the available timber base for the Monument Rock, North Fork John Day, and Eagle Cap Wilderness additions. (Hells Canyon Wilderness additions were already accounted for in the 1979 inventory) Unsuited lands and the area of land occupied by existing roads were removed from the inventory. Indian Creek Research Natural Area and Starkey Experimental Forest were removed as not available for scheduled timber harvest These acreage adjustments reduced the 1979 inventory acre base from approximately 1 2 million acres to 1.06 million acres. Table L-2 displays these adjustments by model component and their effect on the cubic and board measures of standing inventory volume.

Table L-1
VOLUME RECONCILIATION BETWEEN 1968 AND 1979
WALLOWA-WHITMAN TIMBER INVENTORIES

Step		1968 Volume/Acre Expanded by 1979 Inventory Acres	1968 Volume by Plot Expansion 1/
1.	1968 Volume (5"-4" top) Cubic =	2,944 MMCF	2,900 MMCF
2	Gross to net Defect Adjustment from 1968 to 1984 procedure = 12%	-353 MMCF	-348 MMCF
3	Mortality from 1968 to 1979 = 24.5*11 Yrs	-270 MMCF	-270 MMCF
4.	Growth from 1968 to 1979 = 41.4*11 Yrs	+455 MMCF	+455 MMCF
5.	Harvest 2/ from 1968 to 1979 =	-503 MMCF	-503 MMCF
6.	1968 Volume Adjusted for Change in Defect Calculations, Mortality, Harvest and Growth =	2,273 MMCF	2,234 MMCF
7	1979 Inventory Volume =	2,278 MMCF	2,278 MMCF
8.	Unaccounted Difference Between 1968 and 1979 Timber Inventories =	5 MMCF	44 MMCF
9	Percent Unaccounted Difference	0.2%	1.9%

1/ Plot expansion volume adjusted by removal of plots falling within Eagle Cap Wilderness additions of 1972 (19 plots), Lower Minam Wilderness Study Area (5 plots), and Starkey Experimental Forest (7 plots).
2/ State estimate of cubic volume harvest from "Reconciliation of Forest Inventories" January, 1983. John L. Teply, Timber Management, Regional Office (on file at Supervisor's Office in Baker).

Care must be taken when comparing the 1979 inventory volumes reported here with those reported in the 1979 inventory statistics package The cubic volume summarized here is based on 5 inch-dbh to 4-inch top for lodgepole pine and a 9-inch dbh to 6-inch top for other species Summary volumes in the statistics package are either entirely 5-4 inch or 9-6 inch utilization standards.

Both the 1968 and 1979 inventories included standing volume which was under contract at the time the inventories were taken Adjustment in acreage was necessary prior to FORPLAN modeling to reflect the volume which was under contract in 1979 and the additional volume placed under contract between 1979 and 1984 This volume placed under contract represented timber stands unavailable for harvest until the understory or regenerated stands have reached culmination of mean annual increment Acres were updated using the TRI data base and Timber "Cut and Sold" records current to 1984. Table L-3 presents a summary of the acres as carried into FORPLAN These acres include

adjustments for volume under contract but also reflect collapsing of detail necessary to achieve a reasonable model size

Since the FORPLAN inventory volumes include available forest land in Idaho, these acres are subtracted to provide acres comparable to the 1979 timber inventory When the "OREGON 1979 FORPLAN INVENTORY" acres of Table L-3 are expanded against the volume per acre inventoried in 1979, the resulting 7,897 MMBF may be compared with the 9,064 MMBF of the adjusted 1979 timber inventory in Table L-2 The difference, 1,167 MMBF, represents volume placed under contract between 1979 and 1984. Table L-4 shows volume under contract in 1979, and the volume sold in 1980, 1981, 1982, 1983 and 1984 These volumes total 1,277 million board feet. Thus the FORPLAN inventory volumes account for 91 percent of the volume placed under contract between 1979 and 1984 The FORPLAN inventory volume therefore appears to fairly reflect the standing inventory volume available on the Wallowa-Whitman National Forest.

FORPLAN is also updated for growth on existing trees to the mid-point of the first decade of the planning horizon. When the FORPLAN inventory acres are expanded against empirical yield tables which include growth to 1991 as a starting point, a net FORPLAN inventory volume of 9,430 million board feet or 1,840 million cubic feet is the result. Comparison of this 1,840 million cubic feet with the "OREGON 1979 FORPLAN INVENTORY" of 1,536 million cubic feet shows a difference of 304 million cubic feet This growth averages over 12 years to 28.9 cubic feet per acre per year on stands stocked with merchantable trees.

All comparisons above were made against the unconstrained maximum timber benchmark (Region 6 Benchmark 1) Thus further reductions in acres and volume available for harvest occurred in developing alternatives These included management requirements for wildlife, Hells Canyon NRA Comprehensive Management Plan, and lands on which it is not economical to manage timber, given the objectives of the alternative Apparent opportunity costs associated with these various constraints are discussed in Appendix B.

Comparison of FORPLAN Outputs with the Draft 1979 Timber Management Plan

The 1979 Draft Timber Management Plan was never published because of the pending Forest Plan. It suggested a programmable harvest level of 231.58 million board feet Three corrections need to be made to this figure in order to make it comparable with current data.

1) The Draft Timber Management Plan added 57 7 million board feet of lodgepole pine to the programmable harvest volume of pine and associated species to provide for accelerated harvest of lodgepole pine. This represented a departure from nondeclining flow.

2) The currently mapped acreage of "pine and associated" (equivalent to the current CD and CW working groups) is less than the acreage estimated by plot expansion for the Draft Timber Management Plan. Correcting the acreage results in reduction from 173.9 million board feet of pine and associated timber species to 153.3 million board feet.

3) The conversion ratio from board feet to cubic feet for pine and associated species was estimated at 6.29 to 1 in the 1979 Draft Timber Management Plan, whereas the 1979 inventory shows a conversion ratio of 5.55 to 1 for the equivalent working groups Reducing the board foot volume of pine and associated timber species to account for this correction in conversion ratios results in a programmable harvest volume of 135 4 million board foot from the pine and associated components This figure is similar to several of the Forest Plan alternatives developed using the FORPLAN data base.

01727

Table L-2
1979 INVENTORY ADJUSTMENTS
(Oregon Only)

Model Component		Vol/Acre 1/ CF	BF	1979 Inventory M Acres	MMCF	MMBF	Acre Adjustments MNMT	NFJD	ECADD	UNSUITED	STARKEY	INDCRC	ROADS	Adjusted Inventory M ACRES	MMCF	MMBF
CD REGEN	(0101)	1864	10629	92 71	172 82	985 44	- 32	- 06	- 23	-12 09	- 78	- 01	- 78	78 44	146 22	833 76
CW REGEN	(0102)	2371	13328	403 73	957 23	5380.86	-1 62	-6 80	-8 17	-20 30	-6 51	- 07	-3 14	357.13	846 76	4759 83
LP REGEN	(0103)	1788	5030	95 45	170 66	480 10	- 38	-3 29	-1 56	-3 04	- 54	- 67	- 89	85 06	152 09	427 87
CD REG 2	(0201)	264	1380	10 53	2 78	14 53	0 00	0 00	- 01	-4 06	0 00	0 00	0 00	6 46	1 70	8 91
CW REG 2	(0202)	85	415	10 64	90	4 42	- 03	0 00	- 03	-2 85	0 00	0 00	0 00	7 73	66	3 21
CD CT	(0301)	1025	5418	90 25	92 51	488 99	0 00	0 00	- 01	-10 08	- 13	0 00	- 96	79 08	81 05	428 43
CW CT	(0302)	1419	7617	145 21	206 05	1106 06	- 52	-.44	-4 32	-5 86	- 39	0 00	-1 14	132 55	188 09	1009 63
CD FO	(0401)	1548	8650	11 98	18.54	103 59	0 00	0 00	0 00	-1 24	0 00	0 00	0 00	10 74	16 62	92 87
CW FO	(0402)	1698	9148	9 71	16 48	88 79	- 15	0 00	- 25	- 52	- 10	0 00	0 00	8 70	14 76	79 54
LP FO	(0403)	778	1350	72 97	56 77	98 51	-1 15	- 64	-3 62	-3 07	- 82	- 10	- 63	62 94	48 97	84 97
CD PT	(0501)	0	0	1 97	0 00	0 00	0 00	0 00	0 00	- 48	0 00	0 00	- 22	1 27	0 00	0 00
CW PT	(0502)	0	0	4 21	0 00	0 00	- 04	0 00	- 02	- 70	- 26	- 02	- 88	2 29	0 00	0 00
LP PT	(0503)	0	0	18 69	0 00	0 00	- 15	0 00	- 25	- 43	0 00	- 01	- 24	17 61	0 00	0 00
CD REF	(0601)	0	0	5 39	0 00	0 00	0 00	0 00	0 00	0 00	- 09	0 00	- 16	5 14	0 00	0 00
CW REF	(0602)	0	0	11 14	0 00	0 00	- 02	-.01	-.07	0 00	0 00	0 00	- 46	10 58	0 00	0 00
LP REF	(0603)	0	0	2 48	0 00	0 00	0 00	0 00	0 00	- 32	0 00	0 00	- 15	2 00	0 00	0 00
CD OR	(0701)	879	4843	21 59	18 98	104 57	0 00	0 00	0 00	-1 89	- 28	0 00	- 07	19.35	17 01	93 72
CW OR	(0702)	1296	7167	34 05	44 14	244 07	- 57	- 03	- 11	-1 20	- 94	0 00	- 12	31 08	40 27	222 72
CD MT	(0801)	1198	6692	48 76	58 41	326 28	0 00	0 00	- 02	-4 35	- 16	0 00	0 00	44 23	52 29	295 98
CW MT	(0802)	1543	8212	81 40	125 60	668 43	- 46	- 19	- 71	-3 82	-3 84	0 00	- 69	71 68	110 61	588 68
LP MT	(0803)	1250	5059	29 80	37.25	150 76	- 57	- 13	- 75	-1 05	- 81	0 00	0 00	26 48	33 10	133 96
				1202 64	1979 12	10245 41	-5 97	-11.61	-20 13	-77 35	-15 44	- 88	-10 55	1060 51	1750 89	9064 07

1/ Volume per acre from 1979 inventory statistics, 5"-4" for LP, 9"-6" for other species groups

Table L-3
INVENTORY AS REPRESENTED IN FORPLAN

Model Component		1979 Invent CF/AC	1979 Invent BF/AC	Total 1979 FORPLAN Invent 1/ M Acres	Total 1979 FORPLAN Invent 1/ MMCF	Total 1979 FORPLAN Invent 1/ MMBF	Adjust ID Mac	Oregon 1979 FORPLAN Invent 2/ M Acres	Oregon 1979 FORPLAN Invent 2/ MMCF	Oregon 1979 FORPLAN Invent 2/ MMBF	Oregon 1991 FORPLAN Invent 3/ MCF/AC	Oregon 1991 FORPLAN Invent 3/ MBF/AC	Oregon 1991 FORPLAN Invent 3/ MMCF	Oregon 1991 FORPLAN Invent 3/ MMBF
CD REGEN	(0101)	1864	10629	93 71	174 68	996 09	-3 06	90.65	168 98	963 98	2 16	12 31	195 81	1116 11
CW REGEN	(0102)	2371	13328	321 89	763 20	4290 14	-3 17	318 72	755 68	4247 87	2 80	15 74	892 41	5015 35
LP REGEN	(0103)	1788	5030	86 30	154 31	434 11	0 00	86 30	154 31	434.11	2 15	6 04	185 55	521 41
CD REG 2	(0201)	264	1380	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
CW REG 2	(0202)	85	415	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
CD CT	(0301)	1025	5418	120 70	123 71	653 93	-1 76	118 93	121 91	644 38	1 27	6 71	151 05	797 52
CW CT	(0302)	1419	7617	112 86	160 15	859 68	-1 04	111 82	158 68	851 76	1 75	9 40	195 69	1050 87
CD FO	(0401)	1548	8650	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
CW FO	(0402)	1698	9148	0 00	0,00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
LP FO	(0403)	778	1350	67 17	52 26	90 68	- 82	66 35	51 62	89 58	1 01	1,75	67 02	115 94
CD PT	(0501)	0	0	17 99	0 00	0 00	0 00	17.99	0 00	0.00	0 00	0 00	0 00	0 00
CW PT	(0502)	0	0	74 37	0 00	0.00	-1 03	73 34	0 00	0 00	0 00	0 00	0 00	0 00
LP PT	(0503)	0	0	20 99	0 00	0 00	0 00	20.99	0 00	0.00	0 00	0 00	0 00	0 00
CD REF	(0601)	0	0	14 45	0 00	0 00	- 36	14 09	0 00	0 00	0 00	0 00	0 00	0 00
CW REF	(0602)	0	0	39 54	0 00	0 00	0 00	39.54	0 00	0 00	0 00	0 00	0 00	0 00
LP REF	(0603)	0	0	16 96	0 00	0 00	0 00	16.96	0 00	0 00	0 00	0 00	0 00	0 00
CD OR	(0701)	879	4843	6 77	5 95	32 79	0 00	6 77	5 95	32 79	1 05	5 79	7 11	39 17
CW OR	(0702)	1296	7167	9 74	12 62	69 81	0 00	9.74	12 62	69 81	1 57	8 68	15 29	84 56
CD MT	(0801)	1198	6692	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
CW MT	(0802)	1543	8212	69 25	105 85	568 65	- 66	68 59	105 83	563 23	1.89	10.05	129 63	689 62
LP MT	(0803)	1250	5059	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
				1072 70	1553 74	7995 86	-11 90	1060 79	1535 58	7897 07			1839 55	9430 54

1/ Total FORPLAN inventory acres as reported in the maximize timber benchmark, FORPLAN Run Number 616030, with volumes derived from 1979 inventory
2/ Oregon portion of FORPLAN inventory acres with volume derived from 1979 inventory
3/ Oregon portion of FORPLAN inventory acres with volume derived from FORPLAN empirical yield tables

Table L-4
VOLUME UNDER CONTRACT 1979-1984

Volume Under Contract	1979 =	579.5 MMBF
Volume Sold	1980 =	123.2 MMBF
	1981 =	174.3 MMBF
	1982 =	139 7 MMBF
	1983 =	127.0 MMBF
	1984 =	133.0 MMBF
Total Volume		1,276 7 MMBF

APPENDIX M

Analysis of Management Requirements

APPENDIX M

ANALYSIS OF MANAGEMENT REQUIREMENTS

PURPOSE

This appendix presents information responding to decisions of the Chief of the Forest Service and the Deputy Assistant Secretary of Agriculture regarding Appeal Number 1770, brought by the Northwest Forest Resource Council on September 18, 1986 The appeal centered on direction from the Regional Forester to incorporate management requirements (MR's) into Forest Plan alternatives

Appellants requested that the appropriateness of the MR's be examined through the environmental impact statement process. This analysis is intended to address the issue raised by the appellants. In the analysis, alternate ways of meeting the management requirements are examined and their opportunity costs (losses in economic efficiency and timber available for harvest) are compared

BACKGROUND OF THE MANAGEMENT REQUIREMENTS

What Are Management Requirements And What Role Do They Play In Forest Planning?

To assure consistency in applying the laws and regulations to planning, Forest Service National and Regional direction established those substantive requirements of the regulations which must be met in all Forest Plan alternatives. The management requirements are those items identified in 36 CFR 219.27. Some requirements are procedural and need not be dealt with here Some were analyzed and subjected to public review in the Regional Guide Environmental Impact Statement (EIS) process, those too do not need to be dealt with here The management requirements which have not been fully dealt with elsewhere, and require additional analysis, are those for timber harvest dispersion, viable populations of existing native vertebrate species, and water quality/riparian habitat. Each of these management requirements is described in later sections of this appendix.

Legal Requirements Vs. Implementation Methods

The management requirements from NFMA and its implementing regulations are legal requirements These represent "ends" which must be met during forest plan implementation. For example, the NFMA implementing regulations require that "Fish and wildlife shall be managed to maintain viable populations of existing and desired non-native vertebrate species in the planning area." It is mandatory that, whatever implementation methods are chosen, the management requirement be met

Implementation methods are the "means" or "ways" in which the management requirements will be met Using the pileated woodpecker as an example, the management requirement, or "end", is to provide habitat sufficient to maintain a viable population of pileated woodpeckers into the foreseeable future. The "means" or "ways" of providing this habitat involve designing and implementing a set of practices which will assure that nesting and feeding areas, of a size suitable for the needs of the

pileated woodpecker, are available in the future, and that these habitats are close enough together so that the woodpeckers occupying adjacent habitat areas will be able to interact, thus assuring continued genetic diversity

Unfortunately, the distinction between "ends" and "means" is not always clear The National Forest Management Act and implementing regulations clearly describe the "end" regarding viable populations of vertebrate species However, in the case of the harvest dispersion management requirement the "end" is not as well defined. NFMA specifies that harvest openings be limited to a prespecified size and be dispersed, but does not specifically state the reason (or end) to be accomplished by doing so. The implementing regulations and the Regional Guide comply with NFMA by specifying maximum unit sizes, and describing how they are to be implemented to achieve a dispersed standard Limited size and dispersal of harvest openings have no clear precedent regarding "means" or "ends" though for the purpose of this analysis it is treated as though it were an "end" in itself

The "means" (implementation methods) for meeting management requirements must be based on knowledge of the resources involved. For example, in meeting the management requirement for viable populations of vertebrate species it is necessary to define the type of habitat required by the species, the size of habitat area needed to support a breeding pair, and the maximum distance between habitats which will still provide reasonable assurance of genetic interaction Often, the pool of scientific knowledge is insufficient to provide the entire basis for defining the specific conditions or standards that will satisfy or meet a management requirement. When this happens it is necessary to consider the field experience and the professional judgement of knowledgeable professionals and to rely on monitoring and research in providing better information for future planning efforts

Alternative Ways Of Meeting The Management Requirements

Usually there is more than one way in which a management requirement can be met, i e , different means (or ways) can be analyzed for assuring the specifications that indicate ends are satisfied or met. The specifications involve choices as well as the means for achieving those specifications to meet the same end. Considering and analyzing different means (or ways) of meeting a specific management requirement are particularly important if there are potentially large opportunity costs involved.

How Alternative Ways Of Meeting The Management Requirements Were Developed

The general process used in identifying alternative ways of meeting the management requirements is as follows

1. For each management requirement, the desired "end" is identified

2 The existing pool of information about the resources addressed by the management requirement is assembled.

3 The information (from step 2) is analyzed to determine what conditions need to exist on the ground to assure that the management requirement is met (specifications).

4 Ways (means) to provide the conditions (from step 3) are developed. In most cases, it is necessary to simulate the conditions in the FORPLAN model

5 The various ways to provide the desired conditions are analyzed as to their effects on economic efficiency (measured by changes in present net value) and their effects on timber availability (measured by allowable sale quantity)

6. Where opportunity costs of meeting a management requirement with the most efficient means are determined to exceed 2 percent of the PNV or ASQ of the maximum present net value Benchmark, the analysis used to determine the optimum means are presented in this appendix. Note: 2 percent was selected as a threshold of significance. Higher percentages (such as 5 percent) would preclude evaluation of the opportunity costs of a majority of alternative ways for meeting management requirements on many National Forests

Table M-1 presents each of the MR's subject to analysis of opportunity costs on the Wallowa-Whitman National Forest and a summary of the specifications or standards that are indicators of achievement of those ends. Complete specifications are noted in the Forest Plan EIS

Table M-2 shows the alternative means considered for implementing each management requirement where the opportunity costs exceeded 2 percent of the present net value or the allowable sale quantity of the Maximum Present Net Value Benchmark.

In analyzing the effects of the alternative means of meeting the MR's on present net value (PNV) and allowable sale quantity (ASQ), FORPLAN runs were made with and without constraints designed to simulate meeting the management requirement. The Maximum PNV benchmark was used for this analysis. This benchmark is a FORPLAN run which identifies the mix of management activities which would result in the highest level of economic efficiency (i e , the highest PNV) in managing the Wallowa-Whitman National Forest resources. It also identifies the ASQ associated with the most economically-efficient mix of management activities.

A benchmark was chosen to use in the "with and without" constraint comparison, rather than an issue-based Forest Plan alternative, because management practices necessary to meet other objectives of the issue-based alternatives may partially or fully meet the MR, thus clouding any analysis of opportunity costs induced by the management requirement. The true effect when measured against a fully developed alternative is significantly less because the objectives of that alternative may satisfy the management requirements to a large extent.

Table M-3 summarizes the findings of the analysis It displays the PNV and the first-decade ASQ for the maximum PNV benchmark as shown in the DEIS and shows the reduction in PNV and ASQ resulting from application of the selected optimum means of meeting the management requirements Also displayed is the percent change in ASQ and PNV.

Where the opportunity costs exceeded 2 percent, and there were alternative ways of meeting the management requirement, these alternatives were analyzed and the results of these analyses displayed in subsequent tables This is done for harvest dispersion and viable populations of species dependent on mature and old-growth forest As indicated in the analysis results shown in Table M-3, management requirements for water quality and riparian habitat were determined not to have significant effect on both ASQ and PNV Meeting the MR for primary cavity excavators has a significant effect on both ASQ and PNV, but no known alternatives exist. Consequently, no additional analysis of the primary cavity excavator management requirement is discussed.

Table M-1

	Ends		Summary of Specifications
1	Openings created by timber harvest activities are dispersed and limited in size	-	maximum created opening size of 40 acres (with some exceptions).
		-	limit to 1/3 the size and 1/3 the perimeter of adjacent natural openings.
		-	corners of two or more created openings may touch, but are considered a single opening and cannot exceed 40 acres (with some exceptions) if they are not stocked with trees 4 1/2 feet tall.
		-	protect vegetation along edge of natural openings at all times.
		-	site must be adequately stocked with trees 4 1/2 feet tall before a harvest area is considered a closed stand and not an opening
2.	Habitat provided that maintains viable populations of existing native and desired non-native vertebrate species.	-	maintain old growth and mature forest stands (nesting habitat) and feeding areas of adequate size and distribution to permit interaction among breeding pairs of dependent species (See Tables M-6, M-7, and M-8.)
		-	maintain snags in the 10 to 20 inch size classes at not less than the level needed to provide habitat for 20 percent of maximum potential populations of dependent species (primary cavity excavators)
3	Protect water quality and riparian habitat	-	land approximately 100 feet from edges of all perennial streams, lakes, and other bodies of water require special attention: 1. To prevent excessive water temperature increases per State and Federal standards, 2 To maintain streambank stability, 3 To maintain stream channel stability, 4 To avoid unacceptable erosion and sedimentation that would exceed State standards, and 5 To assure that Clean Water Act Standards are met

Table M-2

Management Requirement		Alternative Means
Harvest Dispersion	1	For all tree species, assume 10 years to grow to 4 1/2 feet in height to consider an opening "closed" or no longer an opening.
	2.	For lodgepole pine, assume 10 years and for all other tree species, consider 15 years to grow to 4 1/2 feet in height to consider an opening "closed" or no longer an opening.
Provide for adequate old growth habitat to maintain viable populations of wildlife (pileated woodpecker, three-toed woodpecker, and pine marten).	1.	"Dedicated" old growth stands with no timber management.
	2.	Managed old growth with only the immediate replacement stands designated.
	3.	Managed old growth which provides for all future replacement stands.
Provide habitat (20 percent level) for species dependent on 10 to 20 inch snags	1.	Retain existing snags and provide green-tree replacements sufficient to meet the 20 percent level 1/

1/ No practical alternative ways of meeting this management requirement are known to exist.

The following sections present, for the two management requirements requiring a presentation of the alternatives, (1) the source of the management requirement, (2) a description of the management requirement, (3) alternative ways considered for meeting the management requirement, (4) an opportunity cost analysis, (5) consequences of the different ways of meeting each management requirement, (6) rationale for the selected method, (7) implications for Forest Plan alternatives, and (8) a discussion of the role of monitoring and research

Timber Harvest Dispersion

Source of the Management Requirement. Direction for harvest dispersion comes from several sources. The National Forest Management Act (Section 6 (g)(3)(F)) sets broad direction that the Forest Service is to, among other things, identify maximum sizes for openings created by harvest activities (created openings) This is further defined in the NFMA implementing regulations (36 CFR 219.27(d)) and in the Regional Guide for the Pacific Northwest Region (pages 3-7 and 3-8).

Table M-3

APPROXIMATE CHANGE (OPPORTUNITY COST)
ASSOCIATED WITH MEETING THE MANAGEMENT REQUIREMENTS
WITH SELECTED OPTIMUM IMPLEMENTATION METHOD

	First-Decade Allowable Sale Quantity MMCF/YR (MMBF/YR)	Percent Change in Allowable Sale Quantity 1/	Present Net Value MM$	Percent Change in Present Net Value
Maximum PNV Benchmark as Displayed in the DEIS	27.1 (136.1)	---	249.7	---
	OPPORTUNITY COST (MMCF/YR, MMBF/YR, MILLIONS OF DOLLARS OF PNV, AND PERCENT)			
Total Opportunity Cost of Meeting All Selected Management Requirements	3.8 2/ (18.6)	12.3%	73.9	22.8%
Opportunity Cost of Meeting Harvest Dispersion MR	1.5 (7.5)	5.2	53.1	17.5
Opportunity Cost of Meeting Viable Populations MR	1.0 (4.1)	3.6	7.1	2.8
Opportunity Cost of Meeting Riparian/Water Quality MR	0.3 (1.6)	1.1	4.4	1.7
Opportunity Cost of Meeting the Primary Cavity Excavator MR	1.0 (5.4)	3.6	9.3	3.6

MMCF/YR = Millions of cubic feet per year.
MMBF/YR = Millions of board feet per year
MM$ = Millions of dollars
1/ Percent change calculated on cubic foot basis
2/ Although the potential effects of meeting the four MR's are displayed as if they were additive, there is actually overlap not reflected in the analysis.

Description of the Management Requirement Specifications or Indicators of Achievement. The specifications or standards for achievement of the harvest dispersion management requirement are:

1. A harvested area of commercial forest land will no longer be considered a created opening, for silvicultural purposes, when stocking surveys, carried out in accordance with Regional instructions, indicate prescribed tree stocking that is at least 4 1/2 feet high and free to grow

2. The maximum size limit of harvest openings on the Wallowa-Whitman National Forest is 40 acres. Some exceptions are permitted in specific situations

3. Harvest openings will be separated by blocks of land that generally are adequately stocked with trees that are at least 4 1/2 feet high and that contain one or more logical harvest units of similar size.

4. Harvest openings which touch each other are not precluded, but will be considered a single opening in determining compliance with harvest area maximum size limits.

5. Harvest openings contiguous to 30-acre or larger natural openings are subject to the 40 acre maximum size limit, but normally should not exceed one-third the size of the natural opening and not occupy more than one-third of the natural opening perimeter.

6. Harvest openings should not be created adjacent to any natural openings (regardless of size) unless adequate vegetation along the edge of the natural opening can be developed or retained in sufficient density to protect wildlife and meet visual management objectives.

ALTERNATIVE WAYS CONSIDERED FOR MEETING THE MANAGEMENT REQUIREMENT

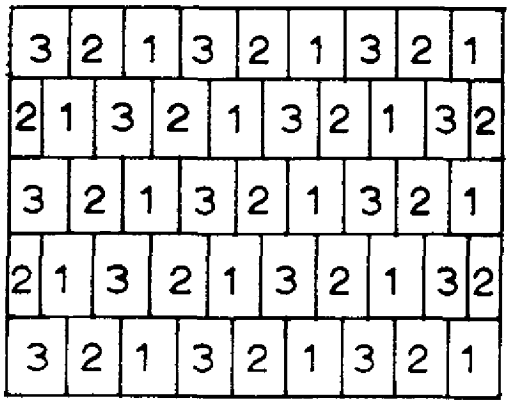
The selected modeling assumption is that 4 1/2 foot trees will generally be achieved within 10 years of a regeneration harvest Achieving a 4-1/2 foot tree height in 10 years requires rapid reforestation and good growth on the newly-established stand. Prompt reforestation of lodgepole pine sites has occurred consistently on the Forest even though natural regeneration is by far the dominant means of stand establishment. Rapid establishment of mixed conifer and ponderosa pine/Douglas-fir sites has been less reliable. For this reason an alternative set of modeling assumptions was evaluated Under these alternative modeling assumptions it was assumed that the average time required to reach a 4-1/2 tree height in a lodgepole pine stand would be 10 years and that for other timber types the average time required would be 15 years This results in a dispersion constraint of 33% on lodgepole pine types and 22% on other timber types.

Two other alternative modeling assumptions were considered, but were not developed in detail. The alternative of constraining the rate of regeneration harvest in all timber working groups to 25% was considered. This would be the the maximum rate at which regeneration could occur, without corners touching, if a checker-board harvesting model were assumed This alternative was not considered in detail because it was obvious that opportunity costs would be greater than with the selected assumption

Also considered was the assumption that up to 50% of an analysis area could be harvested per decade. This could occur under a checker-board modeling assumption, but only if corners of units were permitted to touch and such adjacent openings were not considered one opening. This was not considered in detail since it would not meet the management requirement specifications established by the Regional Guide (i e that openings which touch or corner must be considered a single opening with regard to the maximum opening size standard).

The ways of meeting the management requirement for harvest dispersion were modeled in FORPLAN by constraining the rate of regeneration harvest. For example· using 4 1/2 feet in 10 years and given a continuous stand of mature timber, it is not possible to harvest more than one-third of the area per decade (on the average) and still meet the requirements from the NFMA regulations and the Regional Guide This was determined as follows

> In a theoretical, homogeneous timber stand, made up of numerous smaller stands (represented by the smaller squares making up the large square in the figure below) it is possible to harvest 1/3 of the area in the first decade (those squares labeled "1"), 1/3 in the second decade ("2"), and 1/3 in the third decade ("3"), without corners of created openings touching To do this assumes that an area which is harvested in decade 1 will no longer be a created opening in decade 2 and one created in decade 2 will no longer be a created opening in decade 3 Hence, in the FORPLAN model a constraint was applied which limited the rate of regeneration harvest, for any analysis area, to 33 percent of the area per decade This represents the maximum rate at which an analysis area can be scheduled for harvest.



This relationship can also be depicted by the following equation.

D = 1/H x P/C x 100 where,

D = the dispersion constraint in percent,
H = the number of harvest entries needed to access the entire analysis area without having openings adjacent to each other or having corners touching,
P = the FORPLAN period in years (this is always 10), and
C = the number of years for a created opening to close (the length of time required for a new stand to reach 4 1/2 feet in height).

In the case of the above example, and assuming that a 4 1/2 foot tree height can be reached in 10 years, the equation is as follows

D = 1/H x P/C x 100

= 1/3 x 10/10 x 100 = 33%

Opportunity Cost Analysis. Table M-4 displays the opportunity costs associated with the two sets of alternative analysis assumptions considered in detail for meeting the timber harvest dispersion management requirement

The reduction in PNV per unit loss of ASQ in meeting the harvest dispersion MR is disproportionately high as compared to the effects of the other MR's on PNV This occurs because the lower ASQ is not accompanied by a corresponding reduction in management costs. In fact, some management costs may actually increase with implementation of harvest dispersion requirements For example, to meet the harvest dispersion management requirement it may be necessary to accelerate development of roadless areas (resulting in additional road development costs), delay harvest of high-value timber on some lands, or use faster (and more expensive) reforestation methods to reduce the length of time that an area is considered a created opening.

Consequences of the Different Ways of Meeting the Management Requirement. The 10-year assumption alternative provides a higher timber harvest and present net value than the 10-15-year alternative assumption, although reforestation costs in the former will be higher Assuming a 10-year period for lodgepole pine types and a 15-year period for other types would result in reduced PNV due to first-decade harvest reductions as shown in Table M-4

The 10 year assumptions would result in a slightly more rapid rate of old-growth reduction, loss of big-game thermal cover, and risk of adverse soil and water effects These differences from the 10-15 year assumptions however, are not large enough to be considered significant

The analysis shows that the 10-15-year assumption ASQ opportunity cost is more than twice that of the 10-year alternative assumption The PNV opportunity cost for the 10-15 year assumption is 50% higher than for the 10-year assumption.

Rationale for the Selected Method. The selected set of modeling assumptions was chosen because existing data indicate that achieving a 4-1/2 foot tree height in 10 years on all forest types is feasible This alternative also provides a higher ASQ and PNV. Effects on other resources are negligible. With increased reforestation efforts for mixed conifer and ponderosa pine/Douglas-fir sites, it is reasonable to expect that this alternative can be implemented successfully. The additional expense which may be necessary to assure rapid reforestation is justified by the increased timber availability and PNV which will result Implementation monitoring will provide the basis for tracking regeneration success Should intensified reforestation fall short, future plan amendment would be an appropriate remedy

Implications for Forest Plan Alternatives. Under a strict definition of opportunity costs, most Forest Plan alternatives do not actually involve any opportunity costs associated with meeting the harvest dispersion management requirement This is the case because, for all Forest Plan alternatives (except Alternative G which was modeled on a maximum PNV basis), a specific ASQ level was assigned and shown to be achievable in the FORPLAN run associated with the alternative However, if the alternatives could have been implemented without meeting the harvest dispersion management requirement, a slightly higher ASQ level would have been specified Had this been possible, the opportunity costs both in terms of ASQ and PNV, would be less than is calculated for the Maximum PNV Benchmark with or without the dispersion management requirement This occurs because the objectives of most alternatives contribute to satisfying, or partially satisfying, the dispersion of harvest units needed to meet the management requirement.

Table M-4

APPROXIMATE CHANGE (OPPORTUNITY COST)
ASSOCIATED WITH MEETING THE HARVEST DISPERSION
MANAGEMENT REQUIREMENT

	First-Decade Allowable Sale Quantity MMCF/YR (MMBF/YR)	Percent Change in Allowable Sale Quantity 1/	Present Net Value MM$	Percent Change in Present Net Value
Maximum PNV Benchmark as Displayed in the DEIS	27 1 (136 1)	---	249 7	---
	OPPORTUNITY COST (MMCF/YR, MMBF/YR, MILLIONS OF DOLLARS OF PNV, AND PERCENT)			
Total Opportunity Cost of the Selected Way for Meeting the Harvest Dispersion Management Requirement (10 yrs for all species)	1 5 (7 5)	5 2%	53 1	17 5%
Opportunity Cost of Meeting the Harvest Dispersion Management Requirement Using a Modeling Assumption of 10 years for Lodgepole Pine and 15 years for Other Working Groups	3 3 (16 6)	10 9	81 7	24 7

MMCF/YR = Millions of cubic feet per year
MMBF/YR = Millions of board feet per year
MM$ = Millions of dollars
1/ Percent change calculated on cubic foot basis

In the case of the preferred Forest Plan alternative, for example, substantial acreages of big-game winter ranges would be managed to provide near-optimum habitat. The harvest dispersion requirements for providing the desired habitat conditions are more restrictive than those used in meeting the harvest dispersion management requirement

Role of Monitoring and Research. Monitoring of harvest dispersion will occur during the life of the Plan with several objectives. Monitoring will be used to determine whether or not actual outputs are consistent with those projected by the FORPLAN model using the modeling assumptions applied. Also, the actual time required, on average, for new stands to reach 4 1/2 feet in height will be monitored. This is important in testing the appropriateness of the selected modeling assumptions Also see Forest Monitoring Plan (Forest Plan Chapter 5).

Viable Populations of Existing Native Vertebrate Species

Source of the Management Requirement. The NFMA regulations require that

> "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired nonnative vertebrate species in the planning area For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure continued existence in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area " (36 CFR 219 19)

Description of the Management Requirement. In assessing those wildlife species which could be put at risk as a result of future management activities the Forest Service also examined the types of habitat existing today and how they would change in the future Through this review, it was determined that nearly all types of habitat existing on the Forest today would continue to exist, in similar quantities, in the future. The two significant exceptions to this were the old growth/mature forest habitat type and dead and defective tree habitat Unless management activities were specifically designed to retain a component of old growth and mature forest it was apparent that wildlife species dependant on this type of habitat could experience significant reductions in their population sizes and distribution Likewise, failure to assure protection of some existing dead trees (snags) and failure to provide future snags could result in the elimination of some snag-dependent species over substantial forest areas. This design is necessary because these same old growth and mature forests would be selected and scheduled for early harvest due to their relatively high values when maximizing present net value.

Viable Populations Of Species Dependent On Old-growth And Mature Forest. There are 20 wildlife species on the Wallowa-Whitman National Forest which show a definite preference for old growth/ mature forest. In this analysis three species are considered. They are the pileated woodpecker, the pine marten and the northern 3-toed woodpecker. These species were selected because, in combination, they represent (are indicators of) all species dependent on old growth/mature forest habitats Habitats selected were based on broad seral stages of groups of plant communities which were based on Kuchler's classification system For example, the pileated woodpecker was selected to represent mature and old growth timber in 12 different plant communities

Identification of MR species was made on a Regional (all the National Forests in Oregon and Washington) and a subregional basis The results, by subregion, are shown in Table M-5 The Wallowa-Whitman National Forest is a part of the Blue Mountain subregion (Management requirements also exist for bald eagles and peregrine falcons, but there are no measurable opportunity costs associated with providing sufficient habitat to maintain viable populations on the Wallowa-Whitman. Consequently, they are not analyzed here)

Table M-5

SPECIES MATRIX FOR ADDRESSING MANAGEMENT REQUIREMENTS
FOR WILDLIFE AND THREATENED AND ENDANGERED SPECIES

HABITAT	Zone 1 NORTH COASTAL	Zone 2 WESTSIDE CASCADES	Zone 3 EASTSIDE CASCADES	Zone 4 BLUE MOUNTAINS
Mature and Old Growth	Northern Spotted Owl Marten	Northern Spotted Owl Marten	Marten Pileated Woodpecker	Marten Pileated Woodpecker
(Seral Stages V & VI	Pileated Woodpecker	Pileated Woodpecker	Northern 3-toed Woodpecker	Northern 3-toed Woodpecker
Dead and Defective	Primary Cavity Excavators	Primary Cavity Excavators	Primary Cavity Excavators	Primary Cavity Excavators
Riparian	The Forest determined and documented as part of the planning records, whether it needed to address wildlife in addition to fish, and if so, which wildlife species would represent the riparian habitats Coordination of this process with adjacent Forests was necessary to determine consistency			
Big Game		Mt Goat	Mt Goat (Wenatchee)	
T & E Species	Bald Eagle Peregrine Falcon Falcon Brown Pelican Aleutian Canada Goose	Bald Eagle Peregrine Falcon	Bald Eagle Peregrine Falcon Grizzly Bear Woodland Caribou (Colville)	Bald Eagle Peregrine Falcon

Once the MR species were identified, the Region defined habitat requirements and biological characteristics for the species These are the basis for providing for species habitat, and also for deciding how best to represent the species' needs in the planning process and in the FORPLAN model

Habitat needs were defined using information from "Wildlife Habitats in Managed Forests The Blue Mountains of Oregon and Washington," Thomas, J. W., 1979 and other resources (see bibliography). This information was used to define the habitat conditions, habitat dispersal, and habitat sizes necessary to meet the management requirement When information was available, but did not exactly fit the MR context, professional judgment was used to apply the information in estimating habitat needs When information was not available, habitat needs were developed using professional judgment of a number of the more knowledgeable biologists on the subject Information from existing research was used whenever possible.

This information for each species is provided for three habitat factors described below and presented specifically thereafter for each indicator species.

(1) Principal Habitats Used

Information about the seral stages and Kuchler vegetation types which are used by the various species is documented in many research papers for individual species Information as to which Kuchler type and/or seral stage are primary or secondary habitat, and the amount of dependency upon each habitat, is based mostly on professional judgment (Guenther and Kucera 1978, Phillips et al , 1981)

(2) Dispersal Distance Between Habitats

The guideline on distribution of habitat areas is intended to establish a network that allows individuals of a species to successfully disperse to adjacent habitat areas. This provides interactions among individuals and prevents isolation of sub-populations. This guideline is called the dispersal distance Research information alone is generally not adequate to establish reasonable dispersal distances between habitats As a result, dispersal distance is often determined on the basis of observations, experience, and professional judgement. In establishing the network of habitat areas for each species, consideration is given to habitats in reserved areas and to habitat areas being established for other species

(3) Size of Habitat Areas

The size of individual habitat areas provided for each wildlife species is based on the habitat acreage needed to support the basic social or reproductive unit of the species, i e , breeding pairs Both home range and species density information are used to estimate the needed size of habitat area This was supplemented with professional judgement where no data were available for the specific habitat types being managed

The specific Regional direction for the three identified indicator species and the scientific source of that direction are discussed in the following sections. This direction is summarized from "A Report on Minimum Management Requirements for Forest Planning on the National Forests of the Pacific Northwest Region, USDA Forest Service" (USDA Forest Service, June 1986). In developing the report, various habitat sizes and dispersal distances were considered. Based on that analysis minimum habitat sizes and maximum dispersal distances were identified for each species Since those minimums are based on the best available data, and there are no data specific to the Blue Mountains or the Wallowa-Whitman area which would indicate different habitat needs, alternate minimums were not further considered in developing the Forest Plan for the Wallowa-Whitman National Forest

01744

Pileated Woodpecker

Principal Habitats Used. Pileated woodpeckers represent species which need mature or old growth stands of timber for nesting and feeding Habitats were identified in Bull and Meslow (1977), Guenther et al. (1978), and Thomas (1979)

Dispersal Distance Between Habitats. An initial five-mile maximum dispersal distance between habitats resulted from professional judgment documented in Phillips and Roberts (1985) In June of 1986, the distance between habitats was amended. This changed to one habitat for every 12,000 to 13,000 acres, to allow greater flexibility in application Irwin (1987) suggested that this distance could be greater, but also noted that dispersal distances of juvenile pileated woodpeckers are poorly known. He offered no concrete alternative to the five-mile distance Bull (1987) noted that the distance moved by eight juveniles from the nest where they were raised to the territory they later occupied ranged from 0.4 to 5.4 miles and averaged 2 1 miles

Size of Habitat Areas. The size of areas used by pairs of pileated woodpeckers during the nesting season has been observed to range from 320 acres in eastern Oregon to 1,357 acres in western Oregon (Irwin, 1987) The management requirement established for pileated woodpeckers both east and west of the Cascades, called for 300 acres of old growth or mature timber containing at least 45 snags greater than 20 inches, plus 300 acres of feeding area The requirement for 300 acres containing at least 45 large snags was taken from Thomas (1979) The additional requirement for 300 acres of small snags for foraging areas was established because of the evidence from the literature that pairs of pileated woodpeckers used areas larger than 300 acres Acreage fitures from Bull (1975) and Bull and Meslow (1977) were used. As more data specific to westside and eastside habitats (eastside may be further subdivided) become available, the size of the nesting area may be adjusted (Bull and Meslow, 1977; Bull, 1975; Mannan, 1982, Mellen, 1987) Mellen (1987) has already suggested an increase in foraging and nesting habitat area in westside habitats based on results from radiotelemetry of pileated woodpeckers in the Oregon Coast Range. See Table M-6 for a summary of habitat specifications.

Pine Marten

Principal Habitats Used. The pine marten uses seral stages III-VI (Thomas, 1979; Guenther and Kucera, 1978, Phillips et al., 1981) The Kuchler types used are from Geunther and Kucera (1978) The principal habitat for the pine marten is seral stages V and VI.

Dispersal Distance Between Habitats. Burke (1982) recommends that the maximum dispersal distance between habitat areas for pine marten should be two miles In 1984 the Regional Forester changed the dispersal distance from two miles to three miles This change was made because it was felt that where more than one adjacent habitat is available for dispersal, the dispersal distance can be extended to three miles for pine marten. This change has been reviewed by a number of biologists within and outside the Forest Service and most agree that it would appear not to create a population viability problem for represented species In June of 1986, the dispersal distance specification for the pine marten habitat was changed to one habitat for every 4,000 to 5,000 acres (about three miles apart) to allow greater flexibility in application

Juvenile marten dispersal up to 25 miles has been observed (Hawley and Newby, 1957 and Jonkel, 1959), and average juvenile dispersal distances greater than 6 miles were observed in these studies and in Burnett (1981). Based on this information, Irwin (1987) concluded that "the dispersal distance used in the MR standards might be increased without reducing probabilities for interactions among adults or dispersing young". However, he did not provide a specific alternative, and concluded that

there was little empirical insight into the probability of maintaining a viable marten population using the MR guidelines. As Burke (1982) noted, the distance covered by dispersing individuals is not an absolute guide to appropriate spacing between habitat areas The probability of dispersing individuals locating habitat areas and other individuals decreases rapidly as habitat areas are spaced further apart. Burke suggested that the observed range of population densities might be a better guide to spacing of habitat areas He noted that the three mile spacing would result in a marten density 1/9 to 1/27 of normal densities reported in the literature

Size of Habitat Areas. In the professional judgment of the biologists listed in Phillips and Roberts (1985), a breeding female pine marten can be supported on 160 acres of quality habitat. Research is variable as to the size of area needed, but the female pine marten home range is estimated to be 160 acres (Campbell, 1979). The biologists listed in Phillips and Roberts (1985) judged that this area should be contiguous to ensure that there would be enough habitat within the home range of the female They also judged that crown closure should equal or exceed fifty percent. Research papers indicate that areas with a lower percent crown closure receive little or no use by pine marten Therefore, to ensure an adequate crown closure, a minimum requirement of 50 percent closure was selected.

Research shows that pine marten require dead and down material for foraging, cover, and denning Six down logs/acre (Burke, 1982) was selected as the minimum down material requirement The number and size of snags required was selected to ensure that the amount of down material was achieved. The specifications for pine marten habitat are summarized in Table M-7.

Irwin (1987) noted that the MR guidelines contained an implied hypothesis that 160-acre areas would meet reproductive and winter range needs, and that martin would use broader areas containing a mix of less suitable habitat types at other times. He concluded that monitoring and research could provide appropriate tests of this hypothesis.

Northern Three-Toed Woodpecker

Principal Habitats Used. The three-toed woodpecker represents species dependant upon mature and old growth seral stages Habitats listed are the result of a literature review of Guenther et al, (1978), Jackman and Scott (1975), and Thomas (1979).

Dispersal Distance Between Habitats. The 2 mile dispersal distance between habitats was the result of professional judgment documented in Phillips and Roberts (1985). In June, 1986 this dispersal distance was converted to allow one habitat for every 2,000 to 2,500 acres, to permit greater flexibility in application.

Size of Habitat Areas. The 75 acres per pair was taken from Thomas (1979). The specific numbers and size class for snags as well as seral stages was based on data from Jackman and Scott (1975) and Thomas (1979). The habitat specifications for the three-toed woodpeckers are summarized in Table M-8.

Alternative Ways Considered For Meeting The Management Requirement

Application of the Regional direction for size and dispersal of habitats to the Wallowa-Whitman National Forest requires that a minimum of 28,000 acres of mature/old-growth forest, outside of wilderness or other lands not suitable for timber production, be retained as wildlife habitat for the three indicator species and other species occupying the same habitat In this analysis habitat requirements for the three species are not considered separately since all three species require the same type of

01746

habitat, though in differing amounts In order to reduce the total amount of old growth/mature forest necessary to provide for viable populations, every opportunity was taken to overlap areas managed for the three indicator species, i.e., a habitat area for a pileated woodpecker is also suitable for a pine marten and for a three-toed woodpecker. Consequently, opportunity costs for one species cannot reasonably be considered separately from the other two.

In the published DEIS the Wallowa-Whitman elected to provide this old-growth habitat by dedicating areas to old-growth in the allocation of lands Two other ways of meeting the management requirement were considered prior to selection of this dedicated old-growth strategy: (1) managed old-growth with only the immediate replacement stands designated (i.e. stands that will replace existing old growth in 50-80 years); and (2) managed old-growth which provides for all future replacement stands (i.e. stands that will replace existing old growth in 50-80 years are designated along with stands which will replace these in an additional 50-80 years)

Under a dedicated old-growth strategy, each acre of old-growth is withdrawn from timber production for 150 years and all other acres are available for scheduled harvest. Dedication of existing old-growth stands assures that desired structural characteristics will be available for wildlife It risks the loss of individual stands through catastrophe or decay. Recent literature on old-growth, however, suggests that such risk is much less than once thought Indeed, management of old growth on a harvest basis and replacing it removes structural characteristics important to old-growth and may hasten the decline of the residual stand (Franklin 1981).

In the managed old-growth strategies (often referred to as "managed old growth") it is assumed that existing old growth stands can be harvested in 50-80 years and that other stands will grow into an old growth condition to replace them Failure of the replacement stands to develop desired structural characteristics on schedule would mean that old-growth would be lost for a period of time or that further delay in harvesting the existing old-growth stands would occur.

Under a managed old growth approach with immediate replacement, harvest is delayed on the existing old growth stand reserved for wildlife habitat and harvest is prohibited on an additional replacement stand If a long-term replacement stand is also provided, harvest would be restricted on two additional stands.

Analysis of Opportunity Costs. Table M-9 displays the opportunity costs associated with the three ways of meeting the viable wildlife populations management requirement Present net value for the managed old growth methods is not displayed since opportunity costs were calculated by means other than the FORPLAN model

Consequences of the Different Ways of Meeting the Management Requirements. Populations of pileated woodpeckers, pine martens and other old-growth/ mature forest-dependent species would not be expected to differ significantly under any of the different ways considered to meet the management requirement There are, however, differences in the opportunity costs. These are displayed in Table M-9.

Rationale for the Selected Method. Based on the preceding analysis, it was determined that for the Wallowa-Whitman situation, the dedicated old growth approach would best ensure achieving desired old growth/mature forest habitat, while having the least effect on outputs of other resources.

The dedicated old-growth approach has the advantage that the location of the old growth stand does not change over time, i e , different areas are not being managed for old-growth at different times. This makes implementation less complicated. The dedicated approach also allows existing old growth components to remain

TABLE M-6
WILDLIFE SPECIES HABITAT REQUIREMENTS

SPECIES - Pileated Woodpecker

	Dispersal Distance Between Habitats	Size of Area to Which Wildlife Prescriptions Apply	Habitat Requirements to be Used in Analysis
Zone I	All Zones	600 acres per pair	Within a 1,000 acre unit
A Reproducing Seral stages V and VI of Kuchler Types K1, K2, K3, K12, and riparian B Feeding All seral stages of Kuchler Types listed for reproducing habitat, provided snags are present	One habitat area for every 12,000 to 13,000 acres		- Maintain 300 acres of conifers in seral stages VI and/or V, VI and/or V, per pair for reproducing - Maintain in a minimum average of 2 hard snags per acre greater than or equal to 12 inches DBH, within the 300 acre reproductive area Forty-two of these 600 snags should be greater than or equal to 20 inches DBH
Zone II			When possible, maintain reproductive area in 300 contiguous acres If not possible, habitat may be arranged in blocks not less than 50 acres and no more than 1/4 mile apart
A Reproducing Seral stages V and VI of Kuchler Types K1, K2, K3, K5, K29, and riparian B Feeding All seral stages of Kuchler Types listed for reproducing habitat, provided snags are present			
Zone III			- Maintain a minimum average of 2 hard snags per acre greater than or equal to 10 inches DBH, on an additional 300 acres for feeding
A Reproducing Seral stages V and VI of Kuchler Types K1, K2, K3, K5, K7, K10, K11, K12, K13, K14, and riparian B Feeding All seral stages of Kuchler Types listed for reproducing habitat, provided snags are present			
Zone IV			
A Reproducing Seral stages V and VI of Kuchler Types K11, K12, K14, K15, and riparian B Feeding All seral stages of Kuchler Types listed for reproducing habitat, provided snags are present			

Table M-7
WILDLIFE SPECIES HABITAT REQUIREMENTS

SPECIES - Marten

	Dispersal Distance Between Habitats	Size of Area to Which Wildlife Prescriptions Apply	Habitat Requirements to be Used in Analysis
Zones I and II	One habitat area for every 4,000 to 5,000 acres	160 acres per habitat area	Maintain 160 contiguous acres of conifers in seral states V or VI with a crown closure 50% or greater
A. Reproducing			
Seral Stages V and VI of Kuchler Types KI, K2, K3, K4, K5, K7, K12, K14, K15, and lodgepole climax		(This figure represents the territory of one female and part of the territory for a male)	With the 160 acre unit·
B Feeding			- Maintain an average of 2 hard snags per acre greater than or equal to 12 inches DBH Twenty-four of these 320 snags should be greater than or equal to 20 inches dbh
Seral stages III and IV of Kuchler Types listed for reproducing habitat			
Zones III and IV			
A Reproducing			- Maintain a minimum average of 6 down logs per acre at least 12 inches DBH and 20 feet long
Seral stages V and VI of Kuchler Types K4, K12, K13, K14, K15, and lodgepole climax			
B Feeding			
Seral stages III - VI of Kuchler Types K4, K11, K12, K13, K14, K15, and lodgepole climax			

Table M-8
WILDLIFE SPECIES HABITAT REQUIREMENTS

SPECIES - Northern Three-toed Woodpecker

	Dispersal Distance Between Habitats	Size of Area to Which Wildlife Prescriptions Apply	Habitat Requirements to be Used in Analysis
A Reproducing Seral Stage V and VI of Kuchler Types K4, K15, and lodgepole pine	One habitat area for every 2,000 to 2,500 acres	75 acres per pair	Maintain 75 acres of conifers in Seral Stages VI and/or V, per pair for reporducing
B Feeding All seral stages of Kuchler Types K4, K15, and lodgepole pine, provided snags are present			Maintain a minimum average of two hard snags per acre greater than or equal to 10 inches dbh within 75 acres reproductive areas Forty-five of these snags should be greater than equal to 13 inches dbh

Implications for Forest Plan Alternatives. Alternatives were designed to address public issues As a result most alternatives, including the preferred alternative, incorporate objectives for retention of old-growth and mature timber, for wildlife, visual, and recreational purposes, at levels higher than needed to meet the basic management requirement Consequently, there are no associated opportunity costs.

In addition, each of the other alternatives (except Alternative G) has an assigned minimum ASQ. Since the assigned minimum ASQ is met for the alternative, there are no opportunity costs in the strictest sense of the term. The range of alternatives also shows the range and variation in harvest levels within the available decision space as required to respond to public issues. (If these alternatives could have been formulated without adding the constraints necessary to meet the management requirement, there would have been some increase in ASQ and PNV. The gains, however, would be less than the calculated costs of Table M-9)

Role of Monitoring and Research. The Forest Monitoring Plan (Forest Plan Chapter 5) calls for monitoring populations and habitats of pileated woodpeckers, pine martens, and 3-toed woodpeckers. In future planning efforts, this data will be considered in determining the suitability and effectiveness of the selected way for meeting the management requirement for viable populations This is important in testing the appropriateness of the selected modeling assumptions

Primary Cavity Excavators

Principal Habitats Used. All habitats that are capable of producing trees.

Dispersal Distances Between Habitats/Size of Habitat Areas. Snag densities needed to meet MR direction for cavity excavators must be provided within land areas that are generally no larger than normal harvest unit size (40 acres on east-side Forests and 60 acres on west-side Forests). These densities will be maintained through the full rotation on these areas by providing for green replacement trees that will become snags of adequate size when existing snags fall (See Table M-10.) (USDA Forest Service)

In early stages (grass/forb, seedlings, and saplings) of even-aged management areas, the required snags should be managed in patches wherever the existing distribution of snags and live trees allows One or more patches should be provided per area Size, density, and locations of these patches should be determined based on local conditions and biological, safety and operational considerations. Snag patches on edges of clearcuts near live trees are generally more effective than patches in the middle of clearcuts. In general, the excavator species with the smallest territory size are available within that territory size. Where snag densities are adequate to support more than one pair of each species, they should not be spaced in such a way that all snags fall within a single territory. In general, if a single patch of snags meeting the MR population objective is provided in each of two adjacent 40- to 60-acre areas, the patches from these areas should be no closer than 750 feet wherever the existing distribution of snags and live trees allows

In stands with a forested structure (uneven-aged management or mid-to-late stages in even-aged management), either patches of snags or more evenly distributed snags are acceptable However, within even-aged management areas, it will generally be safer and more efficient to continue providing snags in patches throughout the rotation This means that green replacement trees should be managed in the same patches as the snags that were left at the beginning of the rotations In even-aged management areas, the choice between patches and more evenly-distributed snags should be based on local conditions and consideration of safety, biological effectiveness, and operational feasibility Other requirements for distributions remain the same as above.

Table M-9

APPROXIMATE CHANGE (OPPORTUNITY COST)
ASSOCIATED WITH MEETING THE VERTEBRATE SPECIES
MANAGEMENT REQUIREMENT

	First-Decade Allowable Sale Quantity MMCF/YR (MMBF/YR)	Percent Change in Allowable Sale Quantity 1/	Present Net Value MM$	Percent Change in Present Net Value
Maximum PNV Benchmark as Displayed in the DEIS	7 1 (136 1)	---	249 7	---
	OPPORTUNITY COST (MMCF/YR, MMBF/YR, MILLIONS OF DOLLARS OF PNV, AND PERCENT)			
Total Opportunity Cost of the Selected Way for Meeting the Management Requirement for Viable Populations (Dedicated Old Growth/ Mature Timber)	1 0 (4 1)	3 6	7 1	2 8%
Opportunity Cost Using Managed Old Growth/Mature Timber with Immediate Replacement.	1 0 (4 1)	3 6	NE	NE
Opportunity Cost Using Managed Old Growth/Mature Timber with Long-term Replacement	1 3 (5 1)	4 6	NE	NE

NE = Not Estimated. ASQ opportunity costs were estimated outside of FORPLAN, and no PNV estimate was produced Since a number of acres are affected when "managing" for old growth, PNV opportunity costs would likely be larger, particularly managing for immediate and long-term replacement

MMCF/YR = Millions of cubic feet per year
MMBF/YR = Millions of board feet per year
MM$ = Millions of dollars
1/ Percent change calculated on cubic foot basis

If the snags that are available in an even-aged management area are not currently distributed in patches, those snags may be retained at appropriate densities to meet MR requirements. Green trees that are left as replacement snags may then be managed either in patches or in a more evenly distributed pattern. This choice should be based on safety, biological effectiveness, and operational feasibility.

Where adequate snags are not currently available to meet the MR direction in each 40- to 60-acre area, created snags should be used to meet that direction as nearly as possible If snags are not present and can not be created, higher snag levels can be managed in adjacent areas and averaged with the low levels in deficient areas to meet MR direction However, averaging should be done over as small as area as possible, and replacement snags should be planned for the deficient areas to meet the distribution requirements as soon as possible

(This direction on snag distribution was based on a review of the limited available data on this subject Documentation on this review is available from the Fish and Wildlife Unit, USDA Forest Service, R-6 Regional Office.)

Role of Monitoring and Research. The Forest Monitoring Plan calls for monitoring populations and habitats of primary cavity excavators This data will be used in future planning efforts in determining the appropriateness of level and quality of habitat provided to meet the primary cavity excavator MR

Table M-10
WILDLIFE SPECIES HABITAT REQUIREMENTS

SPECIES - Primary Cavity Excavators

Principal Habitats Used	Dispersal Distance Between Habitats	Size of Area to Which Wildlife Prescriptions Apply	Habitat Requirements to be Used in Analysis
All conifer and broadleaf plant types, provided snags are present	Use professional judgment where specific data is unavailable	Conifer and broadleaf plant types within the Forest	Those areas not managed to meet other MR standards will be managed to provide, at a *minimum, sufficient numbers and sizes of hard* snags to maintain all primary cavity excavators at 20 percent of their potential population size Procedures described in "Wildlife Habitats in Managed Forest, the Blue Mountains of Oregon and Washington" will be used in determining numbers, sizes, and distribution of hard snags needed Also use "Management of Wildlife and Fish habitats in Forests of Western Oregon and Washington" where applicable Note Pileated woodpeckers and Northern 3-toed woodpeckers are covered by separate MR's and are not part of this general requirement

* Habitat requirements specified in MR's for a number of other key vulnerable species also provide habitat for primary cavity excavators In some cases, these habitats will provide high populations of cavity excavators in local areas The purpose of this MR is to provide habitat to maintain a population level outside of other MR habitats that, when considered in conjunction with other MR habitats, will provide for necessary distribution and linkage of all cavity excavators

BIBLIOGRAPHY

Bull, Evelyn L and E. Charles Meslow. 1977 Habitat Requirements of the Pileated Woodpecker in Northeastern Oregon. Journal of Forestry 1975 (6) p 334-337.

Bull, Evelyn L. 1975 Habitat Utilization of the Pileated Woodpecker, Blue Mountains, Or. M.S Thesis. OSU, Corvallis 58 pp.

Bull, Evelyn L. 1987 Ecology of the pileated woodpecker in northeastern Oregon J Wdlf. Manage. 51:472-481.

Burke, T.E. 1982 Marten (unpublished). Colville National Forest, Washington

Burnett, B.W. 1981. Movements and Habitat Use of American Marten in Glacier National Park, Montana. M.S Thesis. Univ of Montana Missoula, MT

Campbell, T.M. 1979 Short-term Effects of Timber Harvest on Pine Marten Ecology M.S. Thesis Colorado State University Ft Collins, Colorado 71 pp.

Franklin, Jerry F. and others 1981. Ecological Characteristics of Old-Growth Douglas-fir Forests Gen Tech. Rep PNW-118. USDA Forest Service. Pacific Northwest Forest and Range Experiment Station

Guenther, K and T. Kucera October 1978. Wildlife of the Pacific Northwest USDA Forest Service, Pacific Northwest Region.

Hawley, V D. and F.E. Newby 1957. Marten home ranges and population fluctuations in Montana J Mammal. 38:174-184.

Irwin, L L. 1987. Review of minimum management requirements for indicator species· pine marten and pileated woodpecker. National Council of the Paper Industry for Air and Stream Improvement Tech Bull. No. 522 New York. 25p

Jackman, Siri M and Dr. J. Michael Scott. 1975 Literature Review of Twenty-three Selected Forest Birds of the Pacific Northwest. USDA Forest Service, Pacific Northwest Region. 382 pp

Johnson, K. September 21, 1983. Westside Coordination Meeting Notes. USDA Forest Service Memo

Jonkel, C.J. 1959. Ecological and Physiological Study of the Pine Marten M S. Thesis Montana State Univ. Missoula, MT

Mannan, R W. 1982. Territory Size and Habitat Preferences of Pileated Woodpeckers in Western Oregon OSU Corvallis Ag Exp. Stat Tech. Paper 000.

Phillips, C. A. and R. Roberts June 4, 1985 Documentation of Wildlife MMR's USDA Forest Service Memo

Phillips, et al January 1981. Wildlife Habitats and Species Management Relationship Program

Thomas, J.W. Edited 1979. Wildlife Habitats in Managed Forests The Blue Mountains of Oregon and Washington USDA Agric Handbook No 553 Washington, D. C

USDA Forest Service. June 1986. A Report on Minimum Management Requirements for Forest Planning on the National Forests of the Pacific Northwest Region, USDA Forest Service.

USDA Forest Service. August, 1988. Forest Plan Direction for Management of Primary Cavity Excavator Habitat Supplement to Original Management Requirement Direction of June 1986

APPENDIX O

Best Management Practices

APPENDIX O

BEST MANAGEMENT PRACTICES

Definitions

Nonpoint sources refers to diffuse or unconfined sources of pollution where wastes can either enter into, or be conveyed by the movement of water to, public waters (Oregon Water Quality Standards, 340-41-007(17)). Silvicultural sources, such as erosion from a harvest unit or surface erosion from a road, are considered nonpoint sources.

Best Management Practices are defined as "methods, measures, or practices selected by an agency to meet its nonpoint source control needs BMP's include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMP's can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters." (40 CFR 130 2, EPA Water Quality Standards Regulation).

Usually BMP's are applied as a system of practices rather than as a single practice BMP's are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility. (EPA Interagency Nonpoint Task Force, 1985).

BMP's are basically a preventative rather than an enforcement system BMP's are a whole management and planning system in relation to sound water quality goals, including both broad policy and site-specific prescriptions

Introduction

Best Management Practices are the primary mechanism to enable the achievement of water quality standards (Environmental Protection Agency, 1987) BMP's will be selected and tailored for site-specific conditions to arrive at the project-level BMP's for the protection of water quality. The process for determining appropriate BMP's, and for ensuring their implementation at both the Forest Plan and Project level, is described Following is a description of the methods and procedures that will be used to control or prevent nonpoint sources of pollution from resource management activities and to ensure compliance with the.

Clean Water Act of 1972, as amended (1977 and 1987). Section 319 of the Clean Water Act Amendments of 1987 requires that the States determine those waters that will not meet the goals of the Act, to determine those nonpoint source activities that are contributing pollution, and to develop a process of determining BMP's to reduce such pollution to the "maximum extent practicable". This Appendix is designed to fulfill the intent of the requirements of Section 319.

Oregon Administrative Rules (Chapter 340-41-001-975). Department of Environmental Quality (DEQ) Oregon's Administrative Rules contain water requirements for the protection of identified beneficial uses of water.

Memorandum of Understanding. The Oregon Department of Environmental Quality and U S Department of Agriculture Forest Service (2/12/79 and 12/7/82), and "Attachments A and B" referred to in this MOU (Implementation Plan for Water Quality Planning

on National Forest Lands in the Pacific Northwest 12/78, and Best Management Practices for Range and Grazing Activities on Federal Lands, respectively)

Washington Administrative Code (Chapters 173-201 and 202) Department of Ecology (DOE) Washington's Administrative Code contains water requirements for protection of various classes of surface waters

Memorandum of Understanding: The Washington Department of Ecology and U.S. Department of Agriculture Forest Service (7/79), and "Attachment A" referred to in the MOU (Implementation Plan for Water quality Planning on National Forest Lands in the Pacific Northwest 12/78).

California's Porter-Cologne Water Quality Control Act (California Water Code, Division 7) The Water Quality Control Plan for the North Coast Region was approved by the North Coast Regional Water Quality Control Board on April 28, 1988 It is pending approval by the State Water Resources Control Board and the Environmental Protection Agency

The Draft North Coast Regional Water Quality Control Plan contains water quality objectives that are considered necessary to protect those present and probable future beneficial uses of water

Memorandum of Understanding: The State Water Resources Control Board, State of California and U S Department of Agriculture Forest Service, Pacific Southwest Region, 1981

The EPA has certified the Oregon Forest Practices Act and Washington Forest Practices Rules and Regulations as BMP's The States of Oregon and Washington compared Forest Service practices with these State practices and concluded that Forest Service practices meet or exceed State requirements As State practices change, comparisons are made to ascertain that Forest Service practices meet or exceed these changes Monitoring and evaluation will determine the need for changes in BMP's *and/or State standards*

Forest Services management practices will meet, as a minimum, the substantive State BMP requirements, and other considerations required by the National Forest Management Act (NFMA), and other authorities, for the protection of the soil and water resources

The general BMP's described herein are action-initiating mechanisms which call for the development of detailed, site-specific BMP prescriptions to protect beneficial uses and meet water quality objectives. They are developed as part of the NEPA process, with interdisciplinary involvement by a team of individuals that represent several areas of professional knowledge, learning, and/or skill appropriate for the issues and concerns identified BMP's also include such requirements as Forest Service manual direction, contract provisions, environmental documents, and Forest Plan Standards and Guidelines. Inherent in prescribing project-level management requirements is recognition of specific water quality objectives which BMP's are designed to achieve

BMP IMPLEMENTATION PROCESS

In cooperation with the State, the primary strategy for the prevention and control of nonpoint sources is based on the implementation of BMP's determined necessary for the protection of the identified beneficial uses

The Forest Service Nonpoint Source Management System consists of:

1 Selection and design of BMP's based on site-specific conditions, technical, economic and institutional feasibility, and the water quality standards of those waters potentially impacted.

2 Implementation and enforcement of BMP's.

3. Monitoring to ensure that practices are correctly applied as designed.

4. Monitoring to determine the effectiveness of practices in meeting design expectations and in attaining water quality standards

5. Evaluation of monitoring results and mitigation where necessary to minimize impacts from activities where BMP's do not perform as expected

6 Adjustment of BMP design standards and application when it is found that beneficial uses are not being protected and water quality standards are not being achieved to the desired level. Evaluation of the appropriateness of water quality criteria to reasonably assure protection of beneficial uses Consideration of recommending adjustment of water quality standards.

BMP Selection and Design - Step 1

Scoping· Potential concerns are identified, e.g , water quality, as part of the NEPA process for environmental analysis. Public notices are dispersed inviting comment and participation in the process. Alternatives are developed to address potential problems and to accomplish project objectives.

Environmental Analysis. Each alternative is evaluated for its potential effect on different resources, including water. From this analysis a preferred alternative is identified, along with the measures (BMP's) needed to reduce risk and increase the potential for success

Documentation· An Environmental Assessment (EA) or Environmental Impact Statement (EIS) is developed with a decision notice and includes required measures (BMP's).

Water quality standards are used as objectives towards which practices are designed to protect beneficial uses.

Appropriate BMP's are selected for each project by an interdisciplinary team BMP selection and design are dictated by water quality objectives, soils, topography, geology, vegetation, climate, economics, institutional constraints, etc Environmental effects and water quality protection options are evaluated, and a range of practices is considered A final set of practices are selected that not only protect beneficial uses, but meet other resource needs. These final selected practices constitute the BMP's.

The selected BMP's, an estimate of their effectiveness, and a plan for monitoring them is included in the project EA or EIS. The site-specific BMP prescriptions are normally included in project implementation plans, but may also be included in the body or appendix of a project environmental document.

BMP Implementation and Enforcement - Steps 2 and 3

The site-specific BMP prescriptions are taken from plan-to-ground by a combination of project layout and resource specialists (hydrology, fisheries, soil, geology, etc) Final adjustments to fit the BMP prescriptions to the site are made before implementing the resource activity

When the resource activity (e g , timber harvest or road construction) begins, timber sale administrators, engineering representatives, resource specialists, and others ensure that the BMP's are implemented according to plan A similar implementation process is used for other resource activities (range management, mining, etc) on National Forests

BMP implementation monitoring is done before, during, and after resource activity implementation. This monitoring answers the question Did we do what we said we were going to do? Some examples of implementation monitoring for a streamside management unit BMP prescription may be·

1 **Before project:** checking Stream Management Units (SMU's) along streams to see if layout meets the objectives of the BMP prescription, or if the road crossing of a stream is properly located and designed per estimates made during the environmental analysis

2 **During project.** during timber felling, the timber sale administrator checks to see if the timber fallers understand marking prescription for timber to be felled in the SMU. The timber sale administrator also observes on-going harvest operations to see if the activity meets the objectives defined in the project plan.

3 **After project**· measuring canopy stream shading to see if the amount specified in the BMP prescription was retained, or monitoring a beneficial use of the water to determine a change or trend in use.

Enforcement is carried out primarily through internal project reviews and contractual enforcement, e g , timber sale contract, grazing or special use permit, etc.

Contract enforcement is a more formal method used to achieve desired results. Normally, each project is assigned a person as a contracting officer. For timber sales, that person is called a timber sale administrator. The project is routinely monitored to ensure that practices are being carried out in the manner and method prescribed in the contract, permit, etc. When a contractor or permittee is not in compliance, they can be held in breech with penalties (e.g , bond forfeiture) until remedies are implemented

Often during the course of an activity, adjustments are made if it is determined that unsatisfactory results are currently resulting or may occur This can often mean that a contract modification may be necessary (as in the case of a timber sale)

BMP Monitoring - Step 4

Once BMP's have been implemented, further monitoring is done to evaluate their effectiveness. BMP "effectiveness monitoring" answers the question Are BMP's effectively meeting management objectives for protection of water quality?

Water quality standards are the "yardstick" against which the effectiveness is tested If, through objective monitoring, BMP's do not meet prescribed objectives, then information is available to modify either the BMP's for future management, or the objectives, or both

The natural variability of water quality under unmanaged conditions is an important factor that will be considered during the monitoring and evaluation. Additionally, effectiveness monitoring will include measurement against land management objectives as well as water quality objectives.

Some examples of the types of BMP effectiveness monitoring to be conducted are.

1. Measuring stream temperatures to see if the riparian prescriptions in a watershed are maintaining water temperatures

2. Storm period surveillance monitoring of a road system to see if road rocking is effectively preventing road surface erosion.

The monitoring and evaluation section of the Forest Plan (Chapter 5), provides that monitoring of BMP's will be accomplished on an appropriate sample basis Once a specific project is designed, a site-specific monitoring plan may be developed.

Results of monitoring should be shared with State and local agencies as well as available to the public Monitoring design, sampling, and laboratory analyses will be coordinated.

BMP Evaluation and Adjustment - Steps 5 and 6

The technical evaluation/monitoring described above will determine how effectively BMP's protect and/or improve water quality. If the evaluation indicates that water quality objectives are not being met and/or beneficial uses do not appear to be receiving adequate protection, corrective action will consider the following three components.

1 **The BMP**: Is it technically sound? Is it really best, or is there a better practice which is technically sound and feasible to implement?

2. **The implementation program or processes.** Was the BMP applied entirely as designed? Was it only partially implemented? Were personnel, equipment, funds, or training lacking which resulted in inadequate or incomplete implementation?

3. **The water quality standards** The water quality standards are established to protect the beneficial uses of water They include numeric and narrative criteria that, when exceeded, are assumed to indicate detrimental impacts on beneficial uses They are intended to provide a benchmark for evaluating harm to beneficial uses.

Assessing the applicability of the standards is a responsibility of the State. The Forest Service will provide information to the State to address the following types of questions.

Do the standards describe the conditions necessary for protecting beneficial uses?

Are standards higher or lower than that necessary for protecting beneficial uses?

Do the standards reflect the natural variability occurring within the natural and human-affected ecosystem?

Do the parameters and criteria that constitute water quality standards adequately reflect (are they sensitive enough) human-induced changes to water quality and beneficial uses?

"Validation" monitoring may be needed to make this assessment. The purpose of validation monitoring is to answer the question whether standards, coefficients, requirements, and guidelines are appropriate to meet objectives, e g., protect beneficial uses

Examples: (1) Did the change in water temperature impact the fish population
(2) Did the soil compaction effect tree growth?

Validation Monitoring will need to be closely coordinated with or, in some cases, conducted by research. It may require the establishment of permanent plots or administrative studies This kind of monitoring will be very limited and will require coordination to select projects with broad application and to prevent duplication Only those coefficients and standards that are not reasonably validated by existing research or documentation should be candidates for this monitoring

Corrective action may be initiated once the reason for failing to achieve the management objectives is determined The management practice may have to be changed, the water quality objectives modified, or both

Training

National Forest personnel involved with project location, design, layout, administration, and maintenance activities will receive BMP training. The training will consist of BMP awareness, as well as on the more technical aspects such as planning, implementation, monitoring, and evaluation.

General Best Management Practices and Examples

Individual, general Best Management Practices are described in *General Water Quality Best Management Practices*, Pacific Northwest Region, 11/88. This provides guidance, but is not a direction document. Also included in this document is a description of the process, and limitations and use of these BMP's Each BMP listed includes the Title, Objectives, Explanation, Implementation and Responsibility, and Monitoring. Evaluations of ability to implement and estimated effectiveness are made at the project level

Not all of the general BMP's listed will normally apply to a given project, and there may be specific BMP's which are not represented by a general BMP in this document

The sensitivity of the project determines whether the site-specific BMP prescriptions are included in the EA/EIS, or in the sale/project plan, or in the analysis files

Following is an example of a general BMP, as described in this document, along with an example of a site-specific BMP which is developed at the project level

EXAMPLES

General BMP

T-5. Title: *Limiting the Operating Period of Timber Sale Activities*

Objective: To ensure that the Purchaser conducts operations in a timely manner, within the time period specified in the Timber Sale Contract (TSC).

Explanation The TSC specifies a Normal Operating Season, during which operations may generally proceed without resource damage Operations are permitted outside the Normal Operating Season only when they can be conducted without damage to soil, water, and other resources. Where determined to be necessary through the environmental analysis, the TSC will limit operations to specific periods or weather conditions Operations are not permitted to continue if damage will occur

Implementation & Responsibility Limited operating periods are identified and recommended during the Timber Sale Planning Process by the interdisciplinary team and followed through the life of the timber sale primarily by the Sale Administrator.

Ability to implement. Add at project level

Effectiveness Add at project level

Monitoring· During implementation of timber sale activities by the Sale Administrator, Forest Service Representative (FSR), engineers, and watershed specialists Also see Forest Plan monitoring plan.

Specific BMP

PT-5. Title: Limiting the Operating Period of Timber Sale Activities

Objective: To ensure that the Purchaser conducts operations in a timely manner, within the time period specified in the Timber Sale Contract (TSC).

Explanation The Ship Mountain Timber Sale contains sensitive soils that are subject to soil compaction during tractor skidding, and a non-surfaced road that is not suitable for wet weather haul.

The normal operating season for the Forest will be enforced for the Ship Mountain Timber Sale All operations off road FR 10 (non-surfaced) will be halted at the onset of wet weather to prevent erosion and damage to the road. Tractor skidding on units 1-5 will be restricted if soil moisture is above the level established by the soil scientist Other operations can continue outside the normal operating season if they can be conducted without damage to soil, water, and other resources.

Implementation and responsibility· For the Ship Mountain Timber Sale the normal operating season for the Forest will be enforced All operations off road FR 10 (non-surfaced) will be halted at the onset of wet weather to prevent erosion and damage to the road. Other operations can continue outside the normal operating season if they can be conducted without damage to soil, water, and other resources The Forest watershed specialists will work with the timber sale administrators to evaluate the potential for resource damage if operating outside the normal operating season

Ability to implement: High

Effectiveness. High

Monitoring. During implementation of timber sale activities by the Sale Administrator, Forest Service Representative (FSR), engineers, and watershed specialists. Also see Forest Plan monitoring plan

REFERENCES

1988 - USDA Forest Service, Pacific Northwest Region, *General Water Quality Best Management Practices*, November 1988

1987 - U S. Environmental Protection Agency, *Nonpoint Source Controls and Water Quality Standards*. Water Quality Standards Handbook, Chapter 2, General Program Guidance, Page 2-25, August 19, 1987.

1985 - U S. Environmental Protection Agency *Final Report on the Federal/State/Local Nonpoint Source Task Force and Recommended National Nonpoint Source Policy* Office of Water, Washington, D.C Page 17.

☆ U S GOVERNMENT PRINTING OFFICE 1990—791-061/01,802 REGION NO 10