Figure B-37 AVERAGE ANNUAL QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS BY ALTERNATIVE

Outputs/Effects	Unit of Measure	No Change	No Act. A	RPA B	C	Preferred E	G
Osprey	Pairs						
Decade 1		125	125	125	125	125	125
Decade 2		140	140	125	125	125	125
Decade 5		180	180	80	80	125	180
Goshawk	Pairs						
Decade 1		No Data	47	43	41	43	47
Decade 2		No Data	50	43	39	45	50
Decade 5		No Data	46	43	42	46	48
Northern 3-Toed Woodpecker	Pairs						
Decade 1		No Data	70-1020	70-1020	70-1020	70-1020	70-1020
Decade 2		No Data	60-880	30-430	20-320	30-420	50-700
Decade 5		No Data	35-510	40-610	30-470	40-600	45-680
Pine Marten	Pairs						
Decade 1		No Data	450-1285	450-1285	450-1285	450-1285	450-1285
Decade 2		No Data	390-1120	375-1075	310-885	375-1065	425-1220
Decade 5		No Data	280-810	405-1150	280-805	450-1285	400-1150
Mule Deer	Numbers						
Decade 1		20,300	20,300	20,300	20,300	24,900	20,300
Decade 2		20,300	20,300	23,300	23,300	24,900	16,700
Decade 5		20,300	20,300	28,600	32,300	24,900	16,700
Woodpeckers	% of Potential Population	40%	40-60%	40%	20%	40-60%[4]	80%
Elk (summer)	Numbers	600	1000	1000	600	1500	2000
Resident Trout		Quantative habitat capacity outputs will be determined for each stream and river reach and lake based on the analysis of habitat survey information collected during the implementation of this Plan An overall increase is expected to result from each alternative due to the implementation of standards and guidelines					
Wolverine & Peregrine Falcon		Occasional sightings of these species. S & Gs developed to continue to protect fish habitat.					
Great Blue Heron		Approximately 40-50 pairs are present Rookeries (nest trees) are protected by S&Gs					

[4]Percent is for even age management, 60% will be available in uneven age management

Figure B-37 AVERAGE ANNUAL QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS BY ALTERNATIVE

Outputs/Effects	Unit of Measure	No Change	No Act. A	RPA B	C	Preferred E	G
Wildlife Habitat Improv	Acre						
Decade 1	Equiva-	6 2	6.2	6.4	30 0	27 0	16.0
Decade 2	lents	6 2	6 2	4 4	30.0	27.0	16 0
Decade 5		6 2	6 2	2 7	30 0	27 0	16 0
Range-Permitted Grazing Capacity	Thousands						
Decade 1	of Animal	35	35	35	35	35	30
Decade 2	Unit	35	35	45	45	45	30
Decade 5	Months	35	35	45	60	45	30
Timber Offered·							
Allowable Sale Quantity	Million						
Decade 1	Board Ft	219	142.1	146.5	191 2	99 8	86 0
Total Sale Program Quantity							
Decade 1		219	177 1	188 5	216 2	141 8	126.0
Timber Offered·							
Allowable Sale Quantity	Million						
Decade 1	Cubic	37 1	24 8	25 9	34.0	17 9	15 6
Decade 2	Feet	-	24 8	25 9	34.0	17 9	15 6
Decade 5		-	24 8	25.9	34 0	17 9	15 6
Total Sale Program Quantity							
Decade 1		37 1	31 6	34 2	39 4	25 4	23.5
Decade 2		-	32.4	33 5	38 4	23 5	22 8
Decade 5		-	31 9	34 0	38.7	24 5	23 5
Allowable Sale Quantity Timber Offered by Species Mix							
Ponderosa Pine	Million						
Decade 1	Cubic	28 2	14.4	3 7	7.3	7 9	7 3
Decade 2	Feet	-	11 9	4 4	15 4	6 6	2 7
Decade 5		-	9 1	16 6	15 5	5 6	0 5
Lodgepole Pine	Million						
Decade 1	Cubic	8 9	0.5	0 6	1.1	5 0	0 1
Decade 2	Feet	-	1 0	5 3	3 8	2 6	2.2
Decade 5		-	10.1	6 4	14 2	8 5	6 6

Figure B-37 AVERAGE ANNUAL QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS BY ALTERNATIVE

Outputs/Effects	Unit of Measure	No Change	No Act A	RPA B	C	Preferred E	G
Mixed Conifer	Million	In					
Decade 1	Cubic	Pond	99	209	256	35	83
Decade 2	Feet	Pine	119	151	102	58	102
Decade 5		above	51	26	23	27	83
Mountain Hemlock	Million						
Decade 1	Cubic	-	0	07	01	1.5	0
Decade 2	Feet	-	01	11	46	2.9	05
Decade 5		-	05	.3	20	11	02
Personal Use Fuel Wood	M Cords	No Data	40	40	?	40	40
Reforestation	M Acres						
Decade 1	per year	No	1	91	135	96	41
Decade 2		Data	3	92	13.1	84	20
Decade 5		-	7.7	9.3	89	95	65
Timber Stand Improvement	M Acres						
Decade 1	per year	96	104	87	183	11.9	67
Decade 2		-	87	19	132	86	45
Decade 5		-	7.5	93	7.7	98	3.1
Long-Run Sustained Yield	Million Cubic Ft.	371	248	259	340	20.7	15.5
Timber Growth In Decade 5	Million Cubic Ft.	No Data	29.8	31.8	40.3	269	18.3
Reforestation Backlog							
Decade 1	Acres	0	0	0	0	0	0
Decade 2		0	0	0	0	0	0
Decade 5		0	0	0	0	0	0
Reforestation Backlog							
Decade 1	Dollars	0	0	0	0	0	0
Decade 2		0	0	0	0	0	0
Decade 5		0	0	0	0	0	0

Figure B-37 AVERAGE ANNUAL QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS BY ALTERNATIVE

Outputs/Effects	Unit of Measure	No Change	No Act A	RPA B	C	Preferred E	G
Soil							
Decade 1	Risk	No	9.0	14.7	20 7	15 0	10 2
Decade 2	Index	Data	13 9	10 5	13 5	11.0	9 4
Decade 5		-	45 2	10 6	10 4	10 5	8 6
Available Geothermal Leasable Acres							
High Potential	M Acres	85	85	90	125	100	50
Moderate Potential		485	485	460	485	470	435
Low Potential		400	400	400	410	400	400
Fire Management Effectiveness Index							
Decade 1	$ M	No	2881	2676	2594	2696	2764
Decade 2	Protected	Data	2910	2799	2696	2764	2943
Decade 5	Acres	-	2820	2553	2512	2594	2758
Forest Road Program							
Road Construction							
Decade 1	Miles	5	5	4	8	5	3
Decade 2		4	4	4	9	5	3
Decade 5		2	2	3	6	3	2
Road Reconstruction							
Decade 1	Miles	10	10	10	12	11	9
Decade 2		9	9	9	14	11	8
Decade 5		6	6	8	10	9	5
Timber Purchaser							
Road Construction							
Decade 1	Miles	11	11	10	17	10	9
Decade 2		6	6	10	18	9	6
Decade 5		3	3	6	10	5	3
Road Reconstruction							
Decade 1	Miles	40	40	36	53	43	31
Decade 2		34	34	37	55	40	26
Decade 5		20	20	28	43	32	18
Roads Available for Passenger Car Use							
Decade 1	Miles	800	800	800	1100	850	650
Decade 2		850	850	900	1200	950	650
Decade 5		900	900	950	1300	1000	650

Figure B-37 AVERAGE ANNUAL QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS BY ALTERNATIVE

Outputs/Effects	Unit of Measure	No Change	No Act. A	RPA B	C	Preferred E	G
Roads Available for High Clearance Vehicles & Closed Roads							
Decade 1	Miles	7700	7700	7700	7400	7650	6850
Decade 2		7150	7150	7100	7100	7050	5850
Decade 5		6100	6100	6050	6700	6000	4350
Fuel Treatment	Thousands						
Decade 1	of Acres	10 5	10 5	17.8	31.8	7.1	4.6
Decade 2		16 8	16.8	11.1	26 3	5.8	4.8
Decade 5		15 2	15 2	18 6	16.6	13.4	4 2
Operational Costs	Million $						
Decade 1		No	9.4	12 8	15 1	12.2	8.1
Decade 2		Data	10 0	11 9	13.9	11 1	8 0
Decade 5		-	9 5	11 8	14 0	13 0	8 5
Capital Investment Costs	Million $						
Decade 1		No	5 3	7.7	9.1	5.2	4 9
Decade 2		Data	5 89	7 1	8 4	5 0	4 8
Decade 5		-	5 8	7 1	8 5	5 5	5 1
Planned Budget	Million $						
Decade 1		No	14 2	20.5	24.2	17.4	13.0
Decade 2		Data	15 0	19.0	22 3	16 1	12.8
Decade 5		-	15 3	18 9	22 5	18 5	13.6
Returns to Government	Million $						
Decade 1		No	17 8	15 6	19.9	10 6	9.1
Decade 2		Data	19 4	12.0	20.7	14 1	10 9
Decade 5		-	25 2	29.9	29.5	21 6	18.7
Changes in Jobs	Number						
Decade 1	of MM$	No Data	248	338	667	219	41
Changes in Income	Change in						
Decade 1	Total MM$	No Data	- 534	-.468	4 693	-2 674	-5.124
Payments to Counties	Million $						
Decade 1		9 0	4 5	3 9	5 0	2 2	2.2
Decade 2		No	4 9	3 0	5 2	3 1	2 7
Decade 5		Data	6 3	7 5	7 4	5 5	4 7

Figure B-37 AVERAGE ANNUAL QUANTIFIABLE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS BY ALTERNATIVE

Outputs/Effects	Unit of Measure	No Change	No Act A	RPA B	C	Preferred E	G
Lands Tentatively Suitable for Timber Production	M Acres	1,272 0	1,150.9	1,150.9	1,150 9	1,150 9	1,150.9
Lands Suitable & Appropriate for Regulated Programmed Timber Harvesting	M Acres	1272 0	867 7	877 9	1,022 6	841.1	635 1
Lands Suitable & Appropriate for Regulated Programmed Timber Harvesting by Yield Category							
Full Yield	M Acres	No	593 5	642.2	823 2	573.3	495.3
50-99% of Full Yield		Data	274.2	235 7	199.4	267.8	139.8
1-49% of Full Yield		-	0 0	0 0	0 0	0 0	0 0
Tentatively Scheduled Timber Harvest							
Decade 1	M Acres						
Clearcut		No	0	1 7	5.1	1 5	0
Shelterwood		Data	0	1 0	1.5	5.9	.0
Selection (uneven-age)			.0	6 4	6 9	4.4	12 2
Overstory Removal			10 4	6	3	2 2	3 6
Commercial Thin			1 9	8 4	8 0	4	0
TOTAL		**23.1**	**12.3**	**18.1**	**21.8**	**14.1**	**15.8**
Decade 2							
Clearcut	M Acres	No	1	9	6 2	3 5	0
Shelterwood		Data	.2	5 3	6.4	0.1	.2
Selection (uneven-age)			0	3 6	2.0	5 3	1.3
Overstory Removal			8.3	.6	.2	0 4	4.2
Commercial Thin			5.7	7.1	8.2	4.7	6.6
TOTAL			**14.3**	**17.5**	**23.0**	**14.0**	**12.3**
Decade 5							
Clearcut	M Acres	No	2.8	4 3	4.0	1.7	1.3
Shelterwood		Data	6 1	10.5	14 4	4.2	3 8
Selection (uneven-age)			2	2.0	0 2	5 6	1 1
Overstory			.0	.0	.0	.0	.0
Commercial Thin			15.6	13 2	14.4	6.6	7.7
TOTAL		**24.7**	**24.7**	**30.0**	**33.0**	**18.1**	**13.9**
Wild and Scenic Rivers							
Wild (W)	Miles	N A	91 9	91 9	91.9	91.9	91.9
Scenic (S)	Miles	N A	36 9	36 9	36 9	36 9	36 9
Recreation (R)	Miles	N A	6 6	6.6	6 6	6 6	6 6
Eligible (R)	Miles	N A				34 2	

Many of the outputs and effects that would result from the implementation of an alternative can not be easily expressed in quantitative terms For these cases, qualitative statements are necessary to summarize the respective consequences of each alternative. Figure B-38 presents a tabular comparison of the qualitative outputs and effects associated with each of the Alternatives·

Figure B-38 QUALITATIVE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS

Resource Outputs and Environmental Effects	ALT. A (Current Direction)	ALT. B (RPA)	ALT. C	ALT. E (Preferred)	ALT. G
Air Quality	Temporary and localized reductions in quality due to dust from roads and smoke from burning	Slight increase in dust and smoke but temporary and localized	Increase in dust and smoke, which could be more continuous, and affect more area	Some increase in dust and smoke, but temporary and mostly localized	Some decrease in dust and smoke
Visual Character of Forest	Subtle changes would occur in areas commonly seen by people Exception would be areas being treated because of pine beetle epidemic	Changes would not be apparent in areas commonly seen, except where pine beetle areas are being treated	The Forest would not appear natural, and human activities would be apparent	Most areas seen by people would appear natural, except areas being treated because of pine beetles	Much of the Forest would appear natural Changes would be gradual
Changes in Recreational Use Patterns	Few problems, but conflicts arise	Could result in polarization	Would polarize some communities	Conflicts should be localized Cohesion would not be affected	Could cause polarization
Social Effects					
a. Community Cohesion	Few problems, but conflicts arise	Could result in polarization	Would polarize some communities	Conflicts should be localized. Cohesion would not be affected	Could cause polarization
b Lifestyles	Provides for lifestyles, but with increasing restrictions	Provides for lifestyles, but with incresed regulation	Increases jobs, but restricts use of the Forest for recreation and firewood gathering	Maintains jobs, and provides for broad recreation opportunity	Reduces jobs and limits recreation opportunity
c. Expectations about change	Does not result in rapid change	Some change, but not dramatically different than current direction	Change would be viewed as dramatic	Some change would occur, but not dramatically different than current direction	Little change would occur

Figure B-38 QUALITATIVE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS (continued)

Resource Outputs and *Environmental Effects*	ALT. A (Current Direction)	ALT. B (RPA)	ALT C	ALT. E (Preferred)	ALT. G
Mountain Pine Beetle					
a. Losses	Much lodgepole would be destroyed, since some areas would not be treated	Some lodgepole would be lost and not treated	Little lodgepole would be lost	Some lodgepole would be lost	Much lodgepole would be lost
b Future Risk of Epidemic	Could repeat in the future	Risk is minimized	Risk would be minimal	Risk would be minimal	Risk would be high in many areas
c. Wood and Forage Production	Would not be increased to its full potential	Some increase would occur	High production levels would occur	Some increase would occur	Slight increase would occur
Wildlife in General	Habitat provided by mature lodgepole pine would be reduced gradually	Habitat provided by mature lodgepole pine would be reduced fairly rapidly	Habitat provided by mature lodgepole pine and other stands would be reduced rapidly	Habitat provided by mature lodgepole pine would be reduced fairly rapidly	Much habitat provided by mature lodgepole will become dead stands
American Indians	Is compatible with Warm Springs Reservations Comprehensive Plan	Is compatible with Warm Springs Reservation Comprehensive Plan	Is not compatible with Warm Springs Reservation Comprehensive Plan	Is compatible with Warm Springs Reservation Comprehensive Plan	Is compatible with Warm Springs Reservation Comprehensive Plan

APPENDIX B
EFFECTS OF BENCHMARKS, CONSTRAINTS AND ALTERNATIVES

Figure B-39 summarizes the development of inventoried roadless areas that would result from the implementation of each of the Alternatives.

During the development of the Alternatives, various management strategies were applied to the different roadless areas A schedule of activities is coupled with these strategies Some of these strategies, such as undeveloped recreation, Research Natural Areas, or old growth, do not permit regulated timber harvesting or road construction. However, other management strategies do involve the scheduling of timber harvesting and its associated road construction activities (i.e., general forest, scenic views, deer winter range, etc) It is the consequences of applying these management strategies to the roadless areas which are displayed in Figure B-39 and the respective individual roadless area tables in Chapter IV of the FEIS.

Figure B-39 Summary of Roadless Area Development by Alternative

	No Change	No Action Alt. A	RPA Alt. B	Alt. C	Pref. Alt. E	Alt. G
Total Unroaded Acres (Roadless areas, Wilderness & OCRA)	357,600	357,600	357,600	357,600	357,600	357,600
Total Roadless Area Acres	145,142	145,142	145,142	145,142	145,142	145,142
Roadless Area Acres Available for Timber Development	44,842	44,842	54,174	89,961	47,422	47,653
Roadless Area Acres Unavailable for Timber Development[1]	100,300	100,300	90,968,	55,181	97,720	97,489
Acres of Timber Harvest.[3]						
Decade 1[4]		0	7,066	8,082	0	0
Decade 2		0	18,429	32,392	255	397
Decade 5[5]		12,434	30,159	69,927	6547	9,262
Cumulative Miles of Road Construction by:[6]						
Decade 1		0	70.7	80.8	.0	0
Decade 2		0	184 3	323.9	2.6	4.0
Decade 5		124.3	301.6	699.3	65.5	92.6
Acres Remaining Undeveloped After.[7]						
Decade 1		145,142	138,076	137,060	145,142	145,142
Decade 2		145,142	126,713	112,750	144,887	144,745
Decade 5		132,708	114,983	75,215	138,595	135,880

Acres Used For Geothermal Development Depends on demand for Geothermal Development

APPENDIX B
EFFECTS OF BENCHMARKS, CONSTRAINTS AND ALTERNATIVES

Economic Comparisons and Tradeoffs Between Alternatives

This section compares and discusses the economic consequences of the Alternatives The section will begin with a general discussion of PNV and the factors which influence it between the Alternatives. The section will then cover the implications of the Alternatives with regard to budget, returns to the U S Treasury, noncash benefits, and economic impacts on the local communities. Finally, the significant incremental changes in PNV from one alternative to another will be summarized The focus of this discussion will be on the tradeoffs between priced and nonpriced outputs and their effects on the overall ability of the Alternatives to address certain key issues, concerns, and opportunities.

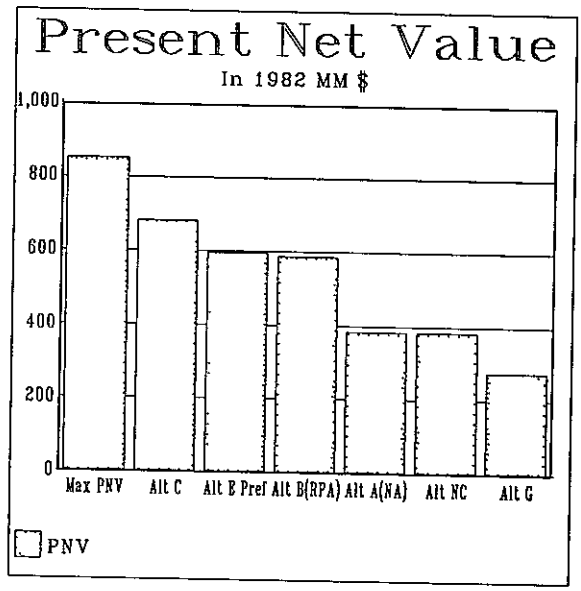
In many cases in the tables, figures, and text, reference is made to various decades The first decade basically represents the period that would be covered by a Forest Plan while the later decades represent the potential that might occur if an alternative were to continue beyond the first decade. The period covered by a plan for any alternative is 10-15 years.

PNV, Discounted Costs and Benefits, and Their General Relationships to Both Priced and Nonpriced Outputs

Present net value (PNV) is the primary quantitative measure of economic efficiency for each benchmark and alternative. PNV is the sum of market and nonmarket priced values less all management costs discounted to present values at a 4 percent interest rate. A fifty year period was used to make the calculation

The PNV of the Max-PNV Benchmark (BM-7) and the Alternatives are displayed in Figure B-42. The Alternatives are ranked in order of decreasing PNV. Figure B-42 shows the differences in PNV between adjacent pairs of the successionally ranked alternatives. These figures are estimates of the net economic values of the priced resources that would be foregone if a lower-ranked alternative is selected over the preceding one These relationships are graphically displayed in Figure B-40.

Figure B-40 - Present Net Value



APPENDIX B
EFFECTS OF BENCHMARKS, CONSTRAINTS AND ALTERNATIVES

Before comparing the PNV's, it is first necessary to discuss some of the components of the PNV calculations in order to get a better understanding of the true differences between the Alternatives. Displayed in Figure B-42 are the present values of the costs and benefits associated with each of the Alternatives Figure B-44 presents a more detailed breakdown of the benefits and costs by major resource categories The PNV for each alternative is the difference between discounted costs and discounted benefits. Figure B-41 displays these relationships for each of the Alternatives ranked in order of decreasing PNV from left to right.

Figure B-41 - Present Value Benefits and Costs

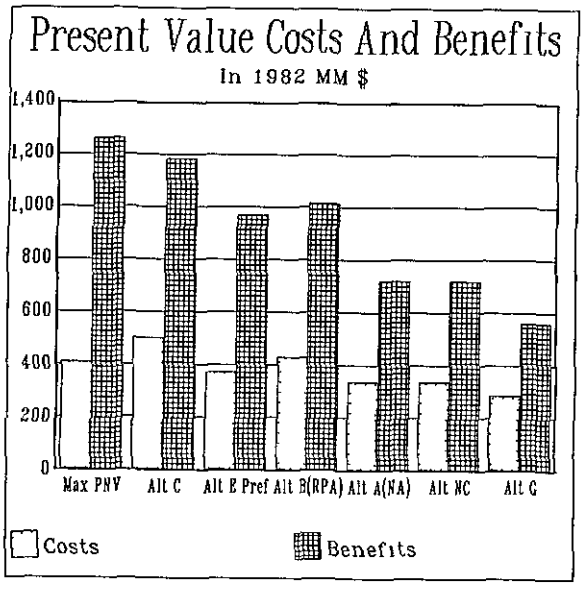


Figure B-42 Present Net Value, Discounted Costs, Discounted Benefits, and Benefits/Costs Ratios (Millions 1982$ @4%)

	Present Net Value		Discounted Costs		Discounted Benefits		Benefit/Cost
	PNV	Change	Costs	Change	Benefits	Change	Ratio
Benchmarks:							
Max. PNV	850.74	NA	409.26	NA	1260.00	NA	3 08
Alternatives:[1]		-169.20		91 19		-78 02	
Alternative C	681 54		500.45		1181 35		2 36
		-86 48		-126.47		-212.94	
Alternative E	595.08		373 98		969 04		2 59
		-9 09		55.15		-409 04	
Alternative B	585.97		429.13		1015 10		2 37
		-202.27		-92 87		-295 14	
Alternative A	383.70		336.26		719.96		2.14
		-109.18		-50 78		-159 96	
Alternative G	274.52		285 48		560.00		1 96
		NA		NA		NA	
Alternative NC	DNA		DNA		DNA		DNA

[1]Alternatives Ranked by Decreasing PNV

DNA = Data not available to determine these values

Discounted costs are the sum of all Deschutes National Forest expenditures for 50 years, discounted to their present value using a 4 percent interest rate. The maximum discounted costs for management of the Forest is $500.45 million for Alt.C while the minimum is $285.48 million for Alternative G. As shown in Figure B-42, the difference in discounted costs between Alternatives is primarily accounted for in the amount of funding necessary for timber management and organizational support in order to implement the Alternatives.

The "discounted benefits" for each alternative is the sum of the present values of all market and nonmarket priced benefits for 50 years. As shown in Figure B-41 & B-42, BM-7 provides the largest amount of discounted priced benefits ($1260 0 million). Of the Alternatives, Alternative C produces the most discounted priced benefits at $1181.98 million while Alternative G results in the fewest ($ 560.0 million). The differences between the Alternatives can be attributed primarily to the timber and recreation related benefits.

Figure B-43 - Discounted Benefits by Resource

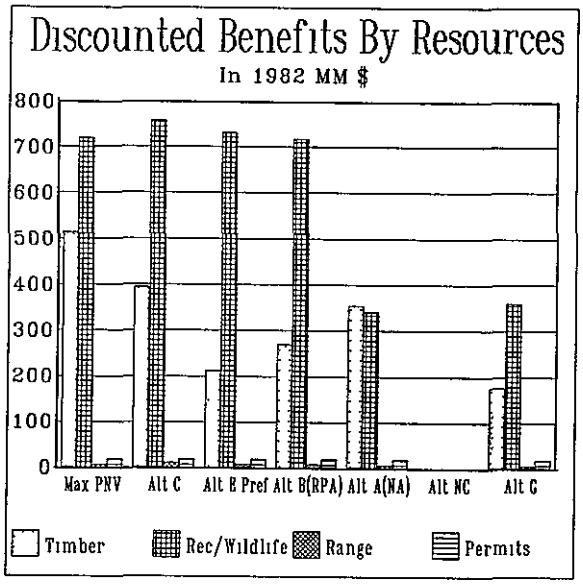


Figure B-44 helps to show this. It presents the discounted benefits for each alternative broken down by resource related outputs. The benefits are mostly accounted for by timber and recreation outputs. It shows that the timber and recreation related benefits are the ones that vary the most from the high to the low end of the range in PNV's between alternatives. However, the nonmarket values for Alternative A (Current Direction) and Alternative G are distinctly lower than the nonmarket benefits for the other alternatives These differences will be explained in more detail below

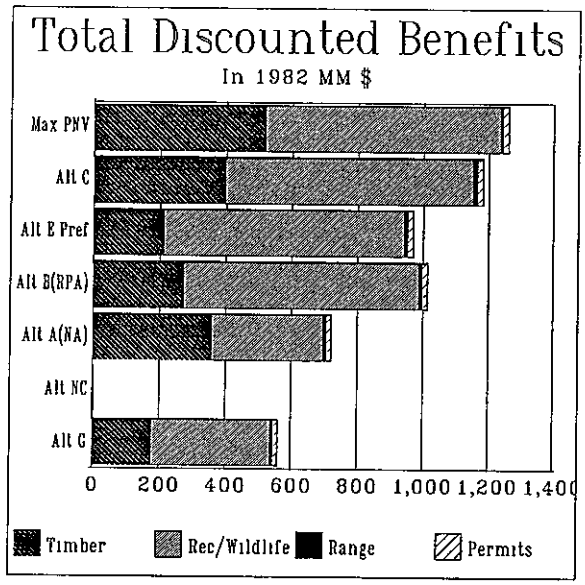
Figure B-44 Discounted Benefits and Costs By Resource Groups (Millions 1982$ @4%)[1]

	Discounted Priced Benefits by Resource					Discounted Costs by Major Categories				
	PNV	Timber	Rec. & Wildlife	Range	Spec. Use Permits	Timber	Rec. & Wildlife	Range	Roads	Admin.& Support
Benchmarks:										
Max. PNV (Run-4)	850.74	513 78	719.20	6.77	20 25	97 85	77.66	3 31	53.60	176 84
Alternatives: (Ranked by Decreasing PNV)										
Alternative C	681.54	393.75	757.47	10 51	20 25	163.56	82 62	7.74	55.27	191.26
Alternative E	595 08	211 08	730 54	8 44	18 99	80 04	77 42	6 21	37.64	172 62
Alternative B	585.97	269.71	717 96	8.44	18.99	129.60	75 61	6.21	40 80	176.91
Alternative A	383 73	354 56	341 00	6 77	17 63	79 87	44 76	3.31	37.13	171.16
Alternative G	274 52	176 27	359 75	6 07	17 91	49 65	47 98	2 97	28.68	156 20
Alternative NC	Data is not available to make computations									

[1]Direct comparisons of benefits and costs by individual resource provide broad indications of specific relationships but they may be misleading because many costs are nonseperable under multiple-use management

It is important to note that none of the economic consequences displayed in this Chapter, whether they be present net values, returns to the government, or impacts on jobs and income in the local economy, include those associated with the possible future development of geothermal resources on the Forest. Substantial geothermal resources are believed to exist on the Forest, but the timing of their development and the extent of their potentials is highly speculative The potential economic consequences that could result from the development of geothermal are believed to be significant and may vary among the Alternatives For more information regarding the geothermal resources on the Forest and their possible economic consequences, refer to Chapters 3 and 4, FEIS

Figure B-45 - Cash and Non-Cash Discounted Benefits



"Noncash benefits" is an aspect of discounted benefits which needs to be discussed. Noncash benefits are the benefits individual resource users receive when charged less for the resource than they are willing to pay, or current market prices indicate they should pay. They are the difference between the full economic value of the resource and the fees actually paid to use that resource. Noncash benefits are measured by the difference between total discounted benefits less the discounted receipts that are generated by each alternative. The Forest receives revenues for stumpage, grazing permits, campground fees, and other special use permits. Yet, the Forest generates benefits to users which are not realized in terms of cash flows. This is because dollar prices are assigned to nonmarket resources on the Forest in order to reflect their full economic value even though none or only part of that value is collected as fees under current laws and policies. Timber is the only resource for which the discounted benefits are equivalent to discounted revenues. For all of the other resources, recreation being the primary one, discounted benefits exceed revenues Figure B-45 displays the total discounted benefits, receipts, and noncash benefits for each alternative in order of decreasing PNV. The size of the benefit is directly related to the amount of recreation (primarily) and timber (secondarily) benefits generated by each alternative.

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The Max-PNV Benchmark (BM-7) is presented as a reference point only. While it meets the minimum legal requirements of managing the Forest, it does not represent a viable alternative because it was not designed to respond to the ICO's. It represents the maximum net economic returns available if the priced resources on the Forest were managed solely to maximize present net value. It has the highest PNV ($850.74 million). Max PNV also has the highest first decade average annual harvest level of 34 0 MMCF; most of which is the higher valued Ponderosa and mixed conifer species working groups as opposed to the significantly lower valued lodgepole pine and mountain hemlock working groups.

The PNV's for the Alternatives range from $681.53 million for Alternative C to $274.52 million for Alternative G Alternative C offers the highest first decade average annual harvest levels of all the Alternatives (34 0 MMCF), while Alternative G provides the lowest (15 6 MMCF) The recreation related benefits between Alternative C and Max PNV are relatively comparable. Therefore, it's important to note that not only is the amount of timber offered for sale an important component of PNV, the mix of species is also a significant factor In fact, one of the principal differences in the timber programs between the Benchmarks and the Alternatives is the species mix

Generally, as the discounted costs decrease from one alternative to another, so do the PNV's. This can be interpreted to mean that additional investments in resource management between the Alternatives usually result in relatively greater returns in terms of increased benefits.

While these relationships hold as a generality, there are exceptions. For example, Alternative B incurs higher discounted costs than the alternative preceding it in the PNV ranking. For various reasons, it did not benefit from the same types of investment returns as did the other alternatives. In order to understand these complex relationships between PNV, discounted benefits, and discounted costs, a more in-depth examination of their components is needed.

Figure B-44 presents the discounted benefits and costs by major resource groups for each Alternative. Note that it would be incorrect to assume a direct relationship between the dollar benefits associated with a particular priced output and the cost figure assigned to it This is because the production of any specific priced output is generally supported by a complex combination of multi-functional input costs However, they do provide some insight into the complex financial relationships that exist between the Alternatives

Figure B-44 also shows that from 16 to 33 percent of the total discounted cost for any alternative can be attributed to the timber resource, while 23 to 49 percent of the Benefits can be attributed to the timber resource. Recreation (Wilderness, Dispersed and Developed) accounts for anywhere from 65 to 75 percent of the benefits for any one alternative Recreation is responsible for the majority of the discounted benefits for the Benchmark and Alternatives C, E, B and G. Together, timber and recreation benefits total more than 95 percent of the discounted benefits for each Alternative.

Timber and recreation related discounted costs and benefits account for the primary differences between the PNVs for the Alternatives Timber related benefits range from $513 78 million for Max PNV, to $393 75 million for Alternative C, to $176.27 million for Alternative G This is a total difference of $338.0 million from the lowest to the highest timber related benefits received amongst the Alternatives. Timber management costs range from $50 million for Alternative G (the lowest) to $164 million for Alt.C (the highest).

Except for Alternative A (Current Direction) and Alternative G which have respective recreation benefits of $341 million and $359 million, the recreation benefits for the other alternatives have a relatively narrow range (from $718 million to $757 8 million). This is despite the wide range in recreation land prescriptions between the Alternatives. The Alternatives reflect a relatively narrow range in recreation benefits because it was assumed that in the short-run, the propensity to participate in recreation would not change

much between the Alternatives. What would change is where recreation takes place on the Forest. What differentiates Alternatives A and G recreation benefits from other alternatives is the quality of recreation experience managed for. They provide lower standards of recreation experiences and, therefore, lower valued recreation outputs than do the other alternatives. This is because of the existing budget levels for Alternative A (Current Direction) and the resource management objectives for Alternative G.

The differences in PNV between the Alternatives can also partly be attributed to the levels of nonpriced outputs which they provide. While these outputs can not be valued in dollar terms, their output levels can often be measured in terms of other units Figure B-47 presents information which is useful in helping to understand the relationships between some of the key nonpriced outputs and present net value. It is important to keep in mind that this table is intended to present only general relationships between the nonpriced benefits and PNV. The differences in the output levels and effects should not be interpreted as absolute measurable tradeoffs. Figures B-48 through B-52 graphically depict the surrogate measures of output levels for the nonpriced outputs which will be discussed in the next few paragraphs.

Figure B-47 Present Net Value Change, Returns to Treasury and Counties, and Key Nonpriced Outputs

	PNV @4% ($MM)	Chge. In PNV ($MM)	PV Costs @4%s ($MM)	Change In Costs ($MM)	Returns To Treas. $MM[1]	Pmts To County $MM[1]	Chge.In Employ Dec.1 (Jobs)	Reserved For Pers.Use (MCords)	Firewood Quality Ret & Part.Ret (MAcres)	Visual Eagles, Owls,& Osprey (MAcres)	Undev. and Winter Rec. Allocations (MAcres)	Unroaded Harvests Decades 1 and 2 (MMBF)	Timber Suitable Timber Lands (MAcres)
Benchmarks:													
Max PNV (Run-4)	850 7	N A	521 3	N A	25 1	6.3	468	0 0	0 0	22 6	0 0	200 9	1150.9
Alternatives: (Ranked by Decreasing PNV)													
		-169.2		-20 8									
Alt. C	681 5		500.5		19 9	5.0	667	0 0	42 2	31 8	27.4	191 2	1027 0
		86 5		-126 47									
Alt E	595 08		373 98		8 9	2 2	219	60	224 2	45 6	92 6	99 8	935 0
		9 1		5 2									
Alt B	586 0		429 1		15 6	3.9	338	60	220 7	44 5	85 4	146 1	977 8
		-202 3		-92 9									
Alt A	383 7		336 3		17 8	4.5	248	60	321 5	30 0	63 5	142 1	1000 2
		0 0		0 0									
Alt G	274 5		285 6		9 1	2 3	41	75	133 1	67 0	148 0	86 0	943 3
Alt NC	DNA		DNA		36 0	9.0	DNA	60	321 5	30 0	63 5	DNA	1272 0

DNA = Data Not Available

[1]Average Annual First Decade

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It is important to note that the provision of some nonpriced benefits is complementary to the production of priced outputs while the provision of others is contradictory. The contradictory relationships generally mean that more nonpriced outputs can only be provided at the expense of producing fewer priced outputs (primarily timber) and, therefore, lower PNV's. It is a subjective decision as to whether the foregone priced benefits are at least compensated for by the increased outputs of nonpriced benefits.

Maintaining and enhancing the lifestyles of Central Oregonians was identified as one of the more important nonpriced benefits. Of course, this is comprised of several components including the opportunity for diverse recreation experiences in a visually pleasing environment, along with clean air and water. Economic stability is also a factor. For this discussion we will cover these as separate nonpriced outputs and in no particular order of importance.

Maintaining and enhancing economic community stability can mean many things to different people and can be measured in various ways Figure B-47 presents the change in the number of jobs in the local economy during the first decade that could result from the implementation of an alternative. To some extent, the payments to county also provide some insight into the economic base from which the local Governments can provide services to residents of the area. In general, both of these have complementary relationships with the production of priced benefits "Payments to counties" is calculated as 25 percent of total Forest Service receipts, 97 percent of which are related to harvesting timber. In turn, many jobs in the local economy are directly related to the amount of timber and recreation supplied from the Deschutes National Forest. Figure B-47 indicates that in the production of timber, and recreation outputs, payments to counties and potential number of jobs in the economy all run together.

With regard to the job estimates, one point needs to be explained. Timber related jobs in the area are estimated as a function of the amount of board feet sold from the Forest. Lodgepole is a relatively small tree Because of this, fewer usable boards can be milled from the cubic feet of fiber which exist in its stem. In addition, many of the local mills now process these small diameter trees in automated (relatively low labor) mills. Therefore, the substitution of lodgepole pine volume for the volumes from larger trees such as Ponderosa pine has a downward pressure on the employment base in the area.

The ease of accessibility to personal use firewood from the Forest is also a component of the Central Oregon lifestyle and considered a nonpriced benefit. Different alternatives investigated various ways of pricing and rationing this material to its end users. The Benchmark, plus Alternative C put this material up for sale to the highest bidder. None was set aside for personal use. The other alternatives each set aside either 40 thousand cords per year for personal use firewood cutters, which is the current level of demand Alternative E allows the supply to increase to 60 thousand cords to meet the demand, should it increase, while Alternative G allows the supply to increase to 75 thousand cords These relationships are depicted in Figure B-48 To the extent that personal use firewood permits are priced below what this material would normally sell for on the competitive market, the rationing of personal use firewood supplies has a slight downward pressure on PNV (although the amount of decrease in PNV would probably be small).

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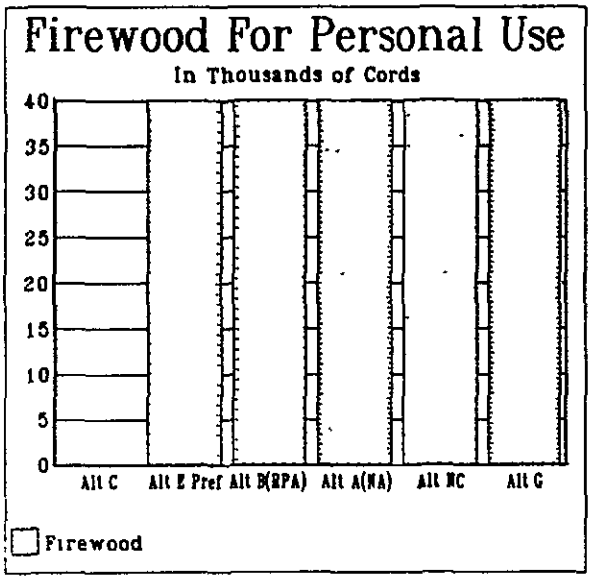
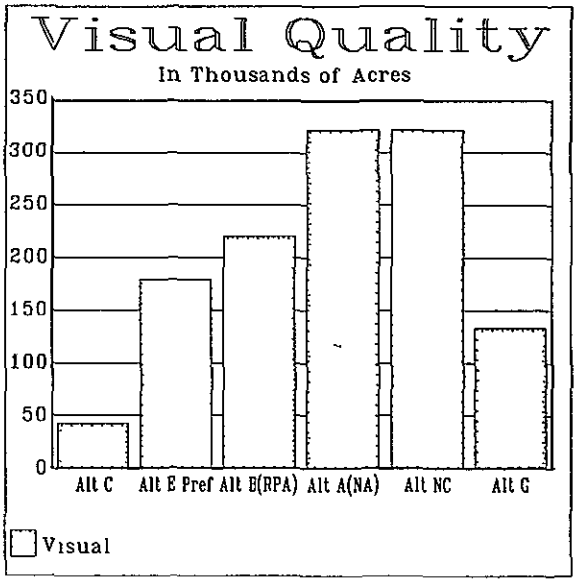
Figure B-48 - Firewood Reserved for Personal Use (First Decade)



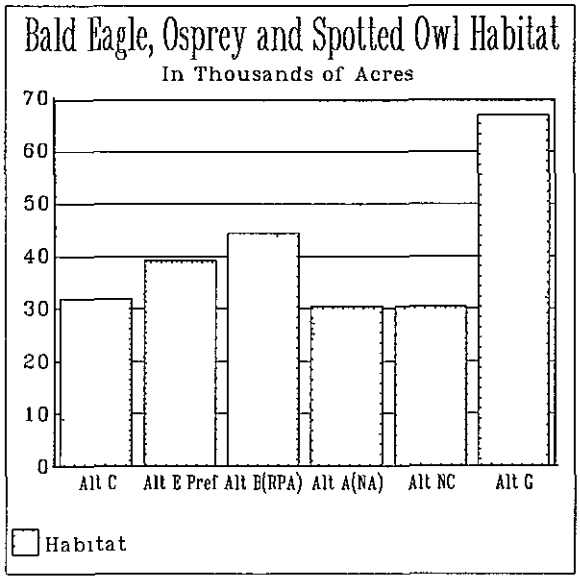
The maintenance or enhancement of visual quality in sensitive scenic areas is another nonpriced benefit In Figure B-47 and Figure b-49 this output is presented in terms of the amount of acres of retention and partial retention visual quality objectives met in each alternative. While some timber harvesting is acceptable, and even necessary, in order to meet the visual *management objectives in scenic areas, the* provision of visual quality on the Forest usually comes at some expense to the amount of timber that could be harvested As more acres are allocated to visual management across the Alternatives, the lower the PNV tends to be.

Figure B-49 - Visual Quality (Retention & Partial Retention)



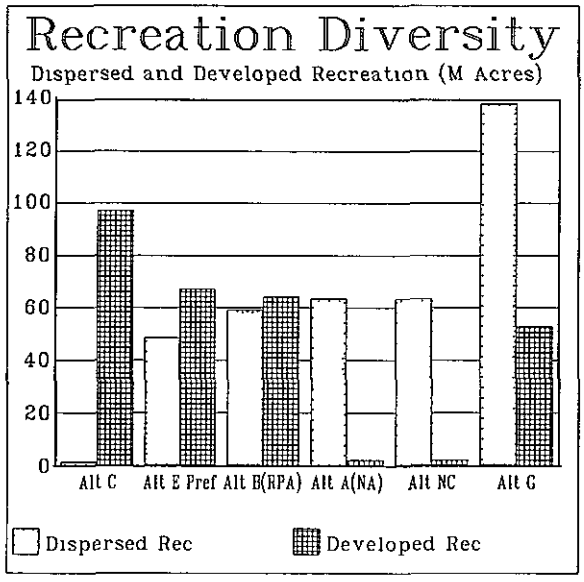
The provision and maintenance of habitat for bald eagles, spotted owls, and osprey are also considered a nonpriced benefit. Figure B-47 and B-50 depict the amount of habitat provided for these species for each Alternative Generally, as the amount of acres managed for their habitat increases, PNV decreases.

Figure B-50 - Habitat Provided for Bald Eagle, Spotted Owls and Ospreys



The provision of opportunities to participate in diverse recreation experiences is another nonpriced benefit. Recreation diversity on the Forest is most limited by the amount of opportunities to recreate in unroaded nonwilderness areas In Figure B-47 and B-51, this output is measured in terms of amount of unroaded undeveloped and winter recreation allocations outside of Wilderness The tradeoffs between this output and timber are the most extreme. On most of these areas, no programmed timber harvesting is permitted. The conflicting relationship between the provision of recreation diversity and PNV is apparent, the more recreation diversity in terms of unroaded nonwilderness recreation, the lower the timber program, and the lower the PNV

Figure B-51 - Recreation Diversity (Undeveloped and Developed Recreation)



The maintenance and enhancement of clean air and water, and the protection of historical and cultural resources, are also, to some extent, contradictory to the harvesting of timber. While the provision of these benefits has not been a serious problem in the past, alternatives which greatly increase the amount of acres harvested will make it more difficult to protect these resources. Figure B-47 and B-52 show that there is no direct correlation between PNV and acres available for timber harvest, but there is a correlation between acres available for timber harvest, ASQ, and returns to the treasury.

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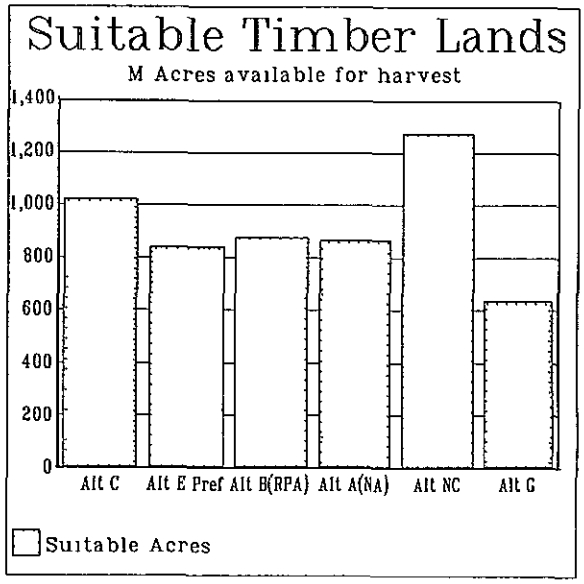
Figure B-52 - Acres of Timber Harvested



U.S. Treasury Cash Flows: Budgets and Receipts

Net returns to the U.S. Treasury are defined as the difference between the total dollar receipts of an alternative and the budget required to implement that alternative. Figure B-53 displays the net cash flows, total budgets, total receipts, and noncash benefits by alternative for the first and fifth decades. The first decade basically represents the life of a plan which is 10-15 years while the fifth decade represents the potential if an alternative were carried forward for five decades. The Alternatives are ordered in terms of decreasing first decade net cash flows. Note that returns exceed budgets for all Alternatives in the 5th decade except Max PNV.

Figure B-53 Average Annual Net Receipts to the U.S. Treasury (Millions 1982$)[1]

	Decade 1[2]				Decade 5[3]			
	Net Returns Treasury	Total Costs	Total Returns Treasury	Noncash Benefits To Users	Net Returns Treasury	Total Costs	Total Returns Receipts	Noncash Benefits To Users
Benchmarks:								
Max PNV(Run-4)	7.9	17.2	25 1	26.5	-3.9	23.2	19 3	48.0
Alternatives:								
Alt A	2 7	15.1	17 8	14.1	9.0	16.2	25.2	18.4
Alt G	-3.9	13.0	9 1	14.5	6.0	13.6	19.6	27.0
Alt. C	-4 2	24.1	19.9	26.5	7.0	22.5	29.5	43.4
Alt. E	-8.5	17.4	8 9	27.2	3.4	18.5	21 9	45.3
Alt. B	-4.9	20.5	15.6	27.2	11.1	18.9	30.0	32.0
Alt. NC	Data is not available for this alternative.							

[1]Costs are limited to Forest Service or taxpayer expenditures Twenty-five percent of the receipts would be paid to counties

[2]First decade basically represents the life of a Plan for any alternative

[3]The fifth decade represents the potential if an alternative were continued for 5 decades.

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The receipts presented in Figure B-53 represent actual dollar revenues generated by each alternative. For all Alternatives, timber stumpage revenues account for over 95 percent of the total receipts. The remainder of the receipts are from campgrounds and other special use fees collected from Mt. Bachelor Ski Area, recreation residents, other resorts, range permittees, minerals, lands, and power. Figure B-54 depicts the estimated average annual receipts by alternative for the first, second, and fifth decades. The Alternatives show a decrease from the current situation to the first decade while the Benchmark does not. The most noticeable difference is between the Benchmark and the Alternatives. The Benchmark and the Alternatives reflect increasing receipts after the first decade. This is mostly related to the differences in their timber harvest schedules and the species mix which comprise them.

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Figure B-54 - Average Annual Returns To The Treasury

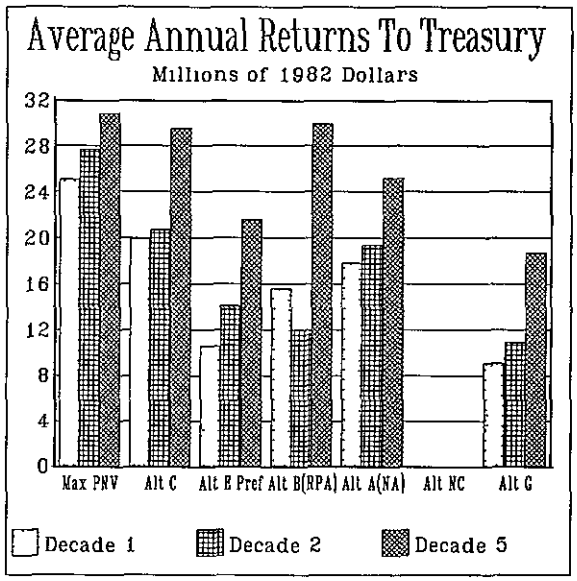
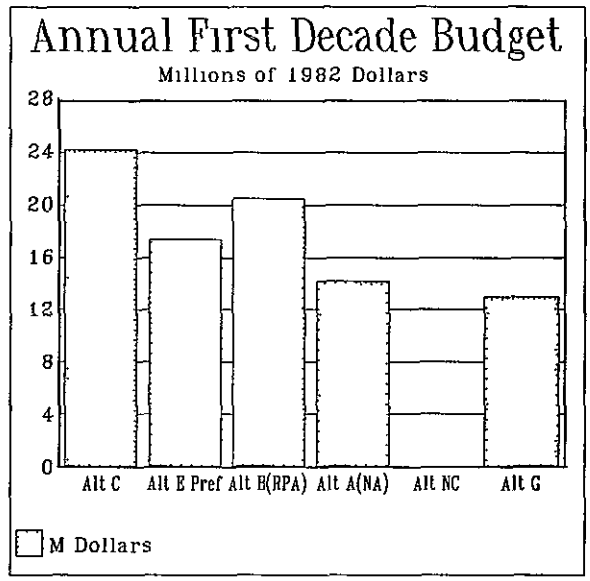


Figure B-55 - Annual First Decade Budget



The estimated average annual budgets for the Alternatives over this same period of time are much more stable, not varying by more than $2.2 million in any Alternative for decades 1, 2, or 5 Figure B-55 depicts the average annual first decade budgets by alternative by two cost categories; capital investment, and operations and maintenance At $24.2 million, Alt.C has the highest budget requirements. This is a 64 percent increase over the Alternative A (Current Direction) budget requirements of $14 7 million (1982 constant dollars). Alternative C has the highest average annual first decade budget amongst the Alternatives. Alternative G requires the least budget to achieve its management objectives, $13 0 million or 1 7 million more the current forest budget. Of these budget estimates, $4.9 million were considered to be fixed, or constant, across all Alternatives. The remainder varied by alternative and was a function of specific output levels and the management activities needed to achieve them.

The majority of the capital investments are for timber management and the Forest road system, with most of it being accounted for by investments in timber production. Most of the Forest transportation network is already in place. Alternatives B & C require the construction of new roads in existing roadless areas during the first decade.

Economic Impacts on the Local Communities

Changes in the levels of timber harvests, recreation use, grazing, and Forest Service expenditures on the Forest have the potential to impact the employment and income levels in the local economy. Many of the local communities are particularly dependent upon the timber and recreation resources as the mainstays of their economies. Therefore, the potential economic impacts on the local economy of Central Oregon resulting from the implementation of any one of the Alternatives is an important element in the process of selecting a preferred alternative. It was identified as one of the issues, concerns, and opportunities (ICO's) at the

outset of the planning process. The following paragraphs present some information regarding this issue.

The primary economic impacts resulting from changes in output levels on the Forest are felt in Deschutes County and small portions of southern Jefferson and northern Klamath Counties Therefore, Deschutes County will be used as a surrogate for the total area of influence. (For more detail on the economic impact analysis, refer to Appendix B, the section on Socio-Economic Analysis). However, in recent years more and more communities outside of this traditional area of influence are depending upon the Forest to some extent for their economic well being. For example, up through 1981 approximately 85 percent or more of the timber sold off the Forest was processed in Deschutes, southern Jefferson, and northern Klamath Counties. In 1982 this figure dropped to 78 percent and in 1983 it dropped again to 47 percent It is primarily lodgepole pine which is being processed outside of the local area In 1982 and 1983, only 40 percent and 25 percent, respectively, of the lodgepole sold on the Forest was purchased by mills within the traditional *local area of influence As timber supplies in* western Oregon and other areas of the State become more restricted due to Wilderness legislation and other land use decisions, buyers are apparently traveling further for their sources of wood

Figures B-56 & 57 display the potential first decade economic impacts in terms of jobs and total personal income in the County that could result from the implementation of any one of the Alternatives The Alternatives are displayed in order of decreasing PNV from left to right. The impacts are expressed as a change from the current Deschutes County employment and income base Max PNV offers the largest potential to provide a stable and growing economy over the next ten years with the opportunity to increase jobs and incomes. Alternatives E, B, A, NC, and G offer the opportunities to increase jobs, however, personal income will decrease. This is caused by the decline in timber volumes and increase in recreation, when secondary jobs from recreation pay less than those from timber. Of the Alternatives, Alternative C is the only one which provides an opportunity for an increase in personal income and jobs based on output levels from the Forest. The implementation of any of the other alternatives will result in a slight increase in jobs and total personal income in the County is down from -.534 MM$ to -5.1 MM$.

Figure B-56 - Changes In Local Employment (First Decade)

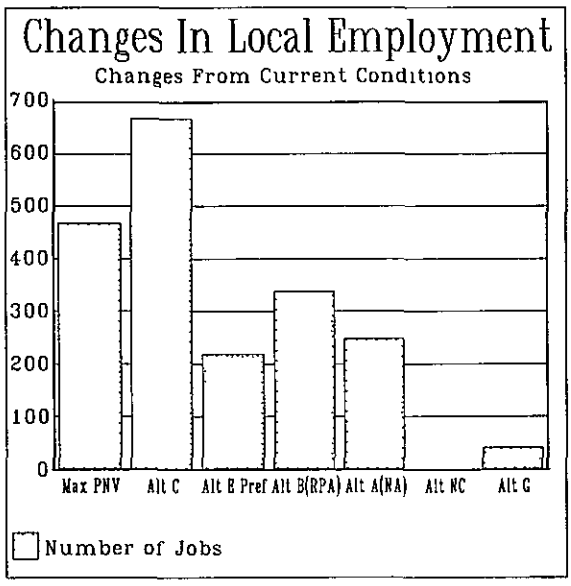
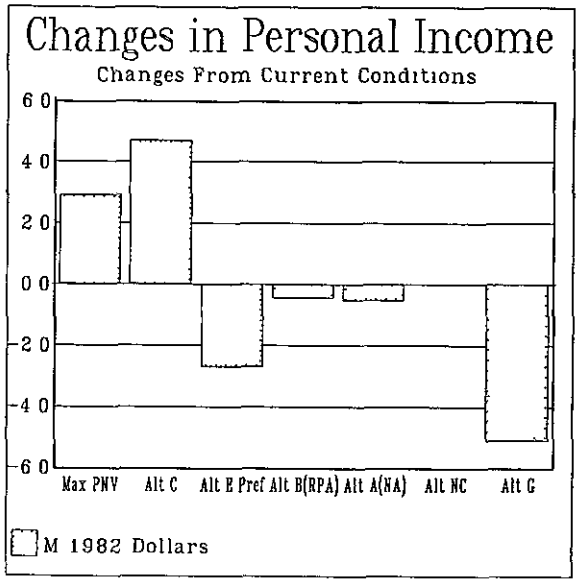


Figure B-57 - Changes in Personal Income (First Decade)



The timber and recreation resources are the primary Forest based outputs which are influencing the local economy Since the recreation use levels will not change that dramatically in the short-term from one alternative to another, it is the amount of timber that each alternative proposes to sell which most heavily influences the jobs and income levels during the first decade. Over the longer run (20 to 50 years), the differences between the Alternatives in their recreation output levels increase and, therefore, become an important factor accounting for the variation in potential for long-term economic growth opportunities.

With regard to the timber related impacts, not only is the amount of wood offered for sale an important factor, but so is the species mix The potential impacts on timber related jobs in the local economy are estimated as a function of the change in the amount of board feet sold by an alternative as compared to current sale levels (as represented by Alternative A-Current Direction). In terms of cubic feet, Alternative G is the only alternative which proposes to sell significantly less volume than Alternative A.

Two other factors are working to influence the relationship between the proposed timber output levels and their impacts on jobs in the local economy. First, many of the local mills now process small diameter trees in automated low labor intensity facilities. Sometimes the small diameter material is chipped and loaded into trucks right at the sale area. Both of these processing techniques imply that the selling of lodgepole pine will not have strong positive impacts on the wood processing related jobs in the local economy. Secondly and as mentioned above, in 1982 and 1983, only 25 to 40 percent of the lodgepole sold off of the Deschutes National Forest was purchased and processed locally The bulk of it went to the west side of the Cascades or to southern Klamath County What this means is that the more an alternative accelerates the harvesting of lodgepole pine during the first two decades and substitutes this volume for the Ponderosa pine and mixed conifer species, the less opportunity for the wood processing sectors in the local communities to maintain their current employment base

Recreation is, and will probably increasingly continue to be, a mainstay of the Central Oregon economy. In 1983, the Deschutes National Forest ranked 5th among the 19 National Forests in the Pacific Northwest Region and 27th among the 125 National Forests in the Nation in terms of visitor days. Most of the Deschutes National Forest visitors, 70 to 80 percent, come from Oregon The majority of visitors from outside the State originate from California and Washington Visitors from Oregon come primarily from three distinct areas: the Portland-Metropolitan area, the Willamette Valley, and Central Oregon. Therefore, the Forest is locally and regionally an important provider of recreation opportunities. Current estimates show the State's population to be increasing at an annual rate of roughly 2 percent. To the extent that an alternative emphasizes the development of capacity for diverse recreation opportunities, recreation use on the Forest is likely to increase at a comparable rate In accordance, the service industry in the

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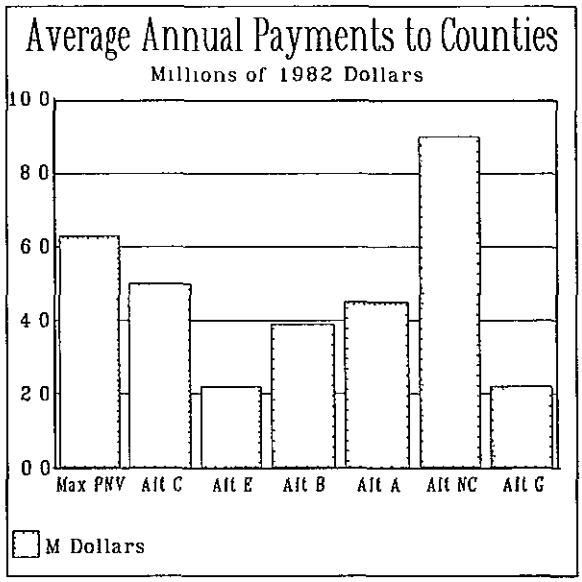
local economy can be expected to grow over the long-run to facilitate the recreation visitors, although the jobs will generally be lower paying than the wood processing related manufacturing jobs.

Another means by which the Forest Service can impact the local economy is through its payments to local governments in lieu of taxes. The Forest Service pays 25 percent of its total receipts to county governments. As was discussed above, most Forest receipts are generated by the selling of timber stumpage. To the extent that an alternative emphasizes the production of timber, the local governments will benefit financially. Keep in mind that stumpage receipts are not only related to the amount of volume which an alternative proposes to sell, but also the mix of species. The Benchmark proposes to sell relatively more volume of the higher valued Ponderosa and mixed conifer species in the early decades, leaving the lower valued lodgepole and mountain hemlock for the later time periods. Figure B-58 shows the average annual returns which the counties can expect from the implementation of any one alternative in the short and long-term.

Figure B-58 - Average Annual Payments to Counties



Summary of Major Tradeoffs Between Alternatives

The following paragraphs summarize the significant tradeoffs between the Alternatives The focus of the discussions is upon the *incremental changes in PNV from one alternative* to another as influenced by the production of both priced and nonpriced outputs, and more importantly, the ability of the alternatives to address key planning issues, concerns, and opportunities (ICO's) With regards to the ICO's, the summary will emphasize those to which the responsiveness varies significantly between the Alternatives and can be indicated quantitatively. Since this discussion is a summary, a more comprehensive understanding of the differences between the Alternatives requires the reading of both Chapters 2 and 4 of the FEIS A more complete description of the ICO's can be found in Chapter 1 and Appendix A

To provide a framework for assessing these tradeoffs, the ICO's which help to identify the significant differences between the Alternatives, and their respective quantifiable indicators of responsiveness are briefly summarized Then, the quantitative responsiveness of each of the

alternatives to these ICO's will be presented in tabular form (Figure B-59). Finally, the incremental tradeoffs between alternatives will be summarized on an alternative by alternative basis in order of decreasing present net value.

National, Regional, and Local Issues

The management of the Deschutes National Forest has implications for national, regional, and local concerns For example, RPA timber output targets assigned to the Forest reflect the anticipated needs of national and international markets for wood products. The development of geothermal resources on the Forest could have significant implications for national, regional, and local energy needs in the future. Decisions influencing the scenic quality of the Forest and its ability to provide an adequate supply of diverse recreation opportunities is of importance to regional and local residents who are the primary users of recreation resources on the Forest.

Consequently, the entire Forest Planning process revolves around the development of alternative ways of addressing identified issues, concerns, and opportunities concerning the management of the Deschutes National Forest. In fact, the primary differences between the Alternatives is in the way they respond to the ICO's. Appendix A fully discusses each of the 18 ICO's that were identified at the outset of the planning process for the Forest. However, while all of the identified ICO's are important, only a subset of them are really useful for distinguishing significant differences between the Alternatives. The following is a brief summary of the eight ICO's used to distinguish between the Alternatives and their quantitative indicators of responsiveness. Figure B-59 displays the quantitative responsiveness to these ICO's by alternative Also included in Figure B-59 is the responsiveness of the Alternatives to present net value, annual cash and noncash benefits which are not specifically identified in the following ICO's but are indicators of interest to the nation.

One ICO that is not displayed in Figure B-59 but is useful in evaluating the differences between the Alternatives is "public acceptance". The response to this ICO by the Alternatives is not quantitatively measurable. However, it is likely that the way some ICO's are addressed in some alternatives will cause some conflict and polarization amongst different users of the Forest. Therefore, in the following discussions, public acceptance of an alternative will also need to be considered even though it is not displayed in Figure B-59.

Figure B-59 Quantitative Indicators of Responsiveness to Issues, Concerns, and Opportunities

	Average Annual ($MM) Decade 1[1]			Decade 5[2]			Response to Issues, Concerns, and Opportunities						
Alts.[4]	PNV ($MM)	Net Return Treas.	Noncash Benefit to User	Net Return Treas.	Dev.[3] Rec. Noncash Benefit to User	Disp[3] Rec Target 2,050 MRVD	Range Target 1,930 MRVD	Timber Target 32 MAUM	Timber Target 41 9 MMCF	Target 195 MMBF	Habitat Improve. Target 6 4 M Acres Equiv.	Average Annual 1st Dec. Revenue to Govt. ($MM)	Average Annual 1st Decade Budget ($MM)
C	681 54	-4 2	26 5	7 0	43 4	3392	2472	45	34	191 2	30 0	19.9	24.2
E	595.08	-8.5	27 2	3 4	45.3	2369	2157	32	17 9	99.8	6 4	8.6	17.4
B	585.97	-4 9	27 2	11 1	32 0	1926	1985	32	25.9	146 5	27 0	11.7	15.8
A	383 77	2 7	14 1	9 0	18 4	2369	2127	29	24 8	142 1	6 2	17.8	14 7
G	274 52	-3 9	14 5	6 0	27.0	1824	1857	26	15 6	86 0	16 0	9.1	13 0
NC	DNA	DNA	DNA	DNA	DNA	2369	2127	29	37.1	219 0	6 2	17.8	14.7

DNA = Data is not available
[1]First decade basically represents the life of a Plan for any alternative
[2]The fifth decade represents the potential if an alternative were continued for 5 decades
[3]Average Annual for the 5th Decade
[4]Alternatives ranked by Decreasing PNV

Figure B-59 Quantitative Indicators of Responsiveness to Issues, Concerns, and Opportunities (continued)

		Average Annual ($MM) Decade 1[1]		Decade 5[2]		Response to Issues, Concerns, and Opportunities							
Alts.[3]	PNV (MM$)	Net Cash Flow	Non Cash Benefit to User	Net Cash Flow	Non Cash Benefit to User	Decade 1 Firewood Reserved Personal Use M Cords	Devel. Rec. M Acres	Undev. Rec. M Acres	Visual Quality M Acres	ODF&W Mule Deer Object. 24859 Deer	Acres High Potential Geothermal Available for Lease M Acres	Average Annual 1st Dec. Pmt. to Counties (MM$)	Job Impact Local Econ.[4]
C	681.54	-4.2	26.5	7.0	43.4	0	97.1	1.4	42.5	32,300	126.1	5	667
E	595.08	-8.5	27.2	3.4	45.3	60	66.5	56.4	179.3	29,800	100	2.2	219
B	585.97	-4.9	27.2	11.1	32.0	60	64.1	59.2	220.7	27,100	91.5	3.9	338
A	383.7	2.7	14.1	9.0	18.4	60	2.2	63.5	321.3	20,300	85.9	4.5	248
G	274.52	-3.9	14.5	6.0	27.0	75	52.8	138	133.1	16,700	52.8	2.3	41
NC	DNA	DNA	DNA	DNA	DNA	60	2.2	63.5	321.3	20,300	85.9	9.0	DNA

DNA = Data is not available

[1]First decade basically represents the life of a Plan for any alternative.

[2]The fifth decade represents the potential if an alternative were continued for 5 decades.

[3]Alternatives ranked by Decreasing PNV.

[4]Potential Job Impact on Local Economy in Decade 1 (# Changes)

APPENDIX B
EFFECTS OF BENCHMARKS, CONSTRAINTS AND ALTERNATIVES

Can the Forest meet the assigned Resource Planning Act (RPA) Targets?

Based on a National assessment, the RPA planning effort made projections of estimated total national demands for many resources produced on the National Forests The RPA then assigned each USFS Region in the country a share of the National output targets that would be needed to satisfy anticipated demands for various resources In turn, the Regional Guide for Oregon and Washington established recreation, range, timber, and wildlife targets for the Deschutes National Forest The Forest must determine if it is capable of meeting or exceeding these output targets within acceptable environmental limits. The respective first decade RPA targets by resource and the Alternatives response to them are displayed in Figure B-59.

How should the Forest consider local and regional economies, lifestyles, and population levels in managing Forest lands?

The economy and lifestyles of many local and regional communities are tied to the Forest in many ways Both tourists and permanent residents are attracted to the wide variety of recreation opportunities available on the Deschutes National Forest. Of the 125 Forests in the National Forests System and the 19 in Oregon and Washington, the Deschutes ranks 27th and 5th respectively in terms of recreation use Accordingly, the businesses which serve the needs of recreationists and tourists are becoming and will continue to be an increasingly important component of the Central Oregon economy.

The Forest also provides wood for a significant forest products industry in the local communities. In addition, since many people use wood as their primary source of home heating, personal use firewood cutting has become an important element of the Central Oregon way of life.

The resulting consequences of the Alternatives to jobs, income, and payments to counties in lieu of taxes are components of this issue. Therefore, the first decade impacts on both jobs and payments to counties in lieu of taxes are displayed by alternative in Figure B-59.

Many of the other elements of this issue are couched as individual issues which are discussed below. The way each of the following issues is treated has a bearing on this issue For example, how the mature lodgepole pine is treated in each Alternative affects personal use firewood supplies and the amount of raw materials for the forest products industry, which in turn affects the economies and lifestyles of the Central Oregon Region

How should the Forest plan to meet future demands for use of wood as an energy source?

Nearly 60 percent of the homes in Central Oregon use wood burning stoves as a source of heat An estimated 60,000 cords of personal use firewood are harvested and burned annually In addition, it is estimated that various commercial operations cut and sell an additional 50,000 cords per year Most of this fuelwood is lodgepole pine With the combined effects of current levels of personal use firewood consumption, commercial timber sale contracts, and the mountain pine beetle epidemic, the primary source of accessible firewood supplies as we know it today will be gone in 10 to 15 years. An important element of this issue is the amount firewood which will be reserved for personal use as opposed to competitive bidding on an annual basis during the first decade This is displayed in Figure B-59

How should the Forest provide for present and future developed recreation?

Developed recreation on the Forest takes on many forms ranging from the Mount Bachelor Ski Area to small isolated picnic grounds. Demand for camping, boating, and other recreation pursuits requiring facilities and resulting in concentrations of people is continuing to grow, and, if it parallels the State's population projections, could double within the next 4 to 5 decades. Destination resorts adjacent to the Forest also attract many recreationists to the area. Two questions need to be addressed, which areas should be managed as developed

recreation sites and how many acres should they include The number of acres managed for developed recreation opportunities by alternative are displayed in Figure B-59

How can the Forest keep pace with expanding demands for dispersed recreation?

Hiking, rafting, fishing, snowmobiling, sailing, hunting, driving for pleasure, caving, mountain climbing, and general goofing off are all popular dispersed recreational activities. Some of the recreational activities occur in exclusive areas of the Forest Others, such as cross country skiing and snowmobiling, occur in the same areas and conflicts can arise Like developed recreation, demand for these types of recreation activities can be expected to grow, and if it parallels the State's population projections could double within the next 4 to 5 decades. Where and how much of the Forest to provide for dispersed recreation activities while minimizing conflicts is the heart of this issue Figure B-59 displays the number of acres managed for undeveloped recreation opportunities by alternative.

How can the Forest maintain scenic beauty while providing goods and services?

The high recreational values of the Forest are directly linked to its beautiful scenery Viewing volcanic peaks along the Cascade Crest, large ponderosa pine trees along major roads, and free flowing rivers are all part of the recreation experience. Many people prefer to view natural appearing landscapes rather than ones dominated by timber harvesting activities. The key to this issue is to determine which areas and how many acres should be managed for their scenic beauty Figure B-59 displays the amount of visually sensitive areas of the Forest which are managed to maintain or enhance their visual quality.

What should wildlife populations be?

The public, the Forest, and the Oregon Department of Fish and Wildlife are concerned about several species which are listed below with their currently estimated populations They are: mule deer (22,800), elk (500 to 700), and osprey (125) pairs. Other species include goshawks, pine martens, and woodpeckers. The question for all the species is what level of emphasis should the Forest place on maintaining or improving habitat for these species? While all of these species are important, we will focus this part of the evaluation on the mule deer populations. The Oregon Department of Fish and Wildlife has established a population objective of 24,850 deer. The habitat capability of each alternative to meet this objective is portrayed in Figure B-59

What areas on the Forest should be made available for geothermal leasing and development?

The Deschutes National Forest is considered to have some of the greatest potential for geothermal resources of any area in the Western United States. Approximately 350,000 acres have already been leased. The Newberry Crater is a designated Known Geothermal Resource Area (KGRA). The interior of the Crater is an important recreation area with two large lakes known for their fishing. Campgrounds and resorts are located adjacent to the lakes The area is also a popular winter sports area for snowmobiling and cross country skiing. There is an active bald eagle nesting territory within the Crater Numerous unique geological features, such as obsidian flows, are also found within the Crater. There are also other areas on the Forest which could be leased that are currently not leased. The main thrust of this issue is where and under what conditions should we lease and how should we protect recreation, visual, wildlife, water quality, and other resource values. Figure B-59 displays the number of high potential acres by alternative which are available for leasing

Tradeoffs and Comparisons Between Alternatives

The following paragraphs summarize the tradeoffs between the Alternatives as displayed in Figure B-59. The focus is on the incremental changes in PNV from one alternative to another

as influenced by the production of both priced and nonpriced outputs, and more importantly, the ability of the Alternatives to address the ICO's The Alternatives are discussed in order of decreasing PNV.

Max-PNV (BM-7)

Benchmark-7 is presented here as a reference point for present net value comparisons only. While it meets the minimum legal requirements of managing the Forest, it does not represent a viable alternative in that it was not designed to address the ICO's Since this Benchmark was not designed to address issues, the responsiveness to the ICO's is not displayed in Figure B-59. However, some of the other economic implications of this Benchmark are displayed in Figures B-42, 43, 47 and 53.

Benchmark-7 identifies the maximum present net value of the priced resources on the Forest to be $850.7 million The primary emphasis in BM-7 is to maximize the discounted timber and developed recreation benefits from the Forest The harvest age of stands is based on maximizing PNV, which occurs sooner than biological culmination All roadless areas are available for development The important developed recreation areas are managed to provide their maximum economic returns. Some timber harvesting is also scheduled in these areas Any additional dispersed recreation benefits are merely incidental to people living in a roaded forested environment

Alternative C

Of all the Alternatives, Alternative C has the highest PNV at $681 54 million This is a 169 2 MM$ drop from the maximum PNV. Alternative C emphasizes the production of priced resources, much like Max PNV Stands must reach 95 percent of biological culmination before being considered for final harvest

What really differentiates Alternative C from Max PNV is that it is designed to address the ICO's and is an implementable alternative. With regard to the timber program, one of the key differences between Alternative C and the Benchmark is its allocation of acres to other multiple use objectives It has more acres available for timber harvest than any Alternative but less than Max PNV

Like Max PNV, Alternative C also has a strong emphasis for developed recreation benefits. It assigns the most acreage of any alternative to the provision of developed recreation opportunities. However, it provides the least opportunities to meet future needs for dispersed roaded and unroaded recreation It provides the least amount of acres to dispersed recreation.

Alternative C is the most favorable alternative from a geothermal leasing and development standpoint. While this is not reflected in the present net value of the alternative, this could result in a real economic plus to the local economy sometime in the next 10 to 20 years.

Of all the Alternatives, Alternative C provides for the most opportunity for the mule deer population to increase. In the future this could be translated into more hunting days and, therefore, more hunter expenditures in the local economy

Alternative C is the strongest alternative in terms of providing the necessary timber and recreation outputs to support the local employment base and provide opportunity for growth in the future should the demand for forest based resources continue to increase. Other than that, such nonpriced benefits as visual quality, recreation diversity, and easy access to personal use firewood will be at lower standards than today.

Alternative C meets RPA targets for developed recreation, dispersed recreation, range and habitat improvement. It does not meet the RPA target for timber.

Despite its strong economic performance, Alternative C may lead to some conflicts and polarization amongst local communities and other users of the Forest due to its strong commodity development emphasis

Alternative E (Preferred)

At $622 62 million, Alternative E has the second highest PNV of all Alternatives, $58.6 million less than Alternative C which has the highest PNV. Alternative E harvests timber on a nondeclining yield basis and has a first decade annual harvest level which is second to the lowest of all Alternatives.

Alternative E generates the second to lowest revenues to both federal and local governments. However, it also requires the second highest budget.

Alternative E, like Alternatives B offers a diverse spectrum of recreation opportunities. It is somewhat stronger in its attempt to provide for unroaded nonwilderness experiences which are becoming one of the limited opportunities on this Forest.

It is the third highest in the amount of acres it permits for geothermal leasing, behind Alternative C.

With regard to nonpriced benefits, Alternative E would maintain the firewood burning aspect of the Central Oregon lifestyle by setting aside 60,000 cords of personal use firewood per year during the first decade. Compared to Alternative B, Alternative E offers slightly fewer benefits pertaining to visual quality. However, it exceeds both the State's targets and Alternative B's output levels for projected mule deer populations

Alternative E meets RPA targets for developed recreation, dispersed recreation, range and habitat improvement It does not meet RPA targets for timber targets

Alternative B

The PNV for Alternative B is $585.97 million. Alternative B provides somewhat higher timber benefits than Alternatives E & G However, these increased timber benefits were equally matched by higher timber management, road construction, and organizational support costs It returns 3.9 million dollars to local county governments (third highest), and incurs the third highest budget.

Alternative B is favorable in its flexibility with regard to geothermal leasing. However, its proposed leasing within the Newberry Crater may cause some polarization.

Alternative B meets RPA targets for dispersed recreation, range and habitat improvement. It does not meet RPA targets for developed recreation and timber.

Alternative A (Current Direction)

Alternative A ranks second lowest in present net value Its PNV is $383 7 million. Its low PNV ranking is due to the fact that of all the Alternatives, the recreation benefits generated by Alternative A are the lowest. Its discounted recreation benefits totaled to $341 million as compared to the 360 million for Alt. G and over 700 million for Alts C, E, and B There are two reasons for this. First, the existing management plan for expanding intensive recreation capacity is quite restrictive; not allowing enough flexibility to adapt and expand as future demands for developed types of recreation experiences increase. With regard to the projections of future recreation use trends and their associated benefits, this limited capacity for expansion was a ceiling on the amount of developed recreation consumption this Forest could provide.

The second cause is related to the standard of recreation quality which is provided by Alternative A. Two sets of recreation values were used for each type of recreation opportunity provided on the Forest during the development of the Benchmarks and alternatives: standard and less than standard. The standard quality experiences had higher benefits associated with them. They also involved higher capital investment and operations and maintenance costs. On the other hand, the less than standard quality experiences had lower benefits and management costs. The standard recreation experiences return more discounted benefits per dollar invested than do the less than

standard. However, it was believed by the ID Team that at current funding levels, the Forest is providing recreation opportunities at the less than standard level of quality. Therefore, the discounted benefits associated with this Alternative are quite lower than the others. In fact, Alternative A and Alternative G have the lowest benefit/cost ratios of all the Alternatives This is primarily due to the low returns associated with dollars invested in less than standard recreation opportunities Since the timber related benefits for Alternative A rank second amongst the Alternatives, some increased investment in managing the recreation resources could enhance the overall PNV ranking of this Alternative.

In addition to its relatively low present net value, Alternative A also fails to meet the developed recreation, range, and timber related RPA targets Despite this, it results in the second highest payments to counties because of its rich ponderosa pine and mixed conifer species mix during the first decade It also requires the second lowest funding levels of all the Alternatives

In addition to ranking fifth in terms of acres available for geothermal leasing opportunities, Alternative A also does not recognize the Newberry Crater as a Known Geothermal Resource Area.

In terms of nonpriced benefits, Alternative A ranks low In fact, it ranks well in regard to some measures of the nonpriced benefits such as jobs, visual quality, and the abundant supply of personal use firewood. Alternative A ranks high in the amount of acres it proposes to manage for scenic quality. On the other hand, Alternative A is the sixth lowest of all the Alternatives when it comes to projected mule deer populations, and fails to meet the State's population targets for this species It also ranks relatively low in terms of both the amount of unroaded recreation and the amount of developed recreation which it provides, thus restricting the diversity of the recreation opportunity spectrum.

Alternative A (Current Direction) and No Change meets RPA targets for developed and dispersed recreation. It does not meet RPA targets for range, timber, and habitat improvement.

Alternative G

At $274.2 million, Alternative G has the lowest PNV of all Alternatives. This is a function of both its relatively low discounted timber and recreation related benefits. The timber benefits are low because Alternative G offers the lowest first decade timber sale program at 15.6 MMCF/year, 2 2 MMCF/year lower than Alternative A and 18.4 MMCF/year lower than Alternative C. The recreation benefits are low because of its relatively low capacity to provide for developed recreation opportunities, and the less than standard quality of recreation opportunities which it is budgeted to manage for. It has the lowest benefit/cost ratio at $1.96 of benefits for each dollar invested This is primarily due to the low returns generated per dollar of investment in the recreation resource

Alternative G falls short of the range, developed recreation, and timber RPA targets Alternative G offers the lowest average annual first decade timber sale quantities, its returns to federal and local governments are lower than those of any Alternative. A positive aspect of the finances regarding Alternative G is its budget requirements. It is the only alternative which proposes a budget lower than current funding levels.

Alternative G is the most restrictive of all the Alternatives with regard to providing opportunities for the leasing and possible future development of geothermal resources on the Forest. It is also rather limiting in its provision of opportunities to meet future needs for developed types of recreation activities Both of these are the result of its strong emphasis towards dispersed recreation and the maintenance of roadless areas in an undeveloped condition This may lead to some conflict and polarization amongst local communities and other users of the Forest.

In terms of nonpriced benefits, Alternative G ranks highly in all aspects except economic stability in the local communities. Its implementa-

tion could result in the most downward pressure on job opportunities and income levels in the local economy. This is primarily due to its low timber sale program On the other hand, it ranks highest in terms of the amount of personal use firewood available to the citizens of Central Oregon. It also ranks highest with regards to maintaining and enhancing visual quality and providing unroaded nonwilderness recreation opportunities. However, Alternative G falls short of the State's mule deer population targets, proposing lower population levels in the future than currently exist.

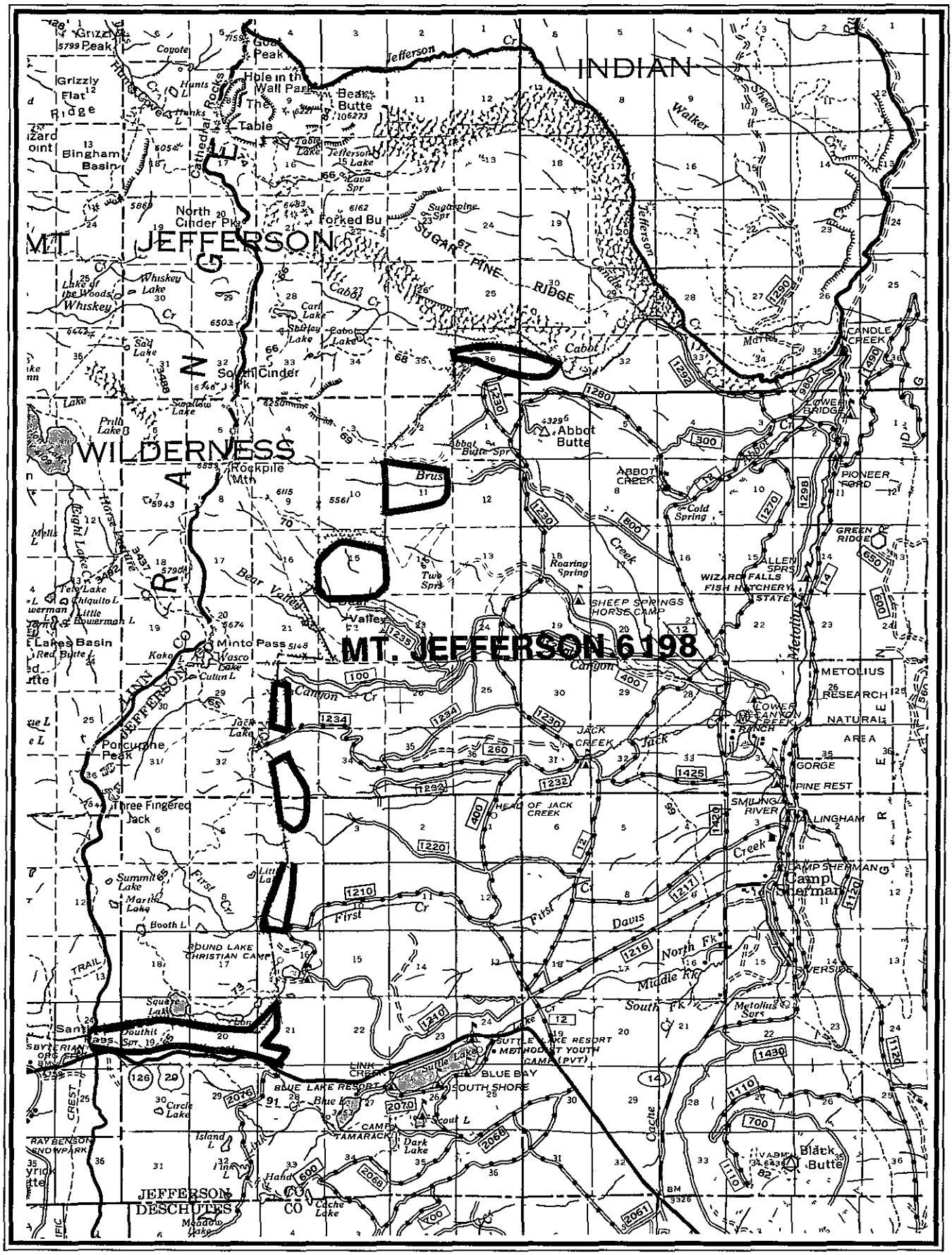
Alternative G meets RPA targets for habitat improvement. It does not meet RPA targets for developed and dispersed recreation, range, and timber.

Mitigation Measures

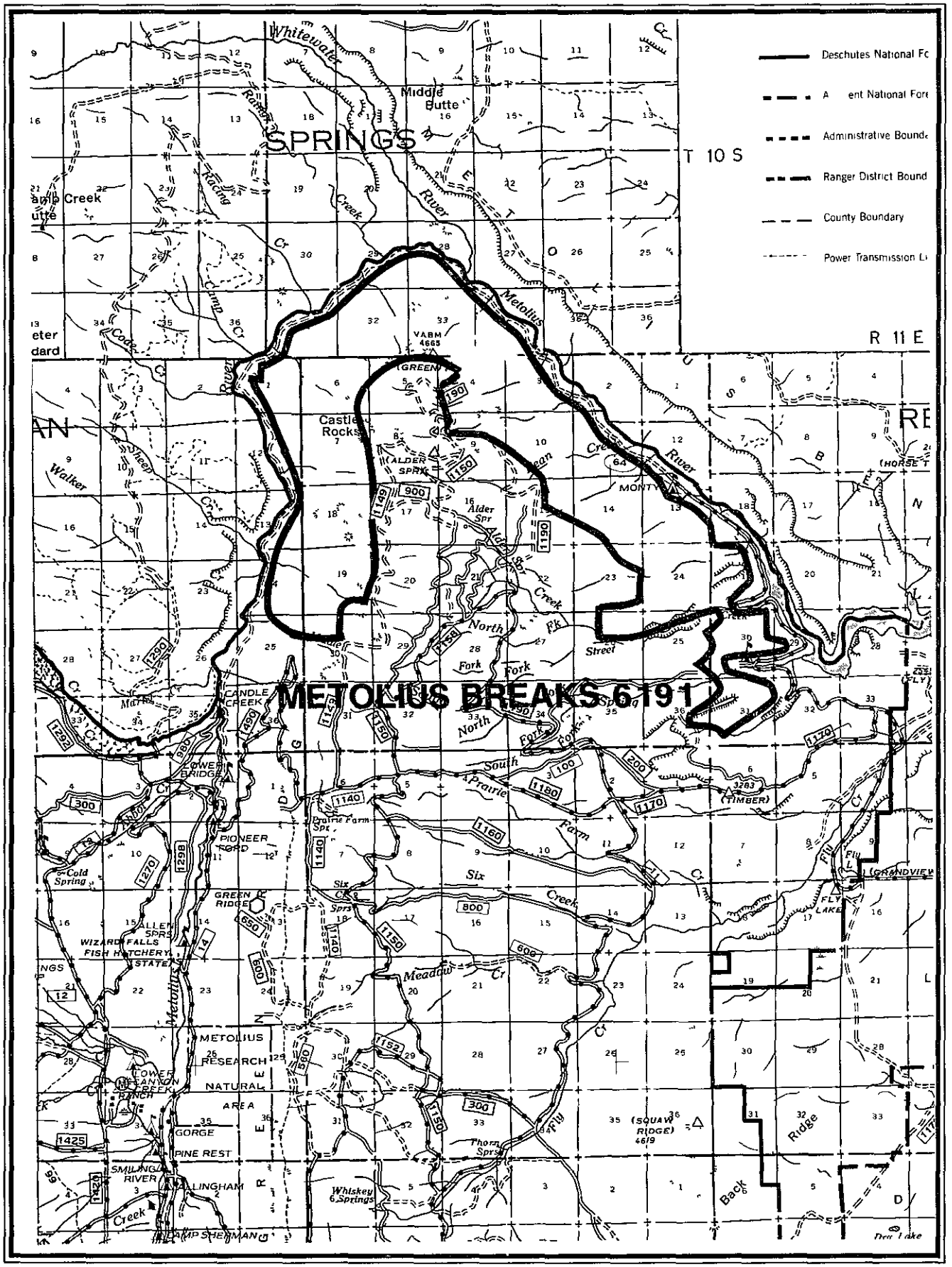
Mitigation of environmental effects are found in Chapter 4 of the FEIS, Environmental Consequences. Probable adverse environmental impacts that cannot be avoided, irreversible or irretrievable commitment of resources, and short-term use and long-term productivity are discussed. The accompanying Land and Resources Management Plan (the Forest Plan) details standards/guidelines which also serve as mitigating measures

APPENDIX C

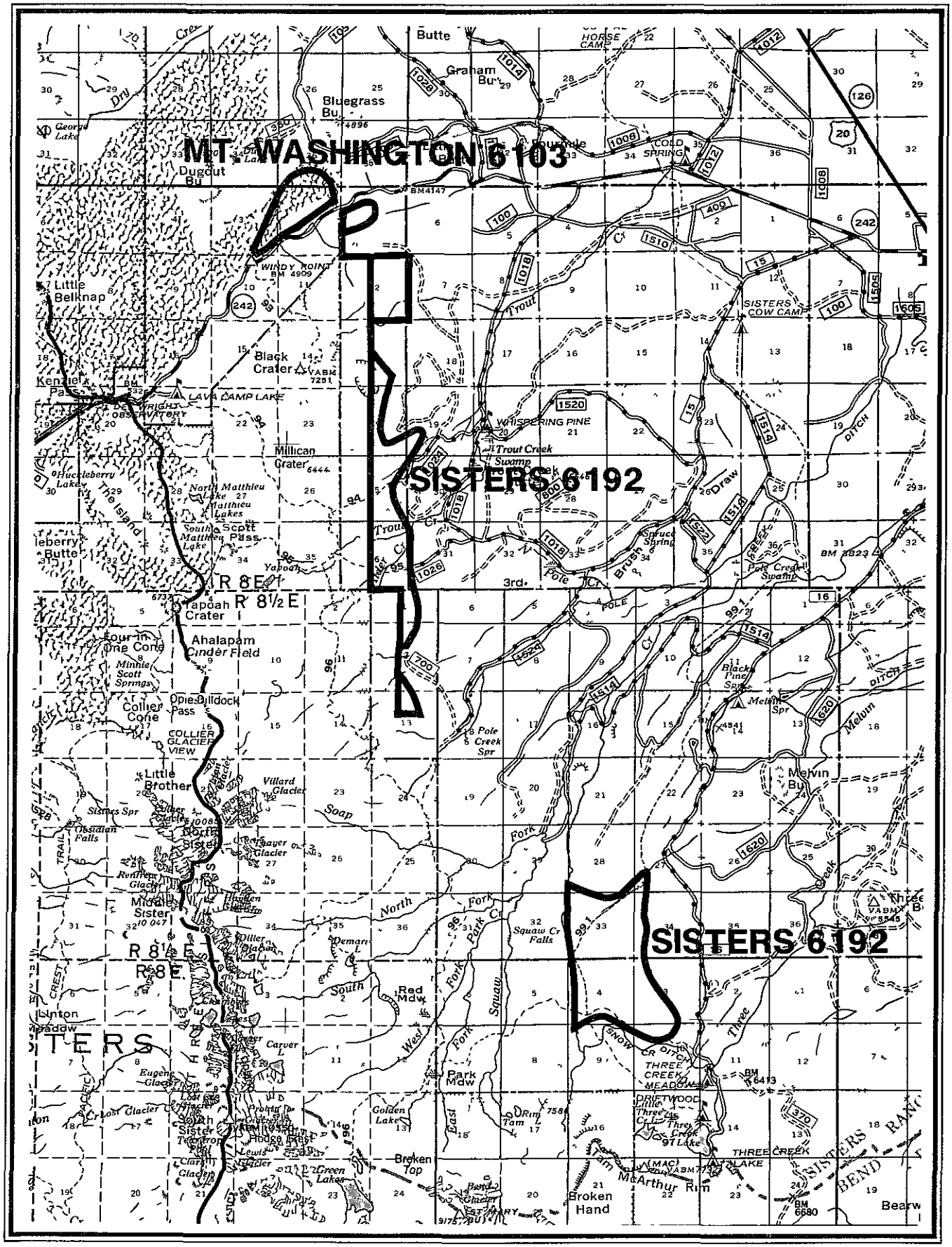
Roadless Areas Maps



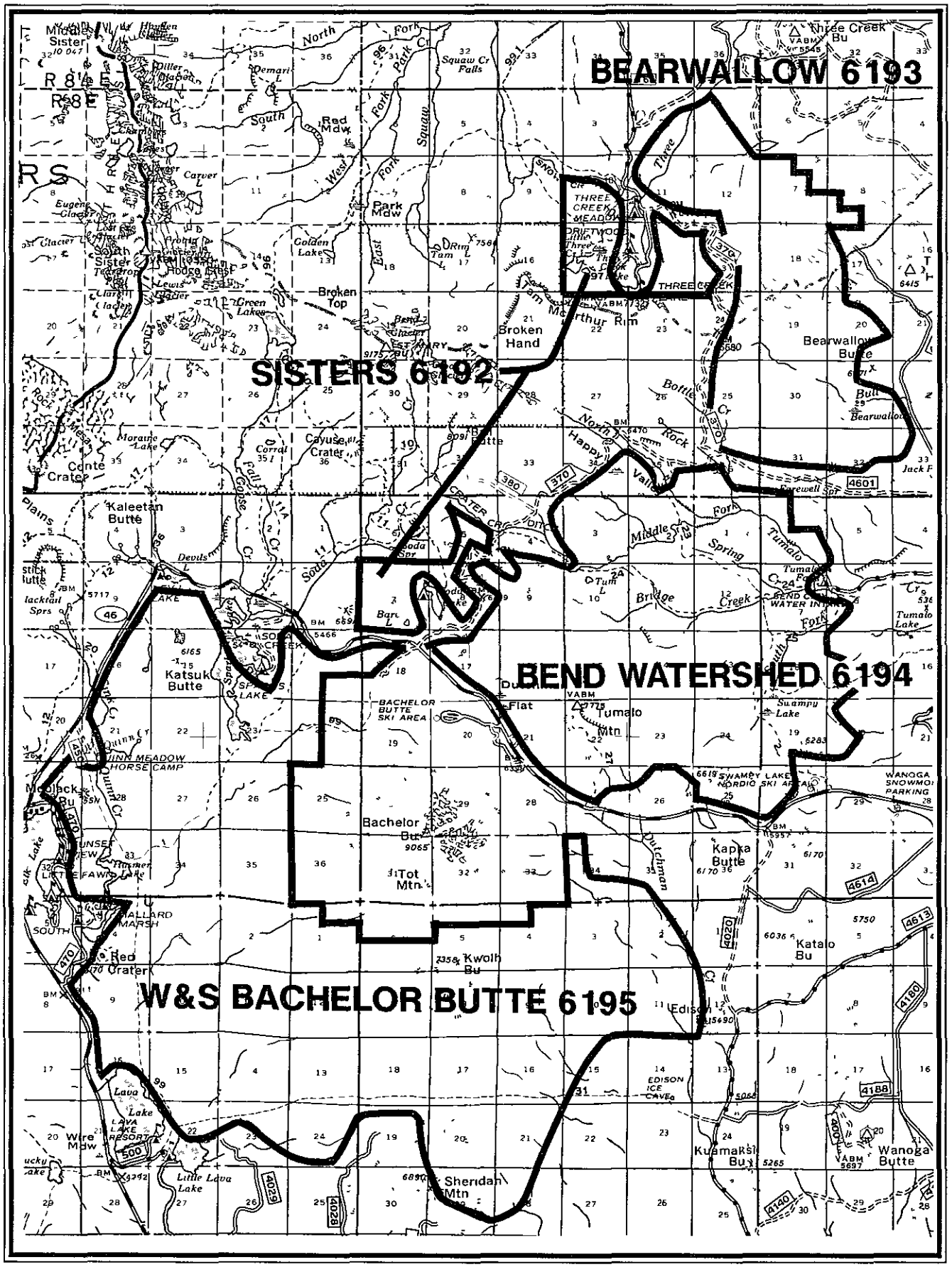
Roadless Areas Map



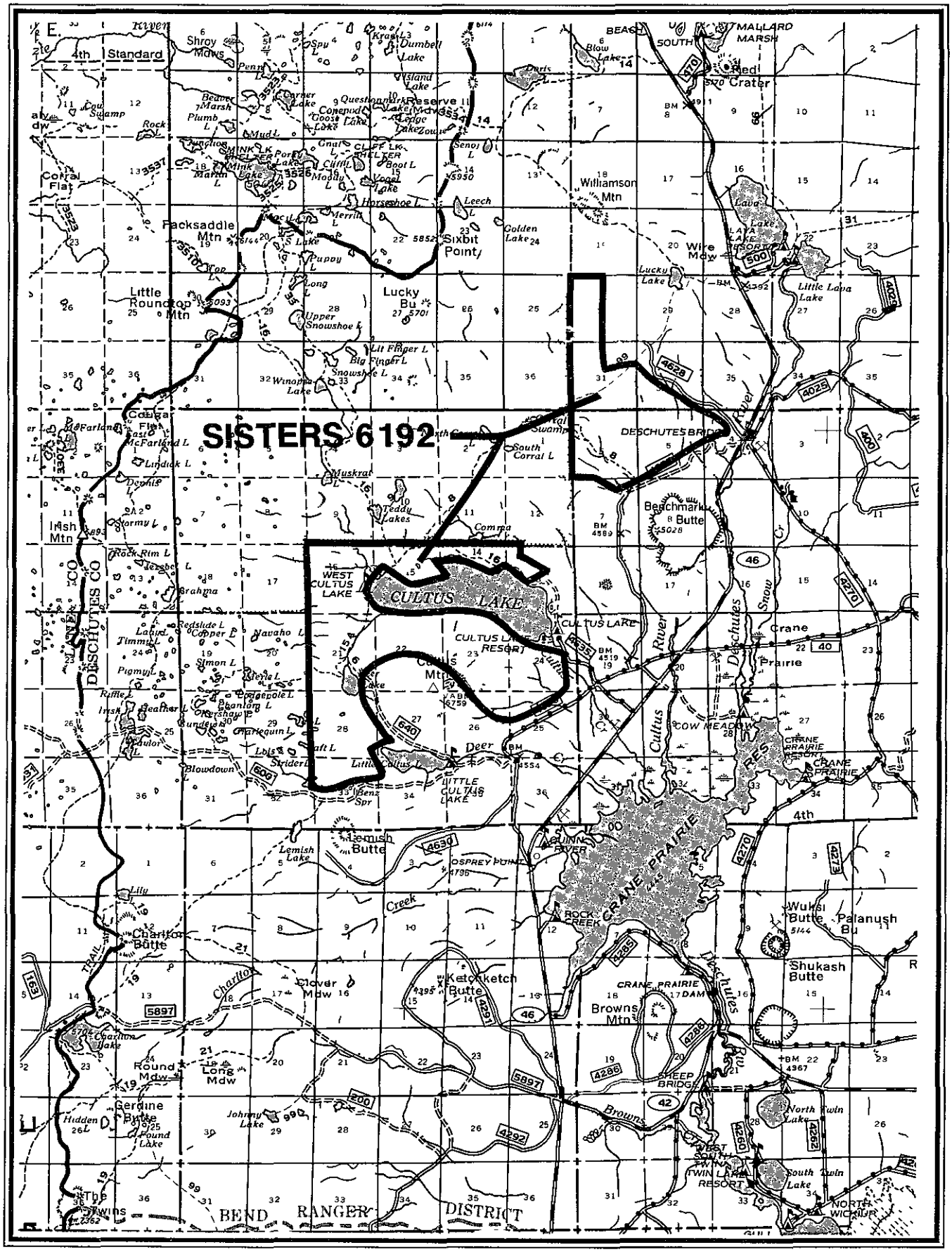
Roadless Areas Maps



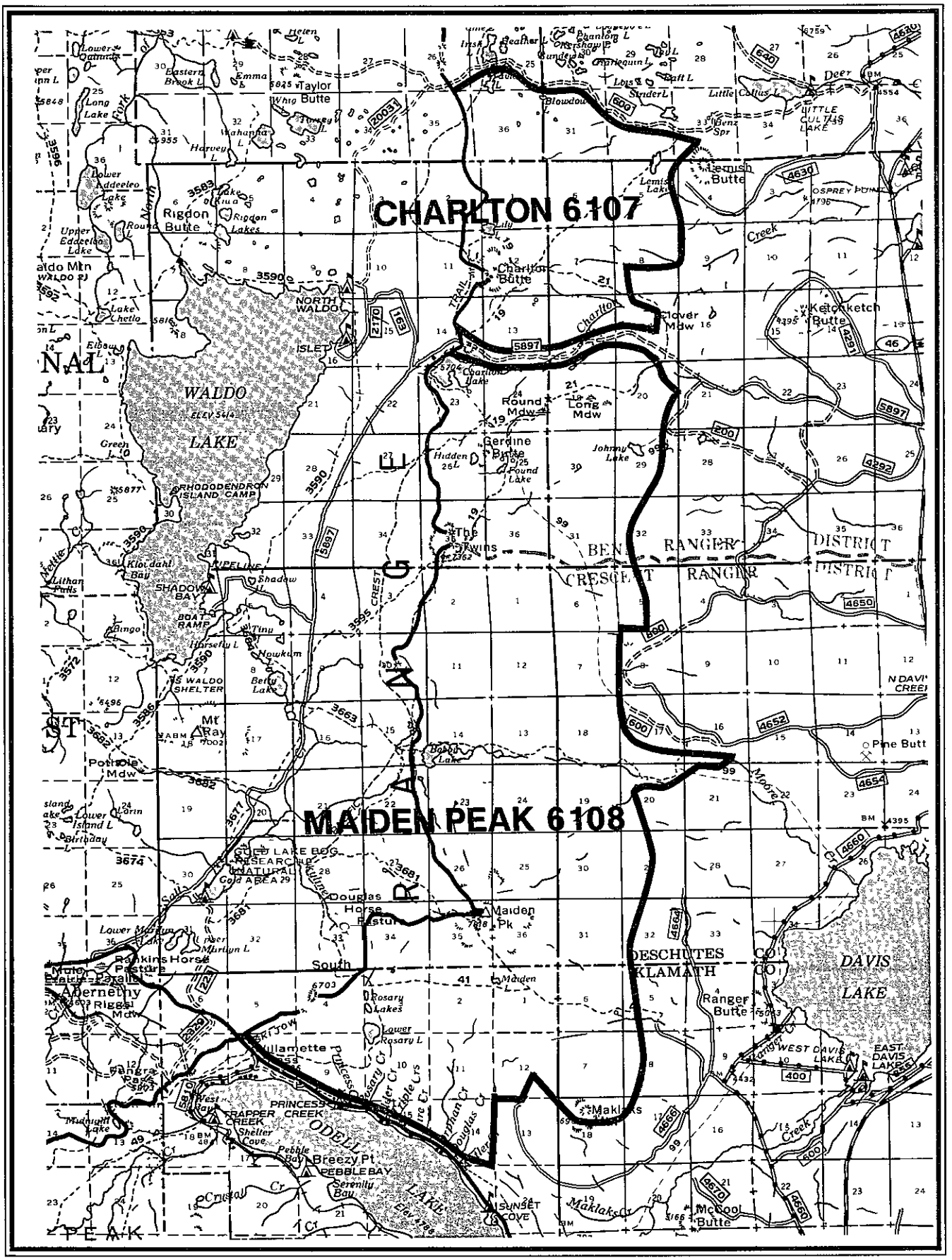
Roadless Areas Map



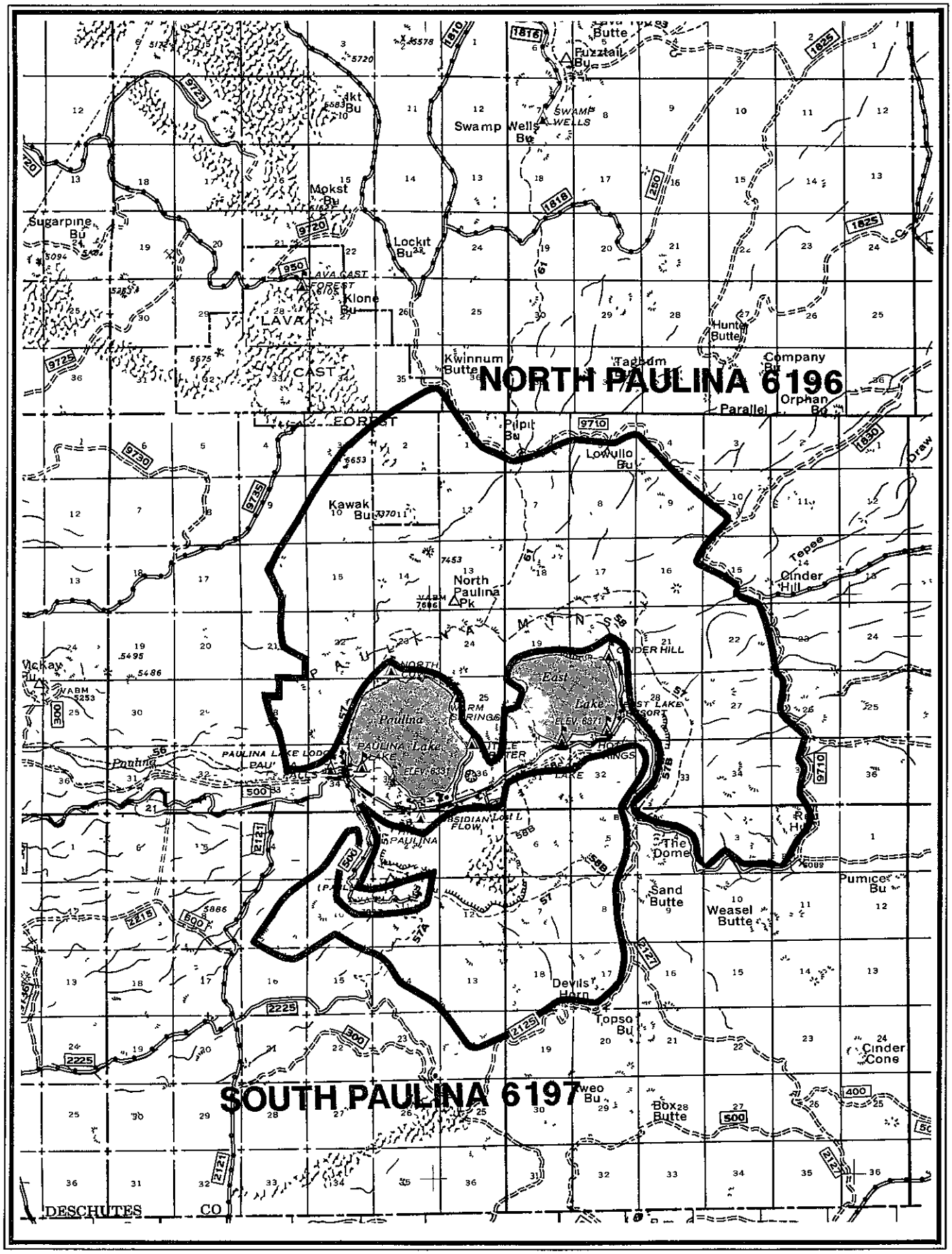
Roadless Areas Maps



Roadless Areas Map



Roadless Areas Maps



APPENDIX C
INTRODUCTION

According to the Oregon Wilderness Act of 1984:

" with respect to the National Forest System lands which were reviewed by the Department of Agriculture in the second Roadless Area Review and Evaluation (RARE II), ...(RARE II) shall be deemed for the purpose of the initial land management plans...to be an adequate consideration of the suitability of such lands for inclusion in the National Wilderness Preservation System and the Department of Agriculture shall not be required to review the wilderness option prior to the revision of the [Forest] plans, but shall review the wilderness options when the plans are revised which will ordinarily occur on a ten-year cycle...[Roadless Areas] shall be managed for multiple use in accordance with land management plans pursuant to Section 6 of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act of 1976; provided that such areas need not be managed for the purpose of protecting their suitability for wilderness designation prior to or during revision of the land management plans. .." (Public Law 98-328.)

Appendix C describes each of the roadless areas on the Forest studied during the Roadless Area Review and Evaluation process (RARE II) It discusses the resources and values considered in each area, the range of alternative land uses considered for these during development of the proposed Forest Plan, and the effects of those alternatives on each area

Throughout the EIS, the Forest's roadless areas have been discussed and evaluated in the aggregate Here, each roadless area is described and analyzed separately, since the purpose of Appendix C is to provide a site-specific analysis of each area. However, to give readers a perspective on the Forest's roadless area acreage as a whole, a section summarizing the roadless area attributes as a whole is also included. Detailed records on each roadless area analysis are on file in the Forest Supervisor's Office as part of the planning records

As of January 1989 all roadless areas remain the same size as indicated in the DEIS, except for North Paulina. The North Peak Lodgepole Fiber Salvage Resale was sold and logged after RARE II areas were released (in the 1984 Wilderness legislation) and before the court determined an EIS was needed to enter roadless areas Approximately 1780 acres of this roadless area were eliminated by this sale

Table C-1 REMAINING ROADLESS AREA ACRES

Rare II Number	Roadless Area	Net Rare II Acres	New Inventoried Acres	Reason for Change
6198	Mt. Jefferson	2,700	2,608	Excluded areas which have been roaded since 1979.
6191	Metolius Breaks	10,900	10,907	Adjustments made as a result of some roads and acquired private land that was unroaded.
6103	Mt. Washington	7,300	0	Was included as Wilderness in 1984 with only small slivers of unroaded lands left.
6192	Three Sisters	36,800	8,315	Majority was included in Wilderness in 1984 A long narrow strip of unroaded land remains
6195	West-South Bachelor	32,500	30,945	Reduction due to developments at Mt. Bachelor Ski Area and excluding some roads.
6193	Bearwallows	8,100	7,337	Reduced to exclude some roads and an electronic site of Bearwallow Butte.
6194	Bend Watershed	16,200	14,250	Reduced as a result of roads constructed during the Bridge Creek Fire and post fire salvage logging and rehabilitation.
6106	Waldo	9,700	4,992	Reduced as much of the area was included in Wilderness in 1984.
6107	Charlton	9,280	7,243	Reduced because of some new road construction and logging.
6196	North Paulina	22,450	21,622	Reduced because of some new roads.

Table C-1 REMAINING ROADLESS AREA ACRES (continued)

Rare II Number	Roadless Area	Net Rare II Acres	New Inventoried Acres	Reason for Change
6197	South Paulina	10,200	9,915	Reduced to exclude some roads and a power line.
6108	Maiden Peak	29,420	27,008	Reduced because of new roads and timber sales.
6111	Odell	14,150	0	Included in Wilderness in 1984
6109	Cowhorn	22,450	0	Included on Oregon Cascade Recreation Area in 1984.
6132	Windigo-Thielson	22,300	0	Included in Wilderness and Oregon Cascade Recreation Area in 1984
	TOTAL	**254,450**	**145,142**	

BEAR WALLOWS ROADLESS AREA (RARE NO. 06193)

DESCRIPTION--THE EXISTING CONDITION

History

The Bear Wallows Roadless Area (RA) was included in both the RARE I and RARE II analysis processes. Some boundaries have changed since 1979. Several small logged areas and the associated roads were inadvertently included within the RA during the initial inventory. The boundary was adjusted to exclude these portions from the RA In addition, the Bear Wallows Butte electronic site and access road were excluded by adjustment of the eastern boundary. These exclusions were based on the premise that logging activities and other human developments are inconsistent with Roadless Area values.

Location and Access

The Bear Wallows RA contains 7,337 acres and lies within portions of the following townships·

T. 17 S., R 9 E.
T. 17 S., R. 10 E.

The RA lies on the eastern slope of the Cascades about one mile north of Tumalo Creek in the Bend and Sisters Districts of the Deschutes National Forest, Deschutes County, Oregon.

Access is gained by traveling west from Bend, Oregon, on County Route 4601 for 11 miles, then north on Forest Roads 4601 and 4602 for 6 miles

No developed trails exist within the RA

Geography and Topography

The topography of the RA is fairly flat and slopes gently to the east. The steepest part is along the northeast boundary There are no dominant landforms or bodies of water within the RA

Elevation ranges from 5000 feet to 6600 feet

Precipitation ranges from 25 to 35 inches per year and falls primarily in the form of snow The porous volcanic soils causes most of the moisture to soak directly into the ground.

Soil Types

The soil types are based on the Deschutes National Forest Soil Resource Inventory [1]

The soils are a high elevation type consisting of a shallow layer of light brown sandy mazama ash over stony glacial till. In the mountain hemlock stands a bleached gray soil occurs in the surface horizon. On steep slopes, rock outcrops and bare rock talus slopes are common.

[1] Daniel H Larson, Soil Resource Inventory, Deschutes National Forest, Pacific Northwest Region, 1976

LAND TYPE	LANDFORM	PERCENT SLOPE	ELEVATION
16	Sloping Uneven Glaciated Uplands	15-40	4300-6500
17	Gentle Uneven Glaciated Uplands	0-30	4200-6500
19	Glaciated Uplands	20	4700-6000
84	Dissected Sideslopes	30-80	6000-7000
85	Ridgetops and Flats	0-30	6000-6800

BEAR WALLOWS ROADLESS AREA (RARE NO. 06193)

Vegetation

The plant communities present are: lodgepole pine/sedge-lupine, mixed conifer/snowbrush-manzanita/sedge-penstemon, mountain hemlock/grouse huckleberry, and lodgepole pine/grouse huckleberry.

The lodgepole pine communities are currently infested by the mountain pine beetle to epidemic proportions

Ecosystem Type

About 62 percent of the RA is lodgepole pine forest with mixed conifer forest accounting for another 25 percent A small amount of ponderosa pine forest is found at the northern tip of the area, and mountain hemlock forest is represented in trace amounts at the southern end.

Most of the forested ground (89 percent) is classified as being in "mature" or "old growth" successional stages. Approximately 15 percent of the total is a mixed conifer type. Rocky ground occurring at the south end accounts for about 8 percent of the area Early successional stages are present in trace amounts

Riparian plant communities are almost nonexistent with the exception of very narrow lands (less than 10 feet) intermittently located along Three Creek, Bull Creek, and a small meadow at Bearwallows The banks of Three Creek are predominantly grass-covered, with occasional pockets of willow, bogbirch, or aspen

This area is summer range for mule deer of the Upper Deschutes Game Management Unit herd. These animals are thought to winter in the Tumalo Reservoir-Plainview area. The predominance of mature forest, with negligible amounts of early-successional or riparian plant communities, makes the area relatively poor deer range.

The RA may also be summer range for elk. It is thought that an occasional family unit or single individuals may use the area. The lack of riparian plant communities is the reason for little use

About 3 miles of Three Creek pass through the RA. This stream segment has very low fisheries potential, although a small population of brook trout is present throughout. Stream gradients averaging 8 percent may partially account for its low potential Bull Creek is an intermittent stream without fish

Current Uses

The area was inventoried under the Recreation Opportunity Spectrum (ROS) as being Semiprimitive Nonmotorized. The primary recreation use has been hunting and snowmobiling, and this has been very limited. No recreation use statistics have been developed for the area

Some woodcutting is occurring along the boundaries where road access is available. Unimproved roads (tracks) penetrate the area.

Appearance

The majority of the RA appears as a continuous stand of beetle infested lodgepole pine. The entire area is quite common with respect to vegetation and landform.

Surroundings

The RA is bounded on the west by Forest Road 370 and the Three Sisters Wilderness. This area is being used for dispersed recreation. This road is a low standard summer road and an established snowmobile route in winter

The northeast corner is bounded by private land These lands are being
managed for timber production.

Forest lands to the south and east are being managed for wood and forage production. Logging activities prevail. Firewood cutting is also a common activity because it is in close proximity to Bend

Triangle Butte to the east is being quarried for cinders The haul route runs adjacent to the RA.

Forest Road 4601 runs adjacent to the south boundary. This is also a low standard road receiving moderate use.

There are three developed sites within 1.5 miles of the RA. These are Three Creeks Lake, Driftwood, and Three Creeks Horse Camp. Total use for these areas is 11,688 Recreation Visitor Days (RVDs).

Attractions

The attractions within the RA include natural forests and limited wildlife

Big game hunting and snowmobiling have been the primary use.

CAPABILITY

Manageability and Boundaries

The ability to manage an area as undeveloped must be considered before a recommendation can be made. Factors such as size, shape, and location are important.

The Forest roads around the area offer adequate opportunity for transportation access and traveler facilities such as trailheads. A trail system could be constructed.

Past experience has shown that low standard roads adjacent to undeveloped areas often require policing and signing in order to keep incompatible uses out.

It would be hard to manage the RA for primitive values because of its small size and roaded boundaries. The area is also easily accessible due to the flat ground and existing tracks.

Mountain pine beetle activity in the area may be setting the stage for a catastrophic fire

The scarcity of water and landform diversity would make it difficult to attract people who are seeking an undeveloped recreation experience

Natural Integrity

The vast majority of the RA is in a natural state and unaffected by human influences

Slash burning around the RA produces air pollution for short periods of time, but it has not affected natural processes within the RA

The firewood cutting has affected the natural processes along the fringes. Time would eventually restore natural processes

The natural processes have been most heavily affected by the suppression of wildfire in the area. The ecology and natural succession have been altered by the exclusion of fire.

Apparent Naturalness

Of the human-caused effects discussed in the previous section, the firewood cutting would have the greatest influence upon the apparent naturalness as perceived by the user. Woodcutting is confined to the perimeter of the area, affecting 20 to 40 percent of the RA.

Opportunities for Solitude

The opportunity for solitude considers the following factors: size of area, topographic screening, vegetative screening, distance from perimeter to core, and human intrusions. Overall, there is a moderate opportunity for solitude.

Primitive (ROS) Recreation Opportunities

Solitude and the following additional factors are used for rating primitive recreation: diversity of opportunities, challenge, and absence of facilities. Overall, there is a low opportunity for primitive recreation.

Existing opportunities include hiking, hunting, backpacking, camping, ski touring, horseback riding, photography, nature study, and acquiring general knowledge and understanding

Challenging Experiences

This attribute is rated as to the RA's ability to offer opportunities for unusual adventure, excitement, challenge, self-reliance, initiative, and judgment. Challenging features include dangerous animals, climatic disturbance, avalanche potential, terrain features (i.e., cliffs, quicksand, sink holes), fast-

BEAR WALLOWS ROADLESS AREA (RARE NO. 06193)

moving water, glaciers, and a lack of dominant visual features on which to orient oneself. Hazardous features are seldom encountered in this area

Special Features

No threatened, endangered, or sensitive species (plant, animal, or insect) known to exist in the RA No known cultural resources are located in the RA.

Historic and Scientific Study

The RA receives an "infrequent" rating for its geological and ecological features This rating is given to features found throughout the High Cascade physiographic province.

Availability and Resource Potentials

Refer to Table C-1.

Management Considerations

The mountain pine beetle infestation is at, or near, epidemic levels in lodgepole pine communities on the Forest Entomologists predict that this epidemic will continue for another 10 to 15 years until the beetles' major food supply of lodgepole pine is either consumed or destroyed In this area, the infestation may be setting the stage for a catastrophic fire

NEED

Nearby Wilderness and Its Use

The Three Sisters Wilderness (94,247 acres on Deschutes National Forest) is the nearest Wilderness and is located just west of the RA. It is currently being used at about 35 percent of capacity

Statistics for fiscal year 1983 indicate use for the Deschutes portion of the Three Sisters Wilderness was 48,900 RVDs [2] About 30 percent of the use came from the local area, about 55 percent from other in-state locations, and about 15 percent from out of State.[3]

Deschutes County, which had a population of 63,300 in 1983, represents the majority of the Forest Influence Area

Distance from Population Centers

The Forest Influence Area includes the following towns. Sisters, Redmond, Tumalo, Bend, Sunriver, LaPine, Crescent, and Gilchrist. All of these are within 100 miles of the Three Sisters Wilderness. Bend, with the largest population (17,840), is 25 miles from the Wilderness by road. This distance is not excessive for people interested in an undeveloped recreation experience.

Ecosystem Representation

No rare or unique ecosystems are known to exist within the RA

Congressional and Proponent Interest

The RA has received very little interest by wilderness proponents and none by Congress. The Congressional Review of roadless areas within the National Forests in Oregon did not include this area within the 1984 Wilderness Legislation (Public Law 98-328).

Public Input

The *RARE II* evaluation process showed that 2 percent of the respondents wanted wilderness designation, 27 percent preferred a nonwilderness designation, and 71 percent wanted further planning

Other Public Scoping Results

Two public workshops on Roadless Areas were conducted in early 1984 Public comments on Roadless Areas were also requested through the "Forest Plan Report " There was only limited concern and that concern was split between retaining the area as undeveloped and developing it.

WILDERNESS POTENTIAL

The Bear Wallows Area has very low potential for Wilderness. The area has limited opportunities for hunting and snowmobiling. The General appearance of the area is dominated by hundreds of acres of beetle damaged lodgepole pine stands. Lack of landform diversity and water limit the areas primitive recreational appeal. The area is in a relatively natural condition and offers a moderate opportunity for solitude.

[2] 1983 RIM Data
[3] This data based on analysis of 1981 Wilderness permits for the Three Sisters Wilderness.

Table C-2 SUMMARY OF BEARWALLOWS ROADLESS AREA DEVELOPMENT BY ALTERNATIVE

	No Change	Alt. A	ALT. B	ALT. C	ALT. E	ALT. G
Total Unroaded Acres	7337	7337	7337	7337	7337	7337
Acres Available for Development	1223	1223	5761	7028	5882	5757
Acres Unavailable for Development[1]	6114	6114	1576	309	1455	1580
Acres Available for Winter Recreation/Geothermal[2]	0	0	1157	0	1007	0
Acres of Timber Harvest.[3]						
Decade 1[6]	0	0	29	0	0	0
Decade 2	0	0	3485	4746	0	80
Decade 5[7]	153	153	5137	5996	411	1320
Cumulative Miles of Road Construction [4]						
Decade 1	0 00	0 00	.3	0.00	0.00	0 00
Decade 2	0	0	34 9	47 5	0	8
Decade 5	1 5	1 5	51.4	60 0	4 1	13 2
Acres Remaining Undeveloped After [5]						
Decade 1	7337	7337	7308	7337	7337	7337
Decade 2	7337	7337	3852	2591	7337	7257
Decade 3	7184	7184	2200	1341	6926	6017

[1]Includes management strategies which primarily exclude roading such as Research Natural Areas, some forms of undeveloped recreation, and the Bend Municipal Watershed
[2]The acres assigned to the winter recreation strategy are available for roading but it is difficult to predict when that would occur
[3]The acres scheduled for timber harvest would also have associated roads so that total acres impacted would be somewhat higher than shown above
[4]Based on a coefficient of 01 mile of collector and local roads per acre harvested The unpredictable impacts of geothermal exploration and development are not included
[5]Includes only the impacts of scheduled timber harvesting Does not consider geothermal exploration or some development that might occur because of the mountain pine beetle epidemic in lodgepole pine
[6]First decade basically represents the life of a Plan for any alternative
[7]The fifth decade represents the potential if an alternative were continued for 5 decades

APPENDIX C
BEND WATERSHED ROADLESS AREA (RARE NO. 06194)

DESCRIPTION--THE EXISTING CONDITION

History

The Bend Watershed Roadless Area (RA) was included in both the RARE I and RARE II analysis processes Some boundaries have changed since 1979 Along the western fringe two boundary adjustments were made to exclude the Mount Bachelor Ski Area water system, powerline, and associated roads, and a short section of road that was inadvertently included in the initial inventory. Along the western fringe, logging activities near Farwell Spring and those associated with the 1979 Bridge Creek Fire Salvage Sale, and a small roaded area along the southern boundary were also excluded. These areas were excluded because the logging and other human developments were inconsistent with Roadless Area values

Location and Access

The Bend Watershed RA contains 14,250 acres and lies within the following townships:

T. 17 S , R. 9 E., W.M
T. 18 S., R 9 E., W M.
T. 17 S., R. 10 E , W.M.
T. 18 S., R. 10 E , W.M.

The area is located on the east flank of the Cascades at the head of Tumalo Creek drainage on the Bend District of the Deschutes National Forest, Deschutes County, Oregon.

The area is reached by traveling west from Bend, Oregon, on County Road 4601 for 14 miles and by Highway 46 (Century Drive).

Approximately 14 miles of trail exist within the RA. Trails 23, 24, 25, and 26 pass through the area. In addition, there are 16 miles of cross-country ski and snowmobile trails.

Geography and Topography

The topography of the RA is extremely variable, ranging from steep to gentle buttes and drainage systems. Principal features within the area include Tumalo Mountain, Swampy Lakes, Bridge Creek, and Tumalo Creek

Elevation ranges from 7775 feet on Tumalo Mountain to 5000 feet near Tumalo Falls

Precipitation ranges from 30 to 45 inches per year and falls primarily in the form of snow. The porous volcanic soils absorbs moisture directly into the ground. The area is drained by tributaries of Tumalo Creek.

Soil Types

The soil types described here are based on the Deschutes National Forest Soil Resource Inventory.[1]

The soils are the high elevation types composed of a shallow layer of light brown, sandy Mazama ash over stony glacial till. A bleached gray soil occurs in mountain hemlock stands; otherwise, soils are moderately deep, light brown, and sandy in texture and excessively drained, or shallow soils lying atop bedrock lava In some areas, a coarse pumice from Devils Hill or Rock Mesa occurs on the surface

[1] Daniel H Larsen, Soil Resource Inventory, Deschutes National Forest, Pacific Northwest Region, 1976

APPENDIX C
BEND WATERSHED ROADLESS AREA (RARE NO. 06194)

LAND TYPE	LANDFORM	PERCENT SLOPE	ELEVATION
4	Alpine Meadows	<30	
11	Lava Flows	0-30	4500-7000
12	Talus Slopes	20-70	4500-7000
16	Sloping Uneven Glaciated Uplands	15-40	4300-6500
17	Gentle Uneven Glaciated Uplands	0-30	4200-6500
18	Glaciated Valley Walls and Cirques	30-80	4200-6600
19	Glaciated Uplands	20	4700-6000
20	Glaciated Uplands with Many Lakes	0-30	5300-6000
22	Glacial Moraines and Valley Walls	25-60	3300-5700
24	Glacial Moraines and Sideslopes	20-60	3600-4300
25	Uneven Glaciated Lands	10-40	4400-5400
73	Uneven Lava Plains	15	4800-5800
84	Dissected Sideslopes	30-80	6000-7000
85	Ridge Tops and Flats	0-30	6000-6800

Vegetation

Plant communities present are. mountain hemlock/ grouse huckleberry, lodgepole pine/grouse huckleberry, mixed conifer/manzanita, lodgepole pine/ manzanita, mixed conifer/snowbrush/sedge, lodgepole pine/sedge-lupine penstemon, lodgepole pine/sedge-lupine, ponderosa pine/bitterbrush-snowbrush/sedge, and wet meadows.

The mountain pine beetle infestation has reached epidemic proportions in lodgepole pine stands.

Ecosystem Type

This RA is composed of mixed conifer and mountain hemlock forest. Lodgepole pine forest accounts for less than 5 percent of the RA. Equivalent amounts of "old growth," "mature," and "young" forest successional stages are represented, most of which is "old growth" mountain hemlock Less than 5 percent of the RA is classified as nonforest where trees are widely scattered or nonexistent. Nonforested areas are either high-elevation, openings with few trees and minimal ground vegetation in coarse pumice located north and west of Tumalo Mountain, or moist meadows in the Bridge Creek and Tumalo Creek drainages. A very small amount of talus slope is found on Tumalo Mountain, providing habitat for dependent wildlife such as the pika and yellow-bellied marmot.

Riparian ecosystems in the Bridge Creek drainage occur along Bridge Creek (4 10 miles) and Spring Creek (1.20 miles) Bridge Creek is dominated by spruce and a grass/forb understory Bridge Creek narrows from 5 to 10 feet wide near its headwaters. No willows or other shrubs are present. The Spring Creek zone is narrow (approximately 5 feet), grass/forb under mountain hemlock/red fir forest communities The first 1/4 mile of this riparian ecosystem was burned during the Bridge Creek fire in July of 1979.

Riparian ecosystems in the Tumalo Creek drainage are more extensive Along Tumalo Creek (1 75 miles) riparian habitat is a narrow (5-10 feet wide) spruce/mountain hemlock forest mixed with alder. Bottle Creek and Rock Creek also have narrow riparian ecosystems, but lack alder. The North Fork Tumalo Creek (1 00 mile) riparian ecosystem is narrow (0 to 10 feet wide) spruce-dominated forest with grass/forb understory. The Middle Fork Tumalo Creek riparian ecosystem has extensive sedge-dominated meadows which is 1,000 feet wide that create an excellent mosaic of forest-to-meadow "edge," and provide habitat for many wildlife species. South Fork Tumalo Creek (2 25 miles) is another narrow (5-10 feet wide) riparian ecosystem of spruce draining Swampy Lakes.

APPENDIX C
BEND WATERSHED ROADLESS AREA (RARE NO. 06194)

Swampy Lakes is a 40-plus acre wet meadow containing several shallow ponds ranging from 1/4 to 3/4 acre in size.

Mule deer belonging to the Upper Deschutes Management Unit herd summer in this RA. Although there is a limited amount of early seral habitat for deer the riparian ecosystems are excellent fawn-rearing sites.

An estimated 25 to 70 Roosevelt elk use this area during the summer and fall. The riparian ecosystems and associated thermal cover, combined with the isolation from human disturbance, make this area a valuable calf-rearing site. The area is becoming more popular for archery elk hunting each year. These elk are thought to either migrate over the Cascade Crest to winter grounds on the Willamette National Forest, or winter along the Deschutes River near Ryan Ranch and vicinity.

No Endangered, Threatened, or Sensitive species of animals or plants are known or suspected in this RA. However, no formal plant surveys have been attempted in recent years.

Tumalo Lake is the only lake present and supports no fishery.

Bridge Creek has a limited population of rainbow trout on its lower reaches in the RA The upper reaches support no fish, apparently due to steep gradient (12 percent) and few pools. Spring Creek is too small (2 feet wide), cold, steep (8 percent), and lacks pools which support a fishery.

The Tumalo Creek system also has a relatively limited fishery. Brook trout are present in all tributaries except Bottle Creek and Rock Creek Steep gradients and low water temperatures contribute to the absence of fish in these two channels.

Tumalo Creek and its north and middle tributaries have limited populations of brook trout, few pools, and poor habitat for a fishery

The RA receives minimal fishing pressure except in the vicinity of Tumalo Falls and areas further downstream.

Current Uses

The RA is inventoried as Recreation Opportunity Spectrum (ROS) category "Semiprimitive Nonmotorized." Primary recreation uses are hiking, horseback riding, hunting, picnicking, dispersed camping, cross-country skiing, and snowmobiling. Use statistics for 1983 indicate 330 Recreation Visitor Days (RVDs) for hiking, 200 RVDs for horseback riding, 1,600 RVDs for hunting, 220 RVDs for picnicking, 200 RVDs for dispersed camping, 13,600 for cross-country skiing, and 2,400 RVDs for snowmobiling. Three primitive shelters accommodate the cross-country skiers.

Since 1926 the majority of the area has been devoted to the Bend Municipal Watershed Management. The City of Bend has the exclusive authority by formal cooperative agreement signed by the Chief of the Forest Service to manage the watershed Bridge Creek is the main water supply for the city of Bend A small diversion dam was constructed on the middle fork of Tumalo Creek and a connecting ditch has been built between the dam and Bridge Creek. A low standard road off Forest Road 370 accesses the area.

The Bridge Creek Burn of 1979 devastated much of the area around Bridge Creek and Tumalo Creek. Some salvage logging by helicopter and planting and rehabilitation projects have been carried out in the area.

Outfitter guides operate within the RA under the authority of special-use permits

Firewood cutting is permitted in those areas where roads run adjacent to the RA.

Appearance

The appearance of the RA varies considerably depending upon location. At lower elevations, the lodgepole communities are dense and beetle infested Consequently, fuel loading is high and many of the trees are dead or dying Virgin stands of hemlock, true fir, and spruce are found at higher elevations along the streams. The RA has good diversity of vegetation and topography, cascading streams, springs, and meadows The Bridge Creek Burn has heavily affected the visual quality,

APPENDIX C
BEND WATERSHED ROADLESS AREA (RARE NO. 06194)

particularly from the ridgetops overlooking the drainage.

Surroundings

To the north and east much of the land has been affected by logging activities and Bridge Creek Burn rehabilitation projects.

The RA is bounded to the south by County Route 46 (the Cascade Lakes Highway). This highway receives intensive year-round recreation use by skiers and summer tourists

The RA is bounded on the northeast by Forest Road 370. This low standard jeep road is a snowmobile trail during the winter. Lands west of Forest Road 370 are primarily in the Three Sisters Wilderness.

The RA is bounded on the north by Forest Road 4601. This is a low standard road which is used for firewood cutting and logging The Bearwallow RA lies just north of Forest Road 4601

Tumalo Falls to the west is a popular place for tourists during the summer, with use totalling 300 RVDs during FY 1983.

Most of the facilities associated with the Bend Municipal Water System, including the caretaker's house, are located near Tumalo Falls.

Geothermal lease applications have been filed for on lands along the western boundary

The Tumalo Irrigation District has a constructed ditch that approaches the western boundary near Tumalo Lake

Attractions

The major attractions within the RA include the cascading streams, springs, meadows, virgin forest, scenery, wildlife, and varied terrain.

The summit of Tumalo Mountain offers panoramic views of the Cascades and surrounding lands.

Easy access and excellent snow depth makes the area attractive to winter users.

CAPABILITY

Manageability and Boundaries

The ability to manage an area as undeveloped must be considered Factors such as size, shape, and location are important

The low standard roads along the northern and western boundaries affect the manageability in both positive and negative ways The roads provide adequate opportunity for transportation access and trailheads. However, jeep roads adjacent to undeveloped areas often require policing and signing in order to keep out motorized uses where not permitted.

The Cascade Lakes Highway will affect the manageability of the southern portion. Traffic noise would detract from undeveloped recreation experience The snowmobile traffic on Forest Road 370 would detract in a similar way

The RA is large enough to be managed as unroaded, but the boundaries are irregular and do not follow clear topographic or geographic lines

The current trail system adequately serves the area

The area would be difficult to manage for a primitive experience because of the large number and varying types of users within the area

The mountain pine beetle epidemic is increasing the potential for a catastrophic fire. Undeveloped designation might preclude treating these fuels (reducing the hazard) by normal methods

Natural Integrity

The majority of the RA is in a natural state and unaffected by human influences.

The trail systems are extensive and their effect upon the immediate area is high. The total area involved is insignificant.

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BEND WATERSHED ROADLESS AREA (RARE NO. 06194)

Physical developments in the area include the three trail shelters and the municipal water system.

Slash burning around the RA produces air pollution for short periods of time, but it has not affected natural processes within the RA.

Several undeveloped campsites are located along the streams in the RA

Natural processes have been most heavily affected by the control of wildfire in the area. Prescribed burning could restore the natural processes.

Apparent Naturalness

The trails, shelters, water system development, and undeveloped campsites have the greatest influence on the apparent naturalness as perceived by the user. Overall, their influences on the naturalness of the area are low.

Opportunities for Solitude

The opportunity for solitude is based on the following factors size of area, topographic screening, vegetative screening, distance from perimeter to core, and human intrusions. The overall opportunity for solitude is moderate except in areas adjacent to the Cascade Lakes Highway.

Primitive Recreation Opportunities

Solitude and the following additional factors are used for rating primitive recreation experience: diversity of opportunities, challenge and absence of facilities. Overall, the opportunity for primitive recreation is high.

Challenging Experiences

A challenging experience is based on an area's ability to offer opportunities for unusual adventure, excitement, challenge, self-reliance, initiative, and judgment Challenging features include dangerous animals, climatic disturbance, avalanche potential, terrain features (i.e., cliffs, quicksand, sink holes), fast-moving water, glaciers, and a lack of dominant visual features on which to orient oneself. Only a few hazardous features are present in the RA

Special Features

No known habitats for Threatened, Endangered, or Sensitive species exist in the area

Historic and Scientific Study

The RA receives an "outstanding" rating because of its geological, ecological, and cultural features not found elsewhere in the area.

Historical features included in this rating are the Tumalo Irrigation System (Crater Ditch), the Bend Municipal Water Supply water intake structures, and possibly the old Tumalo Lookout and the Swampy Lakes Shelter.

The spring at the head of Bridge Creek is a special geological feature

Availability and Resource Potentials

Refer to Table C-1

Management Considerations

The mountain pine beetles' infestation in lodgepole pine stands has reached epidemic proportions on the Forest Entomologists predict that this epidemic will continue for another 10 to 15 years until the beetles' major food supply of lodgepole pine is either consumed or destroyed. In Roadless Areas, the pine beetle epidemic may set the stage for a catastrophic fire.

NEED

Nearby Wilderness and Its Use

The Three Sisters Wilderness (94,247 acres on the Deschutes National Forest) is the nearest Wilderness and is located 2 miles to the north It is currently being used at about 35 percent of capacity

Statistics for fiscal year 1983 indicate use for the Three Sisters Wilderness was 48,900 RVDs.[2] About 30 percent of the use came from the local area, about 55 percent from other in-State locations, and about 15 percent from out of State [3]

APPENDIX C
BEND WATERSHED ROADLESS AREA (RARE NO. 06194)

Deschutes County, which had a population of 63,300 in 1983, represents the majority of the Forest Influence Area.

Distance from Population Centers

The Forest Influence Area includes the following towns· Sisters, Redmond, Tumalo, Bend, Sunriver, LaPine, Crescent, and Gilchrist All of these are within 100 miles of the Wilderness. Bend, with the largest population (17,840) is 25 miles from the Wilderness by road which is not excessive for people interested in an undeveloped recreation experience.

Ecosystem Representation

No rare or unique ecosystems are known to exist within the RA.

Congressional and Proponent Interest

A local group has expressed an interest in closing Forest Road 370 and adding the RA to the Three Sisters Wilderness However, this proposal did not arise again during public comments on Roadless Areas in 1984. The Congressional Review of roadless areas within the National Forests in Oregon did not include this area within the 1984 Wilderness Legislation (Public Law 98-328).

Public Input

The RARE II evaluation process showed that 73 percent of the respondents wanted a wilderness designation, 27 percent wanted a nonwilderness designation, and 71 percent wanted it to be considered for further planning.

Other Public Scoping Results

Two public workshops were conducted during early 1984 Public comments were also requested through the "Forest Plan Report." Public comment primarily was heavy to protecting the area and keeping it undeveloped but some comments favored development of the area

AVAILABILITY

Resource Potentials

The lands along the Cascade Crest are of interest as a possible source of geothermal steam energy. Although the potential developable geothermal energy ranges from approximately 20 to 70 kilowatts per acre, no valid leases have been filed for the area

WILDERNESS POTENTIAL

This roadless area is dominated by forests of Mtn. Hemlock and mixed conifer with less than 5 % non-forestd It includes the Tumalo and Bridge creek drainages and is in a relatively natural state No threatened or endangered species have been recognized in the area

The area is close to Bend and receives relatively high trail use by hikers, mountain bikers and to a lessor extent horse use and winter snowmobile use. Opportunities for solitude are moderate, while opportunities for primitive recreation are relatively good.

The majority of the area has been managed as the Municipal Watershed for Bend Little of the area would be available for development in any alternative. Wilderness potential for this area is moderate to low A wilderness designation would make management of the Bend watershed exceedingly difficult.

[2] 1983 RIM Data
[3] This data based on analysis of 1981 Wilderness permits for the Three Sisters Wilderness

Table C-3 SUMMARY OF BEND WATERSHED ROADLESS AREA DEVELOPMENT BY ALTERNATIVE

	No Change	ALT. A	ALT. B	ALT. C	ALT E	ALT G
Total Unroaded Acres	14,250	14,250	14,250	14,250	14,250	14,250
Acres Available for Development	2,815	2,815	2,566	2,316	723	747
Acres Unavailable for Development[1]	11,435	11,435	11,684	11,934	13,527	13,503
Acres Available for Winter Recreation/Geothermal[2]	0	0	2,368	0	3,920	0
Acres of Timber Harvest [3]						
Decade 1[6]	0	0	953	602	0	0
Decade 2	0	0	1566	1129	0	20
Decade 5[7]	1791	1791	20657	1660	289	317
Cumulative Miles of Road Construction [4]						
Decade 1	0 00	0.00	9.5	6 0	0	0 00
Decade 2	0 00	0 00	15 7	11 3	0	2
Decade 5	17 9	17 9	20 7	16 6	2 9	3 2
Acres Remaining Undeveloped After[5]						
Decade 1	14,250	14,250	13,297	13,648	14,250	14,250
Decade 2	14,250	14,250	12,684	13,121	14,250	14,230
Decade 3	12,459	12,459	12,185	12,590	13,961	13,933

[1]Includes management strategies which primarily exclude roading such as Research Natural Areas, some forms of undeveloped recreation, and the Bend Municipal Watershed
[2]The acres assigned to the winter recreation and geothermal strategy are available for roading but it is difficult to predict when that would occur since it is dependent upon leasing and exploration Some exploration could be expected in the first decade but it is impossible to say how much and where.
[3]The acres scheduled for timber harvest would also have associated roads so that total acres impacted would be somewhat higher than shown above
[4]Based on a coefficient of .01 mile of collector and local roads per acre harvested. The unpredictable impacts of geothermal exploration and development are not included
[5]Includes only the impacts of scheduled timber harvesting. Does not consider geothermal exploration or some development that might occur because of the mountain pine beetle epidemic in lodgepole pine
[6]First decade basically represents the life of a Plan for any alternative
[7]The fifth decade represents the potential if an alternative were continued for 5 decades

APPENDIX C
CHARLTON ROADLESS AREA (RARE NO. 06107)

DESCRIPTION--THE EXISTING CONDITION

History

The Charlton Roadless Area (RA) was included in the RARE I and RARE II analysis processes. Some boundaries have changed since 1979. The eastern boundary was adjusted to exclude two logged areas. This portion was excluded based on the premise that logging activities are inconsistent with Roadless Area values.

Location and Access

The Charlton RA contains 7,243 acres and lies within the following townships:

T. 20 S., R. 6 E., W.M.
T. 20 S., R 7 E , W M.
T. 21 S , R 6 E , W M.
T. 21 S., R. 7 E., W.M.

The general location is on the eastern slope of the Cascade Summit north of Forest Road 5897 and south of Forest Road 60 in the Bend District of the Deschutes National Forest, Deschutes County, Oregon

Access is gained by traveling west from Bend, Oregon, on Highway 46 for 52 miles. Turn right on Forest Road 5897 for 4 miles

Approximately 9 miles of trail are located within the RA The following trails pass through the area. No. 21, No 19, and the Pacific Crest Trail.

Geography and Topography

The topography of this RA is gently rolling and slopes to the east and west from the Cascade Crest, with the exception of Charlton Butte. The principal features in the area are Charlton Butte and Lemish and Taylor Lakes Several smaller lakes are scattered throughout the area.

The elevation ranges from 6500 on Charlton Butte to 5000 feet in the northeastern portion.

Precipitation ranges from 27 to 35 inches per year and falls primarily in the form of snow. It is usually late June or July before the snow melts out The porous volcanic soils causes the moisture to soak directly into the ground. Very little runoff occurs A few wet meadows (old lake beds) are located throughout the area.

Soil Types

The soil types described here are based on the Deschutes National Forest Soil Resource Inventory.[1]

The soils are the high elevation types consisting of a shallow to moderately deep, sandy brown Mazama ash over stony glacial till, scoured bedrock, talus or cinders. A bleached gray layer occurs within the surface horizon under mountain hemlock Bare rock outcrops are common on the steeper slopes.

[1]Daniel H Larsen, Soil Resource Inventory, Deschutes National Forest, Pacific Northwest Region, 1976

APPENDIX C
CHARLTON ROADLESS AREA (RARE NO. 06107)

LAND TYPE	LANDFORM	PERCENT SLOPE	ELEVATION
16	Sloping Uneven Glaciated Uplands	15-40	4300-6500
17	Gentle Uneven Glaciated Uplands	0-30	4200-6500
83	Cinder Cones	25-70	5700-6800
85	Ridgetops and Flats	0-30	6000-6800

Vegetation

Plant communities present are mountain hemlock/ grouse huckleberry, lodgepole/ grouse huckleberry, lodgepole/sedge-lupine-penstemon, lodgepole/ sedge-lupine, lodgepole/lupine needlegrass, lodgepole/erianthastrum/needlegrass-lupine, mixed conifer/snowbrush-sedge, mixed conifer/ manzanita, lodgepole/manzanita, and wet meadows.

Most of the lodgepole pine communities are infested by the mountain pine beetle to epidemic proportions.

Ecosystem Type

Approximately 75 percent of this RA is classified as mountain hemlock forest The eastern 25 percent is lodgepole pine forest. Small inclusions of mixed conifer forest are also present. These forests are classified as either being "old growth" or "mature" successional stages A small amount of "young" forest is found at the southeast corner of this RA

Riparian ecosystems are found on the margins of the lakes and ponds. These communities are narrow in width (<20 feet) Charlton Creek also has very narrow riparian communities along its banks. Predominantly forested, these zones occasionally widen into open meadows as large as 10 acres and more (e.g., Clover Meadow)

The variety of wildlife species is typical of mature and overmature high elevation forest A scarcity of early seral plant communities accounts for a proportionate low representation by such species as the mountain bluebird.

Mule deer belonging to the Upper Deschutes Herd Management Unit summer in this RA. Because most of this RA is mature/overmature forest, deer use is light

An estimated 20 to 40 Roosevelt elk use the riparian communities along Charlton Creek and Clover Meadow as summer and fall range Wile it has not been confirmed, it is suspected that these elk winter on the west slope of the Cascades in the Willamette National Forest Elk inhabit these riparian areas during the archery hunting season, and are favorite hunting sites.

No Endangered, Threatened, or Sensitive species are known or suspected to occur within the RA but no special surveys for plants have been initiated.

The RA contains four fish-producing lakes-- Blowdown, Lemish, Lily, and Taylor Taylor Lake, located on the north edge of the RA, is accessible by vehicles. Blowdown Lake is the smallest of the four at 4 acres, followed by Lily Lake at 15 acres, Lemish Lake at 16 acres, and Taylor Lake at 40 acres. Lily Lake is deep (at 44 feet) when compared to 8 and 13 foot depths of the other three. All are stocked with brook trout

Charlton Creek does not support a fishery because of its ephemeral stream flow

Current Uses

The RAs primary use is dispersed recreation. The Recreation Opportunity Spectrum (ROS) inventoried category is "Primitive." Recreation uses are hiking, horseback riding, hunting, fishing, and dispersed camping. Use statistics for fiscal year 1983 indicate approximately 500 Recreation Visitor

APPENDIX C
CHARLTON ROADLESS AREA (RARE NO. 06107)

Days (RVDs) for hiking, 100 RVDs for horseback riding, 100 RVDs for hunting, and 600 RVDs for dispersed camping

Geothermal lease applications have been filed on 2,500 acres in the RA.

The Soil Conservation Service maintains a snow measurement site near Blowdown Lake. On-site facilities include a rain gauge, snow pillow, radio station, access road, and building

The Bend District has four designated helispots within the RA. These are natural openings (meadows) and no maintenance or vegetative clearing are required.

Appearance

The RA appears as a densely forested area on gently rolling terrain. Charlton Butte is the only dominant landform.

The mountain pine beetle has infested the lodgepole pine stands The trees turn red and die which affects scenic quality.

Surroundings

The area is bounded on the west by the Willamette portion of the RA The primary use has been dispersed recreation. The Pacific Crest Trail passes through the area

The RA is bounded to the north by Forest Road 600 This is a low standard road which separates the Charlton RA from the Three Sisters Wilderness. It receives some winter use by snowmobilers but use at all times is low.

The RA is bounded on the south by Forest Road 5897. This is a wide road roadbed, whose maintenance standard is low It is also the northern boundary of the Maiden Peak RA. Some winter snowmobiling occurs but overall use is low

Lands to the east of the RA are managed primarily for wood and forage production Logging is prevalent.

Attractions

Major attractions within the RA include small lakes, virgin forest, meadows, scenery, and wildlife

The summit of Charlton Butte offers views of the surrounding lands.

CAPABILITY

Manageability and Boundaries

The ability to manage an area as undeveloped must be considered. Factors such as size, shape, and location are important

Low standard roads adjacent to the boundaries affects the manageability in both positive and negative ways. The roads provide adequate opportunity for transportation access and trailheads. Conversely, this type of road often requires policing and signing in order to control incompatible uses.

The eastern boundary is somewhat irregular and does not follow clear topographic or geographic breaks but some improvement was made when the boundary was adjusted in 1983

The mountain pine beetle infestation may be setting the stage for a catastrophic fire

The existing trail system adequately serves the area.

Natural Integrity

The vast majority of the RA is in a natural state and unaffected by human influences

The trail systems are fairly extensive and their effect upon the area immediately surrounding the trails is high Their overall impact is insignificant.

Slash burning around the RA produces air pollution for short periods of time, but it has not affected natural processes within the RA.

There are several undeveloped campsites on the lakes. The planting of fish has disrupted the natural processes in most of the lakes.

Natural process have been most heavily affected by the suppression of wildfire. The ecology and natural succession have been altered by the exclusion of fire Time and prescribed burning could restore the natural processes.

The snow survey station has altered the natural processes in its immediate vicinity.

Apparent Naturalness

Of the human-caused effects discussed in the previous section, the trails, undeveloped campsites, and snow survey station have the greatest influence on the apparent naturalness as perceived by the user, but, overall, this influence is minimal.

Opportunities for Solitude

The opportunity for solitude considers the following factors. size of area, topographic screening, vegetative screening, distance from perimeter to core, and human intrusions. Overall, there is a moderate opportunity for solitude.

Primitive Recreation Opportunities

Solitude and the following additional factors are used for rating primitive recreation· Diversity of opportunities, challenge and absence of facilities Overall, there is a moderate opportunity for Primitive Recreation in the RA.

Existing opportunities include hiking, hunting, fishing, nonmotorized watercraft use, swimming, backpacking, camping, ski touring, horseback riding, photography, nature study, and acquiring general knowledge and understanding

Challenging Experiences

This attribute considers the area's ability to offer opportunities for unusual adventure, excitement, challenge, self-reliance, initiative, and judgment Challenging features include dangerous animals, climatic disturbance, avalanche potential, terrain features (i e., cliffs, quicksand, sink holes), fast-moving water, glaciers, and a lack of dominant visual features on which to orient oneself. Since such hazardous features are seldom encountered, challenging experiences are rare.

Special Features

No Endangered, Threatened, or Sensitive wildlife or plant species are known to inhabit the area.

Historic and Scientific Study

The Deschutes portion of the RA receives an "infrequent" rating for the geological and ecological features present This rating is given to features often found in the High Cascade physiographic province

Availability and Resource Potentials

Refer to Table C-1.

Management Considerations

The mountain pine beetle has infested lodgepole pine stands at, or near, epidemic levels on the Forest. Entomologists predict the epidemic will continue for another 10 to 15 years until the beetles' major food supply of lodgepole pine is either consumed or destroyed. In roadless areas, this activity may be setting the stage for a catastrophic fire

NEED

Nearby Wilderness and Its Use

The Three Sisters Wilderness (94,247 acres on Deschutes National Forest) is the nearest Wilderness and is located immediately to the north. It is currently being used at about 35 percent capacity

APPENDIX C
CHARLTON ROADLESS AREA (RARE NO. 06107)

Statistics for fiscal year 1983 indicate use for the Deschutes portion of the Three Sisters Wilderness was 48,900 RVDs.[2] About 30 percent of the use came from the local area, about 55 percent from other in-State locations, and about 15 percent from out of State.[3]

In considering local use, Deschutes County, which had a population of 63,300 in 1983, represents the majority of the Forest Influence Area

Distance From Population Centers

The Forest Influence Area includes the following towns: Sisters, Redmond, Tumalo, Bend, Sunriver, LaPine, Crescent, and Gilchrist. Bend, with the largest population (17,840), is 25 miles from the Wilderness by road, which is not excessive for people interested in a wilderness experience.

Ecosystem Representation

No rare or unique ecosystems are known to exist within the RA

Congressional and Proponent Interest

Congressional input has shown no interest in the RA, and only minimal interest by wilderness proponents. The Congressional Review of roadless areas within the National Forests in Oregon did not include this area within the 1984 Wilderness Legislation (Public Law 98-328).

Public Input

The RARE II evaluation process showed that 19 percent of the respondents wanted a wilderness designation, while 81 percent want a non-wilderness designation.

Other Public Scoping Results

Two public workshops were held regarding Roadless Areas in early 1984 Public comments were also requested through the "Forest Plan Report " there was not much interest in the area and the few comments that were received were split between development and nondevelopment.

WILDERNESS POTENTIAL

This area is characterized by gently rolling forested terrain About 75% of this area is dominated by Mtn. Hemlock stands and the other 25% with beetle infested lodgepole pine.

Some geothermal potential exists within the area. Most of the existing use is primarily dispersed recreation; hiking, horseback riding, hunting, dispersed camping and fishing All of these occur at low levels A small number of elk utilize the area in summer and fall.

The area is in an undisturbed condition with minimal human disturbance The area offers moderate opportunities for solitude and primitive recreation opportunities but few opportunities for challenging experiences.

The Charlton Roadless Area has low to moderate Wilderness potential

[2] 1983 RIM data
[3] This data is based on analysis of 1981 Wilderness permits for the Three Sisters Wilderness Area

Table C-4 SUMMARY OF CHARLTON ROADLESS AREA DEVELOPMENT BY ALTERNATIVE

	No Change	ALT. A	ALT. B	ALT. C	ALT. E	ALT. G
Total Unroaded Acres	7243	7243	7243	7243	7243	7243
Acres Available for Development	696	696	536	6419	1021	6184
Acres Unavailable for Development[1]	6547	6547	6707	824	6222	1059
Acres Available for Winter Recreation/Geothermal[2]	0	0	0	0	0	0
Acres of Timber Harvest [3]						
Decade 1[6]	0	0	71	5	0	0
Decade 2	0	0	159	5	0	12
Decade 5[7]	386	386	321	4942	180	232
Cumulative Miles of Road Construction [4]						
Decade 1	0 00	0 00	7	1	0	0 00
Decade 2	0	0	1 6	1	0	1
Decade 5	3 9	3 9	3 2	49 4	1 8	2 3
Acres Remaining Undeveloped After [5]						
Decade 1	7243	7243	7172	7238	7243	7243
Decade 2	7243	7243	7084	7238	7243	7231
Decade 3	6857	6857	6922	2301	7063	7011

[1]Includes management strategies which primarily exclude roading such as Research Natural Areas, some forms of undeveloped recreation, and the Bend Municipal Watershed

[2]The acres assigned to the winter recreation and geothermal strategy are available for roading but it is difficult to predict when that would occur since it is dependent upon leasing and exploration Some exploration could be expected in the first decade but it is impossible to say how much and where

[3]The acres scheduled for timber harvest would also have associated roads so that total acres impacted would be somewhat higher than shown above

[4]Based on a coefficient of .01 mile of collector and local roads per acre harvested The unpredictable impacts of geothermal exploration and development are not included

[5]Includes only the impacts of scheduled timber harvesting Does not consider geothermal exploration or some development that might occur because of the mountain pine beetle epidemic in lodgepole pine

[6]First decade basically represents the life of a Plan for any alternative

[7]The fifth decade represents the potential if an alternative were continued for 5 decades

APPENDIX C
MAIDEN PEAK ROADLESS AREA (RARE NO. 06108)

DESCRIPTION--THE EXISTING CONDITION

History

The Maiden Peak Roadless Area (RA) was included in both the RARE I and RARE II analysis processes. Some boundaries have changed since 1979 Several developments and logged areas were inadvertently included within the RA during the initial inventory. The eastern boundary was adjusted to exclude several timber sales. A minor adjustment was made to exclude a portion of the powerline near Odell Lake These areas were excluded because logging and other developments were inconsistent with Roadless Area values.

Location and Access

The Deschutes portion of the Maiden Peak RA contains 27,008 acres and lies within the following townships·

T. 20 S., R. 6 E , W.M.
T 20 S , R. 7 E., W M
T. 21 S., R. 6 E., W M.
T 21 S., R. 7 E , W M.
T 22 S., R. 6 E., W.M.
T 22 S , R. 7 E , W M
T 23 S , R. 6 E., W M.
T 23 S , R. 7 E , W M.

The RA lies along the eastern slope of the Cascade Summit, north of State Highway 58 and south of Forest Road 5897 on the Bend and Crescent Districts of the Deschutes National Forest, Deschutes and Klamath Counties, Oregon

Access is gained by traveling south from Bend, Oregon, on U S Highway 97 for 57 miles, then west on State Highway 58 for 20 miles, at which point Highway 58 parallels the RA.

Approximately 26 miles of trail are included within or adjacent to the RA. The major trails are. Numbers 41, 99, 19, and 21, and the Pacific Crest Trail.

Geography and Topography

The RA is composed of gently rolling forest and steep mountain slopes around
Maiden Peak, the Twins, and Maklaks Mountain. Numerous small lakes and streams dot the landscape. Principal features are Maiden Peak, Bobby Lake, and Rosary Lakes

Elevation ranges from 5000 feet near Odell Lake to 7878 feet at Maiden Peak.

Precipitation ranges from 40 to 60 inches per year and falls primarily in the form of snow The area is usually snow-free by late June or early July.

The porous volcanic soils cause the moisture to soak directly into the ground Wet meadows are scattered throughout the area.

Soil Types

The soil types are based on the Deschutes National Forest Soil Resource Inventory [1]

Soils are composed of shallow to moderately deep sandy Mazama ash and pumice lying atop stony glacial till or glacial scoured bedrock Surface soils are sandy, light brown, and well drained. Subsoils are stony, and of mixed origin. A bleached gray soil occurs in the surface horizon under mountain hemlock stands Bare talus and bedrock exposures are common on the steeper slopes

[1] Daniel H Larsen, Soil Resource Inventory, Deschutes National Forest, Pacific Northwest Region, 1976

APPENDIX C
MAIDEN PEAK ROADLESS AREA (RARE NO. 06108)

LAND TYPE	LANDFORMS	PERCENT SLOPE	ELEVATION
12	Talus Slopes	20-70	4300-6500
16	Sloping Uneven Glaciated Uplands	15-40	4200-6500
17	Gentle Uneven Glaciated Uplands	0-30	6000-7000
84	Dissected Sideslopes	30-80	6000-6800
85	Ridge Tops or Flats	0-30	5400-6000
6H	Lava Plains or Butte Toeslopes	0-30	

Vegetation

Plant communities present are: mountain hemlock/grouse huckleberry, lodgepole pine/grouse huckleberry, mixed conifer/manzanita, and lodgepole, lodgepole pine/sedge-lupine, lodgepole pine/sedge-needlegrass basins, lodgepole pine/sedge wetlands, lodgepole/lupine-needlegrass, mixed conifer/snowbrush-chinkapin, mixed conifer/snowbrush/sedge, and wet meadows

The mountain pine beetle infestation has reached epidemic proportions in the lodgepole pine stands.

Ecosystem Type

Mountain hemlock accounts for 80 percent of the Forest while mixed conifer and lodgepole pine comprises the remaining. The Forest is primarily in "mature" or "old growth" successional stages. Patches of "young" forest and some "early" successional stages are scattered throughout the southern half of the RA Less than 2 percent of the area is classified as nonforested and occurs as small meadows or cinder cones. Small water-filled potholes are widely spaced throughout the area.

Riparian ecosystems include the scattered meadows and forested streambanks along Charlton and Moore Creeks

Mule deer belonging to the Upper Deschutes Herd summer in the area. Deer density is low because the mountain hemlock forest is of low forage productivity. Small family groups of Roosevelt elk also use the area as summer range. Most of this use occurs in the riparian communities along Moore and Charlton Creeks.

Fish are present in nine lakes The lakes vary from 6 to 200 acres in size and are fairly deep. Most support populations of brook trout, though Charlton and Moore Creeks do not support any fish populations

Current Uses

The RA is currently used for Dispersed Recreation. The Recreation Opportunity Spectrum (ROS) inventory classifies the area as "Primitive," although Charlton Lake is classified "Semiprimitive Nonmotorized." Recreation includes hiking, horseback riding, dispersed camping, hunting, fishing, and cross-country skiing Use statistics for fiscal year 1983 show 600 Recreation Visitor Days (RVDs) for hiking, 200 RVDs for horseback riding, 200 RVDs for hunting, 700 RVDs for camping, and 300 RVDs for cross-country skiing.

Six helispots are designated in the RA and comprise natural openings where no clearing is necessary.

A water diversion located on Charlton Lake serves as the water source for the Waldo Lake campgrounds

Appearance

The RA is mainly flat country with dense, virgin, and often beetle-infested forests. Small lakes, streams, and meadows add variety Maiden Peak is the most outstanding landform

Surroundings

The RA is bounded on the west by the Willamette portion of the Maiden Peak RA. These lands are currently being used for dispersed recreation.

APPENDIX C
MAIDEN PEAK ROADLESS AREA (RARE NO. 06108)

To the north, the RA is bounded by Forest Road 5897 and the Charlton RA This is a low standard road receiving little use except for some snowmobiling during winter.

Lands to the east are used for wood and forage production. Logging is prevalent

To the south, the RA is bounded by Highway 58 and Odell Lake. Recreation use totaled 90,375 RVDs for developed sites around Odell Lake during FY 1983. Five campgrounds, 2 picnic sites, 64 summer homes, and 2 resorts are near the Lake. Highway 58 is a major route across the mountains to the Willamette Valley.

Geothermal lease applications have been filed for in the northern portion of the RA

Attractions

Principal attractions within the RA include the numerous small lakes and streams, meadows, scenery, and wildlife. Of these lakes, Bobby and Rosary Lakes attract the most use. The summit of Maiden Peak and the Twins offer panoramic views of the surrounding region.

CAPABILITY

Manageability and Boundaries

The ability to manage an area as roadless must be considered before a recommendation can be made. Factors such as size, shape, and location are important.

The intensive recreational development around Odell Lake will affect the south portion of the RA Noise created by motorboats and the high level of activity would detract from undeveloped recreation experience. The heavy traffic and resulting noise on Highway 58 would also detract from an undeveloped recreation experience

Various roads along the boundaries affect the manageability in both positive and negative ways. They provide adequate opportunity for transportation access and trailheads but roads adjacent to Wilderness may also require policing and signing in order to keep out motorized vehicles.

The eastern boundary presents a problem because it is irregular and does not follow clear topographic or geographic breaks Extensive signing would be required in order to identify the boundary.

The mountain pine beetle infestation is increasing the potential for a catastrophic fire in some of the area.

Natural Integrity

The vast majority of the RA is in a natural state and unaffected by human influences

The trail system is fairly extensive and its impact upon areas adjacent to the trail is high. The impact is insignificant in areas away from the trails.

Slash burning around the RA produces some air pollution for short periods of time, but it has not affected natural processes within the RA. Several undeveloped campsites are located on the lakes. Fish planting has disrupted the natural processes in most of the lakes

Natural processes have been most heavily affected by the suppression of wildfire in the area.

The water diversion on Charlton Lake has had minor effects upon natural processes. The water diversion is not apparent to most visitors and the lake is not subject to drawdown at current use levels.

Apparent Naturalness

Of the human-caused effects discussed earlier, the trails and undeveloped campsites have the greatest influence on the apparent naturalness as perceived by the user. Overall, their influences have had a negligible effect on the naturalness.

Opportunities for Solitude

The opportunity for solitude is based on the following factors: size of area, topographic screening, vegetative screening, distance from perimeter

to core, and human intrusions. Overall, the opportunity for solitude in the RA is moderate.

Primitive Recreation Opportunities

Solitude and the following other factors are used for rating a primitive recreation experience: diversity of opportunities, challenge and absence of facilities. The opportunity for primitive recreation in this RA is low.

Existing opportunities include hiking, hunting, fishing, nonmotorized watercraft use, swimming, backpacking, camping, ski touring, horseback riding, photography, nature study, and acquiring general knowledge and understanding

Challenging Experiences

This attribute considers the RA's ability to offer opportunities for unusual adventure, excitement, challenge, self-reliance, initiative, and judgment. Challenging features such as dangerous animals, climatic disturbance, avalanche potential, terrain features (i.e., cliffs, quicksand, sink holes), fast-moving water, glaciers, and a lack of dominant visual features on which to orient oneself. Hazardous features are seldom encountered in the area

Special Features

No threatened or endangered species are known in the area. Jepson's monkey-flower (Mimulus jepsonii), a sensitive plant species, is suspected to occur because specimens have been found just outside the area The area is suitable habitat for wolverine.

Historic and Scientific Study

The Deschutes portion of the RA receives an "infrequent" rating for the geological and ecological features present This rating is given to features often found in the High Cascade physiographic province.

Availability and Resource Potentials

Refer to Table C-1.

Management Considerations

The mountain pine beetle infestation has reached epidemic proportions in lodgepole pine stands. Entomologists predict this epidemic will continue for another 10 to 15 years until the beetles' major food supply of lodgepole pine is either consumed or destroyed. In Roadless Areas, this activity may be setting the stage for a catastrophic fire.

As of March 1985 there was a pending decision regarding use of 7 acres to be included in the Willamette Pass Ski Area.

NEED

Nearby Wilderness and Its Use

The Diamond Peak Wilderness Area is located one mile to the south (34,000 acres on Deschutes National Forest) is the nearest wilderness area. It is currently being used at about 7 percent capacity.

Statistics for fiscal year 1983 indicate use for the Deschutes portion of the Diamond Peak Wilderness area was 3,400 RVDs [2] About 30 percent of the use came from the local area, about 55 percent from other in-state locations, and about 15 percent from out of State.[3]

About 65 percent of the visitors came from the Willamette Valley.

[2] 1983 RIM Data
[3] This data based on analysis of 1983 wilderness permits for the Three Sisters Wilderness

APPENDIX C
MAIDEN PEAK ROADLESS AREA (RARE NO. 06108)

Distance from Population Centers

The city of Eugene is about 100 miles from the Wilderness. Towns east of the Cascades and in the Forest Influence Area are: Sisters, Redmond, Tumalo, Bend, Sunriver, LaPine, Crescent, and Gilchrist. All of these are within 75 miles of the Wilderness. Bend is 50 miles from the Wilderness by road. These distances are not excessive for people interested in a wilderness experience.

Ecosystem Representation

No rare or unique ecosystems are known to exist within the RA

Congressional and Proponent Interest

There has been no congressional interest in the RA, although one special interest group has indicated some concern. The Congressional Review of roadless areas within the National Forests in Oregon did not include this area within the 1984 Wilderness Legislation (Public Law 98-328).

Public Input

The RARE II evaluation process showed that 19 percent of the respondents wanted wilderness designation, while 81 percent wanted a nonwilderness designation.

Other Public Scoping Results

Two public workshops were held to discuss Roadless Area in 1984 Public comments were also requested through the "Forest Plan Report." The public comments indicate the greatest concern is for areas along the Crest of the Cascade Mountains. Many comments recommended not developing this part, but, overall, the comments were split regarding development.

WILDERNESS POTENTIAL

This area is predominantly gently rolling terrain. Eighty percent is covered by Mtn Hemlock forest with 2% nonforested openings and cinder cones. The remainder is lodgepole and mixed conifer Steeper ground exists around Maiden Peak and other prominent features.

Use of this area is low. Recreation uses includes hiking, horseback riding, dispersed camping, hunting, fishing and crosscountry skiing

Most of this area is in a natural state and has not been significantly effected by human influences.

Opportunities for solitude and primitive recreation are moderate while opportunities for challenging experiences are low.

The Wilderness potential of this area is moderate.

Table C-5 SUMMARY OF MAIDEN PEAK ROADLESS AREA DEVELOPMENT BY ALTERNATIVE

	No Change	ALT. A	ALT. B	ALT C	ALT. E	ALT. G
Total Unroaded Acres	27,008	27,008	27,008	27,008	27,008	27,008
Acres Available for Development	3,178	3,178	10,713	23,037	2,871	2,782
Acres Unavailable for Development[1]	23,830	23,830	16,295	3971	24,137	24,226
Acres Available for Winter Recreation/Geothermal[2]	0	0	0	0	0	0
Acres of Timber Harvest [3]						
Decade 1[6]	0	0	3191	369	0	0
Decade 2	0	0	6890	12,765	0	0
Decade 5[7]	819	819	8054	20,045	488	210
Cumulative Miles of Road Construction [4]						
Decade 1	0 00	0 00	31 9	3 7	0	0 00
Decade 2	0 00	0 00	68 9	127 7	0	0 00
Decade 5	8 2	8 2	80 5	200 5	4 9	2 1
Acres Remaining Undeveloped After [5]						
Decade 1	27,008	27,008	23,817	26,639	27,008	27,008
Decade 2	27,008	27,008	20,118	14,243	27,008	27,008
Decade 3	26,189	26,189	18,954	6,963	26,520	26,798

[1]Includes management strategies which primarily exclude roading such as Research Natural Areas, some forms of undeveloped recreation, and the Bend Municipal Watershed.

[2]The acres assigned to the winter recreation and geothermal strategy are available for roading but it is difficult to predict when that would occur since it is dependent upon leasing and exploration Some exploration could be expected in the first decade but it is impossible to say how much and where

[3]The acres scheduled for timber harvest would also have associated roads so that total acres impacted would be somewhat higher than shown above

[4]Based on a coefficient of 01 mile of collector and local roads per acre harvested The unpredictable impacts of geothermal exploration and development are not included

[5]Includes only the impacts of scheduled timber harvesting Does not consider geothermal exploration or some development that might occur because of the mountain pine beetle epidemic in lodgepole pine

[6]First decade basically represents the life of a Plan for any alternative

[7]The fifth decade represents the potential if an alternative were continued for 5 decades

APPENDIX C
METOLIUS BREAKS ROADLESS AREA (RARE NO. 06191)

DESCRIPTION--THE EXISTING CONDITION

History

The Metolius Breaks Roadless Area (RA) was included in both the RARE I and RARE II analysis processes. Some boundaries have changed since 1979. Several small logged areas and the associated roads were inadvertently included within the RA during the initial inventory. The boundary was adjusted to exclude these developed areas from the RA because such logging activities are inconsistent with Roadless Area Values

Location and Access

The Metolius Breaks RA contains 10,907 acres and lies within portions of the following townships

T. 10 S , R 10 E , W M
T 11 S , R 9 E , W M
T 11 S , R 10 E , W M
T. 11 S., R. 11 E., W M

This RA is located about 6 miles east of the Mt. Jefferson Wilderness Area in the Sisters District of the Deschutes National Forest, Jefferson County, Oregon. It is separated from the Mt Jefferson Wilderness by the Confederated Tribes of the Warm Springs Indian Reservation and the Metolius River.

The RA is reached by traveling northwest from Bend, Oregon, on U.S. Highway 20 for 32 miles, then north on County Road 14 for 12 miles, then north for 3 miles on Forest Road 1499.

No developed trails exist within the RA

Geography and Topography

The RA is on the breaks of Green Ridge It is mainly composed of steep and unstable granular slopes The principle feature in the area is Castle Rocks, an unusual group of rock pinnacles

Elevation ranges from 4800 feet on Green Ridge to 2200 feet near Spring Creek.

Precipitation ranges from 20 to 45 inches per year and falls primarily in the form of snow The area is drained by tributaries of the Metolius River

Soil Types

The soil types are based on the Deschutes National Forest Soil Resource Inventory [1]

Soils are low to mid elevation types which vary by position on the landscape The toeslope and alluvial fans at the west and north base of Green Ridge are gravelly to very stony, light brown and excessively drained sandy loams Escarpment and steep canyon wall soils are shallow, stony sandy loams with rock outcrops The flatter areas to the east are either shallow or moderately deep loamy soils formed over lava flows or weathered ash flow tuffs overlying a sandy loam surface with loam or clay loam subsoils

[1] Daniel H Larsen, Soil Resource Inventory, Deschutes National Forest, Pacific Northwest Region, 1976

LAND TYPE	LANDFORM	PERCENT SLOPE	ELEVATION
26	Toeslopes and Alluvial Fans	10-30	3000-4000
50	South Slopes of Canyon Walls	30-70	2300-4500
51	South Slopes of Canyon Walls	30-60	2400-3800
52	North Slopes of Canyon Walls	30-60	2400-3800
60	Lava Plains	0-30	3200-3600
89	Escarpments of Green Ridge	30-80+	3300-3600
90	Toeslopes of Green Ridge	0-30	3200-3600

APPENDIX C
METOLIUS BREAKS ROADLESS AREA (RARE NO. 06191)

Vegetation

Plant communities present are: mixed conifer/ snowberry/pinegrass and mixed conifer/ snowbrush-chinkapin plant communities dominate the west and north facing slopes of the area Ponderosa pine/bitterbrush/bunchgrass communities dominate the dry east facing slopes. Mixed conifer/snowbrush-chinkapin and brackenfern and mixed conifer/snowberry/pinegrass communities are common on northerly aspects on the east side of the area The juniper/bitterbrush and bunchgrass community occurs on dry sites throughout the area.

Ecosystem Type

The western half of the RA is primarily mixed conifer forest with small inclusions of ponderosa pine forest. The east half of the RA has approximately equal proportions of mixed conifer forest, ponderosa pine forest, and grass shrublands with big sagebrush and scattered ponderosa pine and western juniper.

The majority of the forested land is in either mature or old growth successional stages Clusters of young, pole, or seedling/sapling forest are scattered throughout the RA. This mixture creates a relatively good diversity of plant communities and successional stages which support a variety of wildlife species

Riparian ecosystems occur along Spring Creek and Street Creek These ecosystems are relatively narrow, averaging from 5 to 20 feet on Spring Creek, and 15 to 20 feet on Street Creek The Forest along Spring Creek is predominately coniferous with red fir, mountain hemlock, and little or no shrubbery. Street Creek has a wide variety of shrubs, with alder dominating over Douglas maple, dogwood, and big leaf maple

Unique wildlife species found include the Merriams turkey, pileated woodpecker, and western rattlesnake. Black bear and cougar have also been reported in the area.

Turkeys were introduced onto Green Ridge and along the Metolius River more than 30 years ago. Merriams turkeys were restocked in 1984 and 1985.

Pileated woodpeckers are found in mixed conifer old growth Forests of this RA.

Western rattlesnakes are found in the drier forested and nonforested sites, especially eastward near the boundary of the Forest This is the only occurrence of rattlesnakes on the Forest.

Mule deer belonging to the Metolius Herd Management Unit use the area as summer range. Winter and transition range is found in the east end, especially in the shrub-grasslands

Roosevelt elk occasionally move through the area in small family units Though unverified, biologists suspect that these elk move back and forth across the Metolius River between the Warm Springs Indian Reservation and Green Ridge They apparently winter either on the Reservation's side of the River, or, during milder years, on the Deschutes side.

A bald eagle nesting site is located one mile southeast of Monty Campground. The bald eagle is listed by the Fish and Wildlife Service as a threatened species One nest site, active since at least 1981, contains three nests This pair of birds apparently feeds on fish or waterfowl from the Metolius River to Lake Billy Chinook

It is possible, although not verified, that an occasional peregrine falcon may use the Metolius River canyon to hunt for waterfowl, shorebirds, or smaller passerines However, there are no known cliffs of suitable character for nesting in the RA.

Bean Creek and Spring Creek have no fisheries potential because of ephemeral flows. Street Creek is a very small stream with a modest population of small (sub-legal size) rainbow trout It has little potential for a recreational fishery.

Current Uses

The Recreation Opportunity Spectrum (ROS) inventory category is "Primitive." Primary recreation uses are hiking, hunting, and dispersed camping. No recreation use statistics have been developed

APPENDIX C
METOLIUS BREAKS ROADLESS AREA (RARE NO. 06191)

for the area, but it is assumed that the most common use is big game hunting.

The area borders the Warm Springs Indian Reservation.

Appearance

The RA gives a steep, rugged, and virgin appearance. The steep slopes and heavy fuels have resulted in many fires. Plant communities vary considerably, depending upon slope, aspect, and elevation Spring Creek is the only year-round water source.

Surroundings

The RA is roughly horseshoe shaped and averages about 1.5 miles in width. The lands within the "U" shape are heavily roaded and logging activities are prevalent. The outside periphery is bounded by County Road 64, Forest Road 1499, and the Metolius River. A few private land parcels occur along the river and adjacent to the RA and have a few cabins on them.

Monty and Perry South Campgrounds lie adjacent to the northeast portion. These two developed areas received 8,600 Recreation Visitor Days (RVDs) in 1983.

Forest Road 1499 and County Road 64 (from Monty Campground north) are low standard primitive roads. Vehicular use is minimal.

Attractions

The major attractions within the RA include the scenery, geological formations, virgin forests, and wildlife. Big game hunting is the primary attraction at this time There are several ridgetop vistas within the area; however, access is not easily gained by vehicle or foot

CAPABILITY

Manageability and Boundaries

The ability to manage an area as roadless must be considered before a recommendation can be made Factors such as size, shape, and location are important

The shape of the RA presents the greatest management problem. The narrow width (1 5 miles) precludes a quality environment where solitude and primitive recreation are key ingredients External influences such as logging, vehicular use, and private lands exist on all sides of the area. Outside noises could distract from the experience

The RA is accessible by road on all sides. This allows for adequate transportation access and trailheads.

The irregular shape would require extensive posting in order to be easily recognized.

The steep slopes and high fuel loads increase the potential for a catastrophic fire.

Natural Integrity

The vast majority of the RA is in a natural state and unaffected by human influences.

Slash and field burning around the RA produce air pollution for short periods of time, but they have not affected natural processes within the RA.

The natural process has been most heavily affected by the rapid suppression of wildfire in half the area

Apparent Naturalness

Smoke from slash and field burning will have the greatest influence on the apparent naturalness as perceived by the user The long term influence is negligible.

Opportunities for Solitude

The opportunity for solitude is based on the following factors: size of area, topographic screening, vegetative screening, distance from perimeter to core, and human intrusions. The opportunity in this RA is low because of the short distance from perimeter to core.

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METOLIUS BREAKS ROADLESS AREA (RARE NO. 06191)

Primitive Recreation Opportunities

Solitude and the following additional factors are used for rating primitive recreation: diversity of opportunities, challenge, and absence of facilities. Overall, the opportunity for a primitive recreation experience is low for this area.

The opportunities that do exist include hiking, backpacking, camping, hunting, photography, nature study, viewing outstanding scenery,and acquiring general knowledge and appreciation of nature and the environment.

Challenging Experiences

This attribute considers the RA's ability to offer opportunities for unusual adventure, excitement, challenge, self-reliance, initiative, and judgment. Challenging features include dangerous animals, climatic disturbance, avalanche potential, terrain features (i e , cliffs, quicksand, sink holes), fast-moving water, glaciers, and a lack of dominant visual features on which to orient oneself. The area is steep and the lower elevations are inhabited by rattlesnakes, but, overall, challenging features are rare.

Special Features

One threatened species (plant, animal, or insect) is known to exist in the RA. The bald eagle (Federally listed as threatened) nesting site is located one mile southeast of Monty Campground.

Historic and Scientific Study

This RA receives a "significant" rating because of its geological features infrequently found in the High Cascade Physiographic Province, particularly Castle Rocks. These formations provide a special opportunity for outdoor education and scientific study.

Availability and Resource Potentials

Refer to Table C-1.

Management Considerations

Smith Cabin, a cultural resource, is located in the RA

Dispersed camping along the Metolius River adjacent to the north and west of the RA is heavy. The incidence of man-caused fire is high, which could provide a high risk for escaped fire into the RA. Fuels are heavy and slopes are steep in the RA, both creating high potential conditions for catastrophic wildfires

New management direction is being developed and should be coordinated with the Confederated Tribes of Warm Springs Indian Reservation.

NEED

Nearby Wilderness and Its Use

The Mt. Jefferson Wilderness (32,734 acres on Deschutes National Forest) is the nearest Wilderness and is located about 6 miles east of the RA. It is currently being used at about 26 percent capacity.

Statistics for fiscal year 1983 indicate use on the Deschutes portion of the Mt. Jefferson Wilderness was 12,800 RVDs.[2] About 30 percent of the use came from the local area, about 55 percent from other in-State locations, and about 15 percent from out of State [3]

Deschutes County, with a population of 63,300 in 1983, represents the majority of the Forest Influence Area

[2] 1983 RIM Data
[3] This data based on analysis of 1981 Wilderness permits for the Three Sisters Wilderness

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METOLIUS BREAKS ROADLESS AREA (RARE NO. 06191)

Distance From Population Centers

The Forest Influence Area includes the following towns Sisters, Redmond, Tumalo, Bend, Sunriver, LaPine, Crescent and Gilchrist All of these are within 86 miles of the Wilderness Bend, with the largest population (17,840), is 32 miles from the Wilderness by road This distance is not excessive for people interested in a wilderness experience.

Ecosystem Representation

No rare or unique ecosystems are known to exist within the RA.

Congressional and Proponent Interest

There has been no congressional interest in the RA, and very little interest by proponents of wilderness in the private sector.

Public Input

The RARE II evaluation process showed that 73 percent of the respondents wanted wilderness designation, while 27 percent wanted nonwilderness designation.

Other Public Scoping Results

Two public workshops on Roadless Areas were conducted in 1984. Public comments were also requested through the "Forest Plan Report." The public expressed strong support for protecting the area and keeping it undeveloped. The Confederated Tribes of the Warm Springs Reservation expressed a concern that the area be managed in a manner compatible with their Plan. Their Land Use Plan states that adjacent lands will remain undeveloped.

WILDERNESS POTENTIAL

This area is on the breaks of Green Ridge facing the Metolius River. The ecosystem types are a mixture of mixed conifer forest with small inclusions of ponderosa pine forest in the western half The easter portion is a mixture of mixed conifer forest, ponderosa pine forest and grass shrublands with scattered big sagebrush, pine and western juniper.

This area provides habitat for Meriams turkeys and it is the only occurance on the forest of rattlesnakes. It provides summer habitat for muledeer and the eastern portion transitions and winter habitat. One Bald Eagle nest is also situated in the area.

Currently the only use of the area is for recreation and scenery. Hiking, hunting, and dispersed camping are the primary recreational activities.

The area has been unaffected by human activities and it is in a natural condition

Opportunities for solitude and primitive recreation are low Even with rattlesnakes and steep terrain, opportunities for challenge are rare.

This area is long and narrow which would make it difficult to manage as Wilderness

This areas potential for Wilderness is low.

Table C-6 SUMMARY OF METOLIUS BREAKS ROADLESS AREA DEVELOPMENT BY ALTERNATIVE

	No Change	ALT. A	ALT. B	ALT. C	ALT. E	ALT. G
Total Unroaded Acres	10,907	10,907	10,907	10,907	10,907	10,907
Acres Available for Development	1,161	1,161	1,030	6,971	209	1,379
Acres Unavailable for Development[1]	9,746	9,786	9,877	3,936	10,698	9,528
Acres Available for Winter Recreation/Geothermal[2]	0	0	0	0	0	0
Acres of Timber Harvest.[3]						
Decade 1[6]	0	0	22	4,460	0	0
Decade 2	0	0	82	4,662	0	0
Decade 5[7]	381	381	466	6,547	44	176
Cumulative Miles of Road Construction [4]						
Decade 1	0 00	0 00	0 2	44 6	0	0 00
Decade 2	0 00	0 00	0 8	46 6	0	0 00
Decade 5	3 8	3 8	4 7	65 5	4 4	1 8
Acres Remaining Undeveloped After [5]						
Decade 1	10,907	10,907	10,885	6,447	10,907	10,907
Decade 2	10,907	10,907	10,825	6,254	10,907	10,907
Decade 3	10,526	10,526	10,441	4,390	10,863	10,731

[1]Includes management strategies which primarily exclude roading such as Research Natural Areas, some forms of undeveloped recreation, and the Bend Municipal Watershed.
[2]The acres assigned to the winter recreation and geothermal strategy are available for roading but it is difficult to predict when that would occur since it is dependent upon leasing and exploration Some exploration could be expected in the first decade but it is impossible to say how much and where
[3]The acres scheduled for timber harvest would also have associated roads so that total acres impacted would be somewhat higher than shown above
[4]Based on a coefficient of 01 mile of collector and local roads per acre harvested. The unpredictable impacts of geothermal exploration and development are not included
[5]Includes only the impacts of scheduled timber harvesting Does not consider geothermal exploration or some development that might occur because of the mountain pine beetle epidemic in lodgepole pine
[6]First decade basically represents the life of a Plan for any alternative.
[7]The fifth decade represents the potential if an alternative were continued for 5 decades.

APPENDIX C
MT. JEFFERSON ROADLESS AREA (RARE NO. 06198)

DESCRIPTION--THE EXISTING CONDITION

History

The Mt. Jefferson Roadless Area (RA) was identified during the RARE II analysis process. Some boundaries have changed since 1979. The boundary in the vicinity of Jack Lake was adjusted to exclude the road, campground, and trailhead. Other boundaries were adjusted to exclude areas affected by logging activities. In section 21 of the most southern parcel the boundary was adjusted to exclude an existing road. These were excluded based on the premise that logging and other human developments are inconsistent with Roadless Area values.

Location and Access

The Mt. Jefferson RA contains 2,608 acres and lies within portions of the following townships:

T. 11 S., R. 8 E., W.M.
T. 12 S., R. 8 E., W.M.
T. 13 S , R. 8 E., W.M.

This RA comprises seven different parcels that are contiguous with the east and south boundary of the Mt. Jefferson Wilderness. These parcels run from U.S. Highway 20 to the south to the vicinity of Cabot Creek in the north. The RA lies within the Sisters District of the Deschutes National Forest, Deschutes County, Oregon.

The area is reached by traveling northwest from Bend, Oregon, on U.S. Highway 20 for 34 miles, then right on Forest Road 12. With the exception of the parcel near Highway 20, access to the various parcels can be gained by following Forest Road No. 1234, No. 1235, or No. 1230.

About 2 miles of Trail Number 65 pass through the southernmost parcel.

Geography and Topography

The topography of the RA ranges from steep to gentle mountain slope. It is located on the eastern slope of the Cascades and is drained by tributaries of the Metolius River. Interesting or unusual features are lacking.

Elevation ranges from 3900 feet in the northern most parcel to 5300 feet in the south

Precipitation ranges from 60 to 65 inches per year and falls primarily in the form of snow. The porous volcanic soil causes most moisture to soak directly into the ground.

Soil Types

The soil types described here are based on the Deschutes National Forest Soil Resource Inventory.[1]

Soils are mid-elevation types consisting of moderately deep soils with a surface of Mazama ash or a cindery ash from Belknap Crater. These surface soils are fine brown and well drained sands. A bleached gray layer occurs within the surface horizon under mountain hemlock stands Subsoils are either formed from stony glacial till or bedrock talus slopes. Bare talus and bedrock exposures are common on steeper slopes.

[1] Daniel H Larsen, Soil Resource Inventory, Deschutes National Forest, Pacific Northwest Region, 1976

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MT. JEFFERSON ROADLESS AREA (RARE NO. 06198)

LAND TYPE	LANDFORM	PERCENT SLOPE	ELEVATION
12	Talus Slopes	20-70	4300-6500
16	Sloping Uneven Glaciated Uplands	15-40	4200-6500
17	Gentle Uneven Glaciated Uplands	0-30	3000-4700
21	South Slopes of Glaciated Morains	25-60	3300-5700
22	Glaciated Moraines and Valley Walls	25-60	3300-5700
24	Glaciated Moraines and Sideslopes	20-60	3600-4300
94	Uneven Glaciated Uplands	10-20	4400-4900
95	Uneven Glaciated Uplands	0-30	3700-4400

Vegetation

Plant communities present are: mixed conifer/ snowbrush, chinkapin/pine grass, mixed conifer/ snowbrush/sedge/brakenfern, mixed conifer/ snowberry/forb, and mountain hemlock-lodgepole pine-true fir/beargrass.

Ecosystem Type

All of the parcels comprising the RA, with the exception of one parcel on the north side of Bear Valley, are classified as mixed conifer Forest. Bear Valley is composed of mixed conifer forest with pockets of lodgepole and ponderosa pine.

The Cabot Creek, Brush Creek, and Canyon Creek parcels are mostly in the "old growth" successional stage. The Bear Valley parcel was burned by wildfire in 1945 and is a mosaic of "seedling/sapling," "mature," and "old growth" Forest. The "seedling/ sapling" stage is dominated by snowbrush ceanothus and greenleaf manzanita

Riparian ecosystems are present along Brush Creek and Canyon Creek. The Brush Creek riparian zone is a narrow band (5-10 feet wide) of spruce forest with grass/forb ground cover. Alder, vine maple, serviceberry, snowberry, and thimbleberry are also common. Canyon Creek and a tributary of Cabot Creek are of similar character.

The area is summer range for mule deer of the Metolius Herd Management Unit. The riparian plant communities, and the early seral stages of the Bear Valley segment, are important deer range.

Roosevelt elk are occasionally found during summer as family units comprised of only a few animals.

No Federally listed Endangered or Threatened species of animals or plants are known in the RA The spotted owl is the only Regional Forester-designated Sensitive species known or suspected in this RA. No special surveys for the presence of sensitive plant species have been undertaken.

No lakes are present in this RA Brush Creek has little or no fisheries potential, possibly due to low flows during a part of the year or serious scouring by winter anchor ice.

Current Uses

The Recreation Opportunity Spectrum (ROS) inventory category is "Semiprimitive Motorized." Primary recreation uses are hiking, horseback riding, hunting, and dispersed camping. No recreation use statistics have been developed for these small areas.

One geothermal lease occurs in the RA.

Appearance

The RA is contiguous with the Mt. Jefferson Wilderness Area and shares the same general appearance, though interesting landforms are not present in the RA About 70 percent of the area is in the mixed conifer plant communities. All seven parcels are densely forested and scenic views are not an important factor. Small streams are found in five of the parcels.

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Surroundings

The RA is bounded on the west by the Mt. Jefferson Wilderness which is protected under the Wilderness Act of 1964. The use of this area is further discussed in the "Need" section.

One parcel is in the vicinity of Jack Creek Campground and Jack Lake, which is a popular camping and swimming area Recreation use totalled 5,500 Recreation Visitor Days (RVDs) in 1983.

The most southern parcel lies adjacent to the Santiam Highway (U S. Highway 20)

Logging and road building are occurring adjacent to all parcels.

Attractions

The major attractions within the RA include small streams, virgin Forest, and wildlife.

Easy access and good snow depth make the southern parcel attractive for cross-county skiing.

CAPABILITY

Manageability and Boundaries

The ability to manage an area as unroaded must be considered in the context of its size, shape, and location

The recreational development in the vicinity of Jack Lake will affect the manageability of the adjacent parcel. The noise and high level of activity would detract from the undeveloped recreation experience.

The heavy traffic and noise on the Santiam detract from the experience in the southern parcel.

The various existing roads provide adequate opportunity for transportation access and trailheads. It seems unlikely that new trails would be needed

Natural Integrity

The vast majority of the RA is in a natural state and unaffected by human influences.

The trail system is not extensive and its effect upon the immediate area is low

Slash burning around the RA produces air pollution for short periods of time, but it has not affected natural processes within the RA.

The natural processes have been most heavily affected by the suppression of wildfire in the area.

Apparent Naturalness

Of the human-caused effects discussed in the previous section, the small size of the areas and the development and activity that occurs next to them alters the apparent naturalness

Opportunities for Solitude

The opportunity for solitude considers the following factors: size of area, topographic screening, vegetative screening, distance from perimeter to core, and human intrusions Due to the small size of the areas and the activity next to them, there is little opportunity for solitude.

Primitive Recreation Opportunities

Solitude and the following additional factors are used for rating primitive recreation Diversity of opportunities, challenge and absence of facilities. Overall, limited opportunity exists for primitive recreation.

Existing opportunities include hiking, hunting, backpacking, camping, ski touring, horseback riding, photography, nature study, and acquiring general knowledge and appreciation of nature and the environment.

Challenging Experiences

This attribute considers the area's ability to offer opportunities for unusual adventure, excitement, challenge, self-reliance, initiative, and judgment. Challenging features include dangerous animals, climatic disturbance, avalanche potential, terrain features (i e , cliffs, quicksand, sink holes), fast-moving water, glaciers, and a lack of dominant visual features on which to orient oneself. This area has few hazardous features.

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Special Features

Northern Spotted Owl habitat is identified within the RA, a "sensitive" species designated by the Regional Forester.

Historic and Scientific Study

This RA receives an "infrequent" rating for its geological, ecological, and cultural features This rating is given to features often found in the High Cascade Physiographic Province.

Availability and Resource Potentials

Refer to Table C-1.

Management Considerations

Mountain pine beetles are infesting lodgepole pine stands to near epidemic levels on the Forest Entomologists predict that this epidemic will continue for another 10 to 15 years until the beetles' major food supply of lodgepole pine is either consumed or destroyed. In Roadless Areas, this activity may be setting the stage for a catastrophic fire

NEED

Nearby Wilderness and Its Use

The Mt. Jefferson Wilderness (32,734 acres on the Deschutes National Forest) is the nearest Wilderness and is located adjacent to the western boundary. It is currently being used at about 26 percent capacity.

Statistics for fiscal year 1983 indicate use for the Deschutes portion of the Mt. Jefferson Wilderness was 12,800 RVDs [2] About 30 percent of the use came from the local area, about 55 percent from other in-State locations, and about 15 percent from out of State.[3]

In considering local use, travelers from the Willamette Valley were the most frequent visitors.

Distance From Population Centers

Most of the visitors came from the Willamette Valley which is located 100 miles west of the RA. Other population centers are: Sisters, Redmond, Tumalo, Bend, Sunriver, LaPine, Crescent, and Gilchrist. All are within 90 miles of the Wilderness. Bend, with the largest population (17,840), is 40 miles from the Wilderness by road. These distances are not excessive for people interested in a wilderness experience.

Ecosystem Representation

No rare or unique ecosystems are known to exist within the RA

Congressional and Proponent Interest

No congressional interest and very little interest by wilderness proponents has been expressed for this RA. The Congressional Review of roadless areas within the National Forests in Oregon did not include this area within the 1984 Wilderness Legislation (Public Law 98-328).

Public Input

The RARE II evaluation process showed that 73 percent of the respondents wanted wilderness designation, while 27 percent wanted nonwilderness designation.

[2] 1983 RIM Data
[3] This data based on analysis of 1981 Wilderness permits for the Three Sisters Wilderness

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Additional public input will be sought before the final determination is made.

Other Public Scoping Results

Two public workshops on Roadless Areas were conducted during early 1984. Public comments were also requested through the "Forest Plan Report." Most comments favored increasing the size of the Mt. Jefferson Wilderness which lies adjacent to these areas. No specific comments on the individual small areas were received.

WILDERNESS POTENTIAL

This is a small area contiguous with the Mt. Jerrerson Wilderness It is principally covered with mixed conifer forest although portions which have burned in the recent past are covered by brushy plant communities.

The area provides summer muld deer habitat. It contains no lakes.

Primary uses include small amounts of hiking, horseback riding, hunting, and dispersed camping.

Some of the area has been identified as Northern Spotted Owl habitat Due to the small size of this area and its other features it offers little for solitude or primitive recreation and challenge.

This area has low wilderness potential.

Table C-7 SUMMARY OF MT. JEFFERSON ROADLESS AREA DEVELOPMENT BY ALTERNATIVE

	No Change	ALT. A	ALT. B	ALT. C	ALT. E	ALT. G
Total Unroaded Acres	2,608	2,608	2,608	2,608	2,608	2,608
Acres Available for Development	2,425	2,425	1,685	1,722	1,685	1,773
Acres Unavailable for Development[1]	183	183	923	886	923	835
Acres Available for Winter Recreation/Geothermal[2]	0	0	0	0	0	0
Acres of Timber Harvest.[3]						
Decade 1[6]	0	0	495	530	0	0
Decade 2	0	0	781	799	0	0
Decade 5[7]	1220	1220	1052	993	643	367
Cumulative Miles of Road Construction:[4]						
Decade 1	0 00	0 00	5 0	5.3	0	0.00
Decade 2	0.00	0 00	7 8	8 0	0	0 00
Decade 5	12.2	12.2	10.5	9 9	6.4	3.7
Acres Remaining Undeveloped After.[5]						
Decade 1	2,608	2,608	2,113	2,078	2,608	2,608
Decade 2	2,608	2,608	1,827	1,809	2,608	2,608
Decade 3	1,388	1,388	1,556	1,615	1,965	2,241

[1]Includes management strategies which primarily exclude roading such as Research Natural Areas, some forms of undeveloped recreation, and the Bend Municipal Watershed
[2]The acres assigned to the winter recreation and geothermal strategy are available for roading but it is difficult to predict when that would occur since it is dependent upon leasing and exploration. Some exploration could be expected in the first decade but it is impossible to say how much and where
[3]The acres scheduled for timber harvest would also have associated roads so that total acres impacted would be somewhat higher than shown above.
[4]Based on a coefficient of 01 mile of collector and local roads per acre harvested. The unpredictable impacts of geothermal exploration and development are not included.
[5]Includes only the impacts of scheduled timber harvesting. Does not consider geothermal exploration or some development that might occur because of the mountain pine beetle epidemic in lodgepole pine
[6]First decade basically represents the life of a Plan for any alternative
[7]The fifth decade represents the potential if an alternative were continued for 5 decades

APPENDIX C
NORTH PAULINA ROADLESS AREA (RARE NO. 06196)

DESCRIPTION--THE EXISTING CONDITION

History

The North Paulina Roadless Area was included in both the RARE I and RARE II analysis processes A change occurred in 1983 when Forest Road 9735 was built across the lava near Kwinnum Butte. This road separated Lava Cast Forest from the North Paulina Roadless Area, and it no longer met the 5,000 acre minimum Roadless Area requirement. The pumice claim between East and Paulina Lakes and a small tract near Cinder Hill Campground were also excluded due to human activities inconsistent with Roadless Area values

Location and Access

North Paulina Roadless Area contains 21,622 acres and lies within portions of the following townships:

T. 21 S , R 12 E., W M
T 21 S , R. 13 E , W M.
T. 22 S , R 13 E , W M.

The Roadless Area includes the northern half of Newberry Crater in the Fort Rock District of the Deschutes National Forest, Deschutes County, Oregon.

Access is best gained by traveling 24 miles south from Bend, Oregon on U S. Highway 97, then 13 miles east on County Road 21

There are approximately 15 miles of trail within the Roadless Area. Trail No 57, the Newberry Crater Rim Loop; Trail No 61, the Swamp Wells trail; and Trail No. 58, the Newberry Crater trail, all cross through the area

Geography and Topography

Newberry Crater is an ancient shield-shaped volcano which rises above the encircling plateau The Crater is a caldera that resulted from a collapse of the summit. The summit depression contains two popular recreation lakes, East and Paulina

The Roadless Area lies atop the northern rim and flank of Newberry Crater. This area is characterized by numerous cinder cones, buttes, and lava flows The terrain varies from rolling topography to steep cinder slopes.

The elevation ranges from 5700 feet near Paulina Creek to 7686 feet on top of North Paulina Peak

The precipitation ranges from 20 to 30 inches per year and falls primarily in the form of snow. The porous volcanic soils causes the moisture to soak directly into the ground Very little runoff occurs There is no surface water within the Roadless Area itself.

Soil Types

The soil types described here are taken from the Deschutes National Forest Soil Resource Inventory.[1]

Soils are the high to mid elevation types composed of either sandy brown Mazama ash overlying a buried bedrock lava with many exposed basalt outcrops, or a deep deposit of pumice from the more recent Newberry eruptions A bleached grey soil occurs in the surface horizon under mountain hemlock stands On steep slopes within and on the flanks of the crater, exposed rock is common, and slopes are stable.

[1]Daniel H Larsen, Soil Resource Inventory, Deschutes National Forest, Pacific Northwest Region, 1976

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NORTH PAULINA ROADLESS AREA (RARE NO. 06196)

LAND TYPE	LANDFORM	PERCENT SLOPE	ELEVATION
84	Dissected Sideslopes	30-80	6000-7000
85	Ridge Tops and Flats	0-30	6000-6800
7A	Rough Uneven Lava Flows	5-15	5800-7000
9K	Smooth to Gentle Sloping Lands	0-30	5800-7000

Vegetation

Plant communities present are. mountain hemlock/grouse huckleberry, lodgepole pine/ grouse huckleberry, mixed conifer/manzanita, lodgepole pine/manzanita, lodgepole pine/ needlegrass basins, lodgepole pine/lupine-needlegrass, mixed conifer/ snowbrush-manzanita, ponderosa pine/ bitterbrush-manzanita/needlegrass, lodgepole pine/bitterbrush/needlegrass, and lodgepole pine/bitterbrush. The lodgepole pine communities occupy 85 percent of the area, mountain hemlock 14 percent, and ponderosa pine 1 percent.

Lodgepole pine communities are partly infested by the mountain pine beetle from epidemic to catastrophic proportions Many of the trees are now turning red, and it seems likely that the condition will worsen

Ecosystem Type

The majority of the area is overmature (old growth) lodgepole pine forest, with scattered islands of old growth mountain hemlock. Stands of mixed conifer (ponderosa pine, lodgepole pine, and white fir) and ponderosa pine forest, both predominantly in mature or old growth successional stages, are found at the north end of the Roadless Area Early Forest successional stages are scarce, indicating very little wildlife history during the last 40 to 60 years.

Wildlife species are typical of the various plant associations and successional stages present. Species favoring early successional stages are relatively rare (i.e., rufous-sided towhee, green-tailed towhee, and mountain bluebird).

The Roadless Area is part of the summer range for mule deer of the Paulina Game Management Unit. These animals winter on the east fringe of the District south of Pine Mountain The area is also summer range for a few elk

The cover to forage ratios and arrangements for big game indicate an over-abundance of cover, with less than optimum forage quality due to canopy closure and forage species composition. As mountain pine beetle damage increases, some loss of cover will occur

A bald eagle nesting site is located on the north shore of East Lake. The bald eagle is listed by the Fish and Wildlife Service as a threatened species.

The Roadless Area borders Paulina Creek. Water quality is excellent for supporting a fishery but habitat is less than optimum due to an absence of pools

Current Uses

At the present time about 30 percent of the Roadless Area is allocated to the Special Management Option and about 70 percent is allocated to the Wood/Forage Management Option. The Special Management area is located on the rim and in the crater adjacent to the lakes.

The Recreation Opportunity Spectrum (ROS) inventory category is "Semiprimitive Motorized," Primary recreation uses are snowmobiling, horseback riding, and hiking. Use statistics for fiscal year 1983 indicate approximately 1,500 recreation visitor days (RVDs) for snowmobiling, 150 RVDs for horseback riding, and 100 RVDs for hiking. There is also some mountain biking

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and off highway vehicle (OHV) use of the area. The pumice flats and bowls on the rim and in the vicinity of North Paulina Peak are popular play areas for snowmobiling These areas and the trails receive the bulk of the use. The rest of the Roadless Area receives very little human activity.

As of March 1985, there were two geothermal test holes in the RA. They have been capped and the area impacted is negligible.

Appearance

The Roadless Area lies atop the northern rim and extends down the flank of Newberry Crater The east rim is fairly high and open, and offers views of the Crater and East and Paulina Lakes. North Paulina Peak offers panoramic views of the Cascades and the encircling plateau. Vegetation on much of the rim is dense, dwarfed, and stunted by the harsh growing conditions Several barren pumice flats dot the landscape The portion of the Roadless Area on the northern flank is rolling country with many timbered cinder cones and barren lava flows.

The lodgepole pine forest throughout the area is heavily infected by the mountain pine beetle and is gradually turning a rust color This condition will worsen, and it will be years before the green color again dominates. The islands of fir and hemlock add diversity to the area and will be unaffected by the mountain pine beetle

Surroundings

The Roadless Area is bounded on the east and west by lands allocated to the Wood/Forage Management Option The management goal in these areas is for optimum and sustainable levels of timber production while providing wildlife forage and opportunities for public recreation.

A small portion is bounded on the north by the Lava Cast Forest Geological Area, a special interest area whose management goal is preservation and interpretation of this unique geological feature. In 1983, recreation use in this area was about 1,200 RVDs

Newberry Crater to the south has the greatest influence upon the Roadless Area. This is a developed recreation area receiving intensive recreation use. Recreation use for this area totaled 208,950 RVDs in developed use and 1,750 RVDs in dispersed use in fiscal year 1983 The summer season is short at this elevation, but the lakes are an excellent and popular fishing area. There are eight campgrounds, five picnic sites, six summer homes, one private RV park, one defunct organizational site, and two resorts in the occupancy zone adjacent to the lakes. The resort at Paulina Lake now remains open through the winter to serve winter recreationists Snowmobiling has become especially popular in the Crater.

Attractions

The major attractions within the Roadless Area are wildlife, geology, and scenery

A portion of the Roadless Area falls within the Newberry Crater Wildlife Reserve. Consequently, visitors to the area have an opportunity to observe wildlife in a pristine and protected setting

The Roadless Area contains of a multitude of unique volcanic features.

The opportunity for viewing outstanding scenery exists at a few points around the rim and on North Paulina Peak The dense lodgepole pine forest inhibits viewing scenery from most of the existing trails

CAPABILITY

Manageability and Boundaries

The ability to manage an area as unroaded must be considered before a recommendation can be made Factors such as size, shape, and location are important

Intensive recreation development adjacent to the RA would most heavily affect the manageability of the North Paulina RA Noise and a high level of activity would detract from the undeveloped recreation experience, especially along the rim

area. This RA is not large enough to sufficiently buffer these external influences.

The fact that the RA is within a high potential geothermal area could present some management problems if that potential is developed Geothermal power plants adjacent to the area add an element of industrialization that may detract from an undeveloped recreation experience. One could expect impacts such as construction noises, winter steam plumes and power lines.

The RA boundaries do provide adequate opportunity for transportation access and traveler transfer facilities such as trailheads.

The mountain pine beetle infestation presents a situation which could lead to a catastrophic fire

Natural Integrity

The vast majority of the RA is in a natural state and unaffected by human influences

Forest roads run adjacent to the RA on the east and north boundaries. Along these roads, firewood gathering has impacted a strip approximately one-half mile wide. A few hunting camps have been established along Forest Service Road 9710.

The trail system is not extensive and its impact is very slight

Slash burning around the RA produces some air pollution for short periods of time, but it has not affected natural processes within the RA

One bird guzzler is located near Red Hill. This improvement affects about one-quarter mile of the RA.

Roads have been cleared on a proposed road extending off Forest Service Road 9735-600 for the North Peak Timber Sale. About one mile of clearing is completed, but no construction has begun on the roadbed itself

The ecology and natural succession has been altered by the control of wildfire in the RA

Apparent Naturalness

Most of the human-caused effected discussed in the previous section are located near the boundary Of these, the road clearing in the western portion will have the greatest influence on the apparent naturalness as perceived by the user The rest of the area away from the boundaries are free of disturbance.

Opportunities for Solitude

The opportunity for solitude is rated according to the following factors: size of area, topographic screening, vegetative screening, distance from perimeter to core, and human intrusions Overall, there is a moderate opportunity for solitude.

This RA is not large enough to adequately buffer outside influences, especially noise The spirit of adventure, serenity, and self-reliance is diminished when the sounds of civilization can be heard just a few miles away

Primitive Recreation Opportunities

Solitude and these additional factors are used for rating primitive recreation experience· Diversity of opportunities, challenge and absence of facilities. Overall, opportunity for primitive recreation is low.

Existing opportunities include hiking, backpacking, camping, hunting (outside the wildlife reserve), ski touring, horseback riding, mountain biking, photography, nature study, and acquiring a general knowledge and appreciation of the outdoors and environment.

Challenging Experiences

The RA is rated as to its ability to offer opportunities for unusual adventure, excitement, challenge, self-reliance, initiative, and judgment The RA receives a "Rare" rating because of its size and the lack of surface water are important reasons for this rating Hazardous features are seldom encountered.

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NORTH PAULINA ROADLESS AREA (RARE NO. 06196)

Special Features

One threatened species (plant, animal, or insect) is known to inhabit the RA. A bald eagle (Federally listed as threatened) nesting site is located on the north shore of East Lake, the RA is part of its range.

Historic and Scientific Study

The Newberry Volcano gives this RA a "unique" quality, a rating given to rare, natural, or cultural features The area is geologically young (1300 years) and provides opportunities for outdoor education and scientific study. As part of this large formation, the RA contains significant features including the northwest rift zone extending toward Lava Butte, ring fractures, numerous cinder cones, lava flows, and tree casts.

Archaeological sites are identified along the southern boundary of the RA near the lakes Prehistoric people used the obsidian flow as a quarry site. These people undoubtedly entered the Crater by many routes, and it is likely that many more sites will be found as cultural resource surveys are completed. The opportunities for scientific and archeological study are also "unique."

Availability and Resource Potentials

Refer to Table C-1

Management Considerations

The mountain pine beetle infestation has been at, or near, epidemic proportions in lodgepole pine communities on the Forest for several decades Entomologists predict that this epidemic will continue for another 10 to 15 years until the beetles' main food supply of lodgepole pine is either consumed or destroyed In Roadless Areas, the mountain pine beetle epidemic may set the stage for a catastrophic fire

NEED

Nearby Wilderness and Its Use

The Three Sisters Wilderness (94,247 acres on Deschutes National Forest) is the nearest Wilderness and is located about 27 air miles to the west It is currently being used at about 35 percent capacity.

Statistics for fiscal year 1983 indicate use for the Deschutes Portion of the Three Sisters Wilderness was 48,900 RVDs.[2] About 30 percent was local use, about 55 percent from other in-State locations, and about 15 percent from out of State [3]

Deschutes County, which had a population of 63,300 in 1983, represents the majority of the Forest Influence Area

Distance from Population Centers

The Forest Influence Area includes the following towns Sisters, Redmond, Tumalo, Bend, Sunriver, LaPine, Crescent, and Gilchrist. All of these are within 60 miles of the Wilderness. Bend, with the largest population (17,840), is 37 miles from the Wilderness which is not excessive for people interested in a wilderness experience.

Ecosystem Representation

No rare or unique ecosystems are known to exist within the RA

Congressional and Proponent Interest

There has been no congressional interest in the RA. The Congressional Review of roadless areas within the National Forests in Oregon did not include this area within the 1984 Wilderness Legislation (Public Law 98-328)

Public Input

The results of the RARE II evaluation process show that 3 percent of the respondents want a wilderness designation and 27 percent wanted nonwilderness designation. The remaining 70

percent requested evaluation before making the final determination.

Other Public Scoping Results

Two public workshops regarding Roadless Areas were held in 1984 Public comments were also requested through the "Forest Plan Report." Considerable interest was expressed regarding the Roadless Area compared to the interest expressed during the RARE II process. This largely stems from the potential for geothermal development. Comments were split between development and nondevelopment of the area.

[2] 1983 RIM Data

[3] This data based on analysis of 1981 wilderness permits for the Three Sisters Wilderness Area

WILDERNESS POTENTIAL

This area is predominantly lodgepole pine (85%) which is heavily damaged by mountain pine beetle. The other 15% is Mtn hemlock. The area contains no surface water.

One Bald Eagle nest is located within the area on the North shore of East Lake.

Recreation use of the area is light. Primary uses are horseback riding, hiking, and most importantly snowmobiling.

The area contains many unique geologic features and is in a natural condition.

The area offers a moderate opportunity for solitude, little opportunity for primitive recreation and few challenging experience opportunities.

The potential for Wilderness is very low.

Table C-8 SUMMARY OF NORTH PAULINA ROADLESS AREA DEVELOPMENT BY ALTERNATIVE

	No Change	ALT. A	ALT. B	ALT. C	ALT. E	ALT. G
Total Unroaded Acres	21,622	21,622	21,622	21,622	21,622	21,622
Acres Available for Development	13,117	13,117	13,643	13,614	14,049	13,469
Acres Unavailable for Development[1]	8,505	8,505	7,979	8,008	7,573	8,155
Acres Available for Winter Recreation/Geothermal[2]	0	0	261	4,107	0	4,469
Acres of Timber Harvest [3]						
Decade 1[6]	0	0	1,419	900	0	0
Decade 2	0	0	3,267	2,711	67	285
Decade 5[7]	2531	2531	7,825	12149	1193	2624
Cumulative Miles of Road Construction [4]						
Decade 1	0 00	0 00	14 2	9 0	0 0	0 00
Decade 2	0 00	0 00	32 7	27 1	0 7	2 9
Decade 5	25 3	25 3	78 3	121 5	11 9	26 2
Acres Remaining Undeveloped After [5]						
Decade 1	21,622	21,622	20,203	20,722	21,622	21,622
Decade 2	21,622	21,622	18,355	18,911	21,555	21,337
Decade 3	19,091	19,091	13,797	9,473	20,429	18,998

[1]Includes management strategies which primarily exclude roading such as Research Natural Areas, some forms of undeveloped recreation, and the Bend Municipal Watershed.
[2]The acres assigned to the winter recreation and geothermal strategy are available for roading but it is difficult to predict when that would occur since it is dependent upon leasing and exploration Some exploration could be expected in the first decade but it is impossible to say how much and where
[3]The acres scheduled for timber harvest would also have associated roads so that total acres impacted would be somewhat higher than shown above
[4]Based on a coefficient of 01 mile of collector and local roads per acre harvested The unpredictable impacts of geothermal exploration and development are not included.
[5]Includes only the impacts of scheduled timber harvesting Does not consider geothermal exploration or some development that might occur because of the mountain pine beetle epidemic in lodgepole pine
[6]First decade basically represents the life of a Plan for any alternative
[7]The fifth decade represents the potential if an alternative were continued for 5 decades

APPENDIX C
SOUTH PAULINA ROADLESS AREA (RARE NO. 06197)

DESCRIPTION-THE EXISTING CONDITION

History

The South Paulina Roadless Area (RA) was included in both the RARE I and RARE II analysis processes Some boundaries have changed since 1979. Minor boundary adjustments were made to exclude roaded areas that were inadvertently included in the initial inventory In addition, the boundary was adjusted to exclude the powerline into East Lake Resort. The reason for excluding these portions was based on the premise that human developments are inconsistent with Roadless Area values.

Location and Access

The South Paulina RA contains 9,915 acres and lies within portions of the following townships.

T. 21 S., R. 12 E., W.M.
T. 22 S., R. 12 E., W.M.
T. 21 S., R. 13 E., W.M.
T. 22 S., R. 13 E., W.M.

The RA includes the southern half of Newberry Crater in the Fort Rock Ranger District of the Deschutes National Forest, Deschutes County, Oregon.

Access is best gained by traveling 24 miles south from Bend, Oregon, on U.S. Highway 97, then 13 miles east on County Road 21.

There are approximately 17 miles of trail within the RA The following trails are included No 57, No 57A, No. 58, No. 58A, No 58B, and No 58C

Geography and Topography

Newberry Crater is an ancient shield volcano which rises above the encircling plateau. The crater is a caldera that resulted from a collapse of the summit. The summit depression contains two popular recreation lakes, East and Paulina.

The RA lies atop the southern rim and flank of Newberry Crater. The area is characterized by lava flows, pumice flats, and numerous cinder cones. The topography ranges from steep to gentle.

The elevation ranges from 5800 feet along the eastern boundary to 7984 feet on Paulina Peak.

The precipitation ranges from 20 to 30 inches per year and falls primarily in the form of snow. The porous volcanic soil cause the moisture to soak directly into the ground Very little runoff occurs The only surface water within the RA is Lost Lake.

Soil Types

The soil types described here are taken from the Deschutes National Forest Soil Resource Inventory.[1]

Soils are the high to mid-elevation types, composed of either sandy brown Mazama ash overlying a bedrock lava with many exposed basalt outcrops, or a deep deposit of pumice from the more recent Newberry eruptions. A bleached, gray soil occurs in the surface horizon under mountain hemlock stands. On steep slopes within and on the flanks of the crater, exposed rock is common, and slopes are stable.

[1] Daniel H Larsen, Soil Resource Inventory, Deschutes National Forest, Pacific Northwest Region, 1976

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SOUTH PAULINA ROADLESS AREA (RARE NO. 06197)

LAND TYPE	LANDFORM	PERCENT SLOPE	ELEVATION
84	Dissected Sideslopes	30-80	6000-7000
85	Ridge Tops and Flats	0-30	0000-6800
7A	Rough Uneven Lava Flows	5-15	5800-7000
9K	Smooth to Gentle Sloping Lands	0-30	5800-7000

Vegetation

Plant communities present are: mountain hemlock/grouse huckleberry, lodgepole pine/grouse huckleberry, mixed conifer/manzanita, lodgepole pine/manzanita, lodgepole/needlegrass basins, lodgepole pine/lupine-needlegrass, mixed conifer/snowbrush-manzanita, and ponderosa/bitterbrush-manzanita/needlegrass.

Lodgepole pine stands have for the most part been infested by the mountain pine beetle from epidemic to catastrophic proportions Many of the trees are now turning red, and it is estimated by Forest Silviculturists that the condition will worsen

Ecosystem Type

Approximately 80 percent of this RA is forested Half of the area is classified as lodgepole pine forest; the remaining Forest is equally represented by mixed conifer and mountain hemlock classifications. These Forest types are generally found on north facing aspects. Ponderosa pine forest accounts for less than 1 percent of the area

The majority of this RA is classified as either "old growth" or "mature" Forest No "grass/forb" stage is present. The lodgepole pine forests show significant amounts of mountain pine beetle mortality.

One-fifth of the area consists of obsidian flows and cliffs, with associated talus These are north or northeast facing, and have long-lasting snow cover

The North Paulina, South Paulina, and Fort Rock deer herds summer here Deer densities are not especially high in this summer range because of the absence of moist plant communities or dryland communities with extensive bitterbrush. A portion of the area is included in a wildlife reserve

A few Roosevelt elk also summer here in small family units The mixed conifer and mountain hemlock stands are probably used for cooling thermal cover on this predominantly south-facing side of Paulina Peak

No fisheries exist within the RA.

Current Uses

Most of the RA is currently allocated to the Special Management Option The Special Management Area lies up on the rim and in the crater adjacent to the lakes

The Recreation Opportunity Spectrum (ROS) inventory category is "Semiprimitive Motorized " Primary recreation uses are snowmobiling, horseback riding, and hiking Use statistics for fiscal year 1983 indicate approximately 7,600 recreation visitor days (RVDs) for snowmobiling, 700 RVDs for horseback riding, and 500 RVDs for hiking. There is also some mountain biking and off highway vehicle (OHV) use. The pumice flats, Paulina Peak roads, and bowls on the rim are popular play areas for snowmobiling.

Newberry Crater and the lands surrounding it have become of interest as a possible source of geothermal steam energy As of March 1985 there were 6 valid leases on 2,120 acres of land within the RA. There may be a developable geothermal energy resource of 20 to 70 kilowatts per acre. Other estimates run both higher and lower

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SOUTH PAULINA ROADLESS AREA (RARE NO. 06197)

The Big Obsidian Flow is within the RA. This is a unique geological feature An interpretive trail with signing runs along the eastern edge of the flow. Visitor use on this trail totaled 8,200 RVDs in 1983.

Appearance

The Roadless Area lies atop the southern rim of Newberry Crater and extends down into the caldera The high ground near Paulina Peak offers an outstanding view of Newberry Crater, the Big Obsidian Flow, and East and Paulina Lakes. To the south and west are panoramic views of the Cascades and the encircling plateau. Vegetation on much of the rim is dense, dwarfed, and stunted by the harsh growing conditions. Several barren pumice flats dot the landscape within the caldera.

The lodgepole pine forest throughout the RA is being heavily affected by the mountain pine beetle infestation and is gradually turning a rust color This condition will worsen, and it will be years before the green color again dominates. Small islands of fir and hemlock add diversity to the area and will be unaffected by the beetle infestation.

Surroundings

To the east, south, and west, the RA is bounded by lands allocated to the Wood/Forage Management Option. These areas have been affected by logging and woodcutting activities.

Geothermal leases have been applied for on lands to the east, south, and west No development has begun, although four test holes have been drilled adjacent to the boundaries.

Newberry Crater to the north has the greatest influence upon the RA. This is a developed recreation area receiving intensive recreation use Recreation use for this area totalled 208,950 RVDs in developed use, and 1,750 RVDs in dispersed use in FY 1983 The summer season is short at this elevation, but East and Paulina Lakes provide a good fishery and the area is popular. There are eight campgrounds, five picnic sites, six summer homes, one private recreation vehicle park, one defunct organizational site, and two resorts in the occupancy zone adjacent to the Lakes. The resort at Paulina Lake now remains open through the winter to serve winter recreationists. Snowmobiling is especially popular in the Crater.

The RA is bounded to the east and south by Forest Roads 21, 2127, and 2125. It is bounded to the west by Forest Road 2121. The Paulina Peak Road (FR 500) partially bisects the RA

Paulina Peak is an important tourist viewpoint. The peak offers an outstanding panoramic view of the surrounding area Mountain peaks in five States can be seen on a clear day. In 1983, 29,000 people visited Paulina Peak

Attractions

The major attractions within the RA are wildlife, geology, and scenery

Scenic views are accessible via the trail system along the Crater Rim Trail.

Easy access and excellent snow depth makes the area attractive to snowmobilers

A portion of the RA falls within the Newberry Crater Wildlife Reserve Consequently, visitors to the area have an opportunity to observe wildlife in a protected setting

The RA contains a multitude of unique volcanic features

CAPABILITY

Manageability and Boundaries

The ability to manage an area as unroaded must be considered before a recommendation can be made. Factors such as size, shape, and location are important.

Intensive recreation developments adjacent to the RA would most heavily affect the manageability of the South Paulina RA. Noise and high level of activity would detract from a primitive experience--especially along the Rim This RA is not large enough to sufficiently buffer these external influences.

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SOUTH PAULINA ROADLESS AREA (RARE NO. 06197)

Because the RA is within a high potential geothermal area, management problems could arise if that potential is developed Geothermal power plants adjacent to the area would add an element of industrialization, including construction noises, winter steam plumes, and powerlines, that is not compatible with Primitive or Semiprimitive recreation values.

The RA boundaries provide adequate opportunity for transportation access and trailheads

The mountain pine beetle infestation could present another management problem If the RA remains undeveloped, it would be an island where normal treatments could not be used The fire hazard created by the dead and dying trees would also be a problem, increasing the potential for a catastrophic fire.

Natural Integrity

The vast majority of the RA is in a natural state and unaffected by human influences Forest roads run adjacent to the RA for several miles Along these roads, firewood gathering has impacted a strip approximately one-half mile wide. A few undeveloped hunting camps have been established along Forest Service Road 9710 The trail systems are not extensive and their impact is very slight

Slash burning around the RA produces air pollution for short periods of time, but it has not affected natural processes within the RA The natural process has probably been most heavily affected by the control of wildfire in the area The ecology and natural succession has been altered by the exclusion of fire.

The Yarder Timber Sale (sold in 1983) extends into the RA just east of 2121 When this sale is completed, that portion of the RA will no longer be roadless

Apparent Naturalness

Most of the human-caused effects discussed in the previous section are located near the boundary. Of these, the logging activities in the western portion will have the greatest influence on the naturalness of the area

Opportunities for Solitude

The opportunity for solitude is based on the following factors size of area, topographic screening, vegetative screening, distance from perimeter to core, and human intrusions Overall, there is a moderate opportunity for solitude.

This RA is not large enough to adequately buffer outside influences, especially noise The spirit of adventure, serenity, and self-reliance is diminished when the sounds of civilization can be heard just a few miles away

Primitive Recreation Opportunities

Solitude and the following additional factors provide for primitive recreation diversity of opportunities, challenge, and absence of facilities Overall, the opportunity for primitive recreation is low

Existing opportunities include hiking, backpacking, camping, hunting (outside the wildlife reserve), ski touring, horseback riding, photography, nature study, and acquiring general knowledge and appreciation of the outdoors and environment The lack of diversity compared to other existing wilderness and undeveloped areas is the primary reason for the rating of Low

Challenging Experiences

A challenging experience is based on the area's ability to offer opportunities for unusual adventure, excitement, challenge, self-reliance, initiative, and judgment. Hazardous features are seldom encountered in the South Paulina RA

Special Features

No Endangered or Threatened species are known to exist in this RA Although the cliffs of Paulina Peak are sufficiently vertical for potential use by peregrine falcons, and foraging sites are within 2 to 3 miles, no recent or historical peregrine nests are known.

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SOUTH PAULINA ROADLESS AREA (RARE NO. 06197)

Two Regional Forester-designated sensitive plant species--pumice grape-fern (Botrychium pumicola) and little grape-fern (Botrychium simplex)--are known to occur in the RA Pumice grape-fern has also been found just outside the RA on the west slope of "The Dome "

Historic and Scientific Study

This RA has a "unique" quality because it is part of the Newberry Volcano. The area is geologically young and offers opportunities for outdoor education and scientific study. The RA includes a part of the crater, and contains features such as the Big Obsidian Flow and fumaroles near Lost Lake

Archaeological sites are identified within the RA. Prehistoric people heavily used the obsidian flow as a quarry site. They undoubtedly entered the Crater by many routes, and it is likely that many sites will be found as cultural resource surveys are completed. The opportunities for scientific and archaeological study are also "unique."

Availability and Resource Opportunities

Refer to Table C-1.

Management Considerations

The mountain pine beetle has infested lodgepole pine stands at, or near, epidemic levels on the Forest for several decades Entomologists predict this epidemic will continue for another 10 to 15 years until the beetles' major food supply of lodgepole pine is either consumed or made unavailable In Roadless Areas, the pine beetle epidemic may set the stage for a catastrophic fire

NEED

Nearby Wilderness and Its Use

The Three Sisters Wilderness (94,247 acres on Deschutes National Forest) is the nearest Wilderness and is located about 27 air miles to the west It is currently being used at about 35 percent of capacity

For fiscal year 1982, use of the Three Sisters Wilderness was 155,400 RVDs.[2] About 30 percent of the visitors came from local areas, about 55 percent from other in-State locations, and about 15 percent from out of State [3]

Deschutes County which had a population of 63,300 in 1983, represents the majority of the Forest Influence Area

Distance from Population Centers

The Forest Influence Area includes the following towns Sisters, Redmond, Tumalo, Bend, Sunriver, LaPine, Crescent, and Gilchrist. All of these are within 60 miles of the Wilderness. Bend, with the largest population (17,840), is 37 miles from the Wilderness, which is not excessive for people interested in an undeveloped recreation experience

Ecosystem Representation

No rare or unique ecosystems are known to exist within the RA

Congressional and Proponent Interest

The RA has received no congressional interest and little interest by wilderness proponents. The Congressional Review of roadless areas within the National Forests in Oregon did not include this area within the 1984 Wilderness Legislation (Public Law 98-328).

[2]1983 RIM Data
[3]This data based on analysis of 12981 Wilderness permits for the Three Sisters Wilderness Area

APPENDIX C
SOUTH PAULINA ROADLESS AREA (RARE NO. 06197)

Public Input

During the RARE II evaluation process, the Forest Service requested public comment. These comments were then analyzed to determine the preferred treatment of the RAs by people in the private sector. The results showed that 8 percent of the respondents wanted wilderness designation, while 91 percent wanted a nonwilderness designation The remaining 1 percent requested that further planning be done before the final determination was made.

Other Public Scoping Results

Two public workshops on Roadless Areas were conducted during early 1984 Public comments were also requested through the "Forest Plan Report." Public comment was split regarding keeping the area undeveloped or developing parts of it

WILDERNESS POTENTIAL

About 80 % of this area is forested, half with mixed conifer and hemlock and half with lodgepole pine heavily damaged by mountain pine beetle. Most of the area is very arid and the only surface water is Lost Lake.

The primary use of the area is by snowmobiles Additionally hiking, horseback riding, mountain biking and ATV riding occurs in the simmer.

This area has high geothermal potential

The area is in a relatively natural condition

The opportunity for solitude is low The opportunities for primitive recreation are moderate The opportunities for a challenging experience in this area are rare.

The Wilderness potential of this area are low.

Table C-9 SUMMARY OF SOUTH PAULINA ROADLESS AREA DEVELOPMENT BY ALTERNATIVE

	No Change	ALT. A	ALT. B	ALT. C	ALT. E	ALT. G
Total Unroaded Acres	9,915	9,915	9,915	9,915	9,915	9,915
Acres Available for Development	4,559	4,559	4,070	4,382	3,518	3,506
Acres Unavailable for Development[1]	5,356	5,356	5,845	5,533	6,397	6,409
Acres Available for Winter Recreation/Geothermal[2]	0	0	3,243	3,131	0	0
Acres of Timber Harvest [3]						
Decade 1[6]	0	0	211	488	0	0
Decade 2	0	0	1,504	488	0	0
Decade 5[7]	316	316	3,094	4,122	137	582
Cumulative Miles of Road Construction [4]						
Decade 1	0 00	0 00	2.1	4 9	0	0 00
Decade 2	0 00	0 00	15	4 9	0	0 00
Decade 5	3 2	3 2	30 9	41 2	1 4	5 8
Acres Remaining Undeveloped After [5]						
Decade 1	9,915	9,915	9,704	9,427	9,915	9,915
Decade 2	9,915	9,915	8,411	9,427	9,915	9,915
Decade 3	9,599	9,599	6,822	5,793	9,778	9,333

[1]Includes management strategies which primarily exclude roading such as Research Natural Areas, some forms of undeveloped recreation, and the Bend Municipal Watershed

[2]The acres assigned to the winter recreation and geothermal strategy are available for roading but it is difficult to predict when that would occur since it is dependent upon leasing and exploration Some exploration could be expected in the first decade but it is impossible to say how much and where

[3]The acres scheduled for timber harvest would also have associated roads so that total acres impacted would be somewhat higher than shown above

[4]Based on a coefficient of 01 mile of collector and local roads per acre harvested The unpredictable impacts of geothermal exploration and development are not included

[5]Includes only the impacts of scheduled timber harvesting. Does not consider geothermal exploration or some development that might occur because of the mountain pine beetle epidemic in lodgepole pine

[6]First decade basically represents the life of a Plan for any alternative

[7]The fifth decade represents the potential if an alternative were continued for 5 decades

APPENDIX C
THREE SISTERS ROADLESS AREA (RARE NO. 06192)

DESCRIPTION--THE EXISTING CONDITION

History

The Three Sisters Roadless Area (RA) was included in both the RARE I and RARE II analysis processes From 1979 to 1983 some boundaries were adjusted About 96 acres were altered by timber sales Then the Oregon Wilderness Act of 1984 was passed and most of the RA was designated as Wilderness and added to the Three Sisters Wilderness Area

Other human developments excluded between 1979 and 1983 included (1) a road constructed in the Squaw Creek portion, and (2) water impoundments on Snow Creek and Little Three Creeks The reason for excluding these portions was based on the premise that logging and other human developments are inconsistent with Roadless Area values

Location and Access

The Three Sisters Roadless Area contains 8,315 acres and lies within township T. 15-19 S., R. 8 and 9 E., W.M.

What remains of this RA is a relatively narrow strip of land contiguous with the eastern side of the Three Sisters Wilderness It is located north of Bench Mark Butte and south of Lucky Lake on the Bend District of the Deschutes National Forest, Deschutes County, Oregon and runs north onto the Sister Ranger District to a point near the McKenzie Highway

The RA is very accessible via the Cascade Lakes Highway and Forest Roads 8 and 4632.

There are two trails totaling approximately 4 5 miles within RA. Both trails provide access to the Three Sisters Wilderness area

Geography and Topography

The topography of the RA is hummocky and gently slopes to the east. There is one small stream within the RA

The elevation ranges from 4500 feet to 5600 feet

Precipitation ranges from 35 to 50 inches per year and falls primarily in the form of snow It is usually late June or July before the snow melts The porous nature of the soils causes most of the moisture to soak directly into the ground.

Soil Types

The soil types described here are taken from the Deschutes National Forest Soil Resource Inventory.[1]

Soils are the high elevation type consisting of a shallow layer of Mazama ash over stony glacial till or glacial scoured bedrock In local areas a coarse pumice layer from Devils Hill or Rock Mesa occurs on the surface In mountain hemlock stands a bleached grey horizon occurs in the surface soils Otherwise soils are moderately deep, light brown, sandy, and excessively drained. Areas occupied by meadows, lakes, and bare rock are not good soil

[1] Daniel H Larsen, Soils Resource Inventory, Deschutes National Forest, Pacific Northwest Region, 1976

APPENDIX C
THREE SISTERS ROADLESS AREA (RARE NO. 06192)

LAND TYPE	LANDFORM	PERCENT SLOPE	ELEVATION
—	Talus Slopes	20-70	
16	Sloping Uneven Glaciated Uplands	15-40	4300-6500
17	Gentle Uneven Glaciated Uplands	0-30	4200-6500
20	Glaciated Uplands with Many Lakes	0-30	5300-6000

Vegetation

Plant communities present are: hemlock/grouse huckleberry, lodgepole pine/grouse huckleberry, mixed conifer/snowbrush/sedge, mixed conifer/ snowbrush-manzanita/sedge-penstemon, lodgepole pine/sedge-lupine-penstemon, and lodgepole/sedge-lupine plant communities.

Where there is lodgepole pine it is currently infested by the mountain pine beetle to endemic proportions. It seems likely that this condition will worsen. However, the effect upon the visual quality should be minimal because there are few pure lodgepole pole stands.

Ecosystem Type

Approximately 90 percent of the area is forested. Mountain hemlock forest prevails around McKenzie Pass. From near McKenzie Pass south to Squaw Creek, lodgepole pine predominates. Mixed conifer is found in the vicinity of Three Creeks Lake. A mosaic of mountain hemlock, mixed conifer, and lodgepole pine are found from Three Creeks Lake south to the southern tip of the area. These forested stands are mostly "old growth" and "mature" successional stages Very few young or early successional stages are present. The 10 percent of the area that is not forested is primarily high elevation cinder or pumice covered flanks of Broken Top mountain or lava flows

Riparian ecosystems are found as scattered moist meadows and along stream channels. Much of this is found in the Squaw Creek drainage.

Mule deer of the Upper Deschutes Herd Unit summer in the Area. Deer densities are probably highest in the segment of the area that flanks Broken Top mountain. Roosevelt elk are also concentrated near this area and near the riparian ecosystems in small family unit groups An estimated 50 to 70 elk may spend their summer and fall season in this area

The East Fork of Park Creek, Fall Creek, and Goose Creek all support brook trout. The streams have limited potential as fisheries because of very low water temperatures.

Current Uses

About 50 percent of the RA is allocated to Protection Management This management option provides custodial management and small-scale timber management experiments on sensitive sites until acceptable methods for managing the timber resource are determined The other 50 percent is in the Visual Management Option In this area the designated visual quality standards will be met

The Recreation Opportunity Spectrum (ROS) designation is Semiprimitive, Motorized Primary recreation uses have been hiking, cross-country skiing, horseback riding,and some snowmobiling. There are a few areas where the boundaries for motorized snowcraft use overlap the RA boundaries No use statistics are available on this narrow strip but most of the use is primarily people passing through the area to points in the Three Sisters Wilderness.

APPENDIX C
THREE SISTERS ROADLESS AREA (RARE NO. 06192)

Appearance

The RA is contiguous with the Three Sisters Wilderness and has the same general appearance. It offers good variety in vegetation and landform. It is on the east slope of the Cascades and is drained by tributaries of the Deschutes River.

Surroundings

The RA is bounded on the west by the Three Sisters Wilderness Here, the goal is to protect and provide the benefits of Wilderness values for the public, in accordance with the Wilderness Act of 1964. The use of this area is further discussed in the "Need" section.

Most of the area to the east is allocated to Visual Management along the Cascade Lakes Highway and Wood Forage along much of the rest of the Boundary.

The nearness of the Cascade Lakes Highway and associated recreational development tends to have the greatest effect upon the RA This highway receives heavy tourist traffic during the summer and fall and is an established snowmobile route during the winter.

Forest Roads 4228 and 4632 provide easy access to the south and east boundaries Some woodcutting activities have occurred in these areas

Attractions

The major attractions within the RA include the small streams, virgin forests, and wildlife

Easy access and excellent snow depth make limited portions of the area attractive to winter users

CAPABILITY

Manageability and Boundaries

The ability to manage an area as undeveloped is a consideration Factors such as size, shape, and juxtaposition relative to external influences are important.

The intensive recreational development along the Cascade Lakes Highway will affect the manageability of the RA. The traffic noise and the general high level of activity would detract from an undeveloped recreation experience

Forest Roads 4228 and 4632 affect the manageability in both positive and negative ways. The road provides adequate opportunity for transportation access and traveler transfer facilities such as trailheads Conversely, experience has shown that jeep roads and snowmobile routes adjacent to undeveloped areas often require policing and signing in order to retain the undeveloped character Areas along this road have received some resource damage by off-road vehicle use in undesignated areas

Natural Integrity

The vast majority of the RA is in a natural state and unaffected by human influences

The trail systems have a high effect upon the immediate area

Slash burning around the RA does produce some air pollution for short periods of time, but it has not affected natural processes within the RA.

The natural process has been most heavily affected by the control of wildfire in the area The ecology and natural succession has been altered by the exclusion of fire

APPENDIX C
THREE SISTERS ROADLESS AREA (RARE NO. 06192)

Apparent Naturalness

Of the human-caused effects discussed in the previous section, the trails will have the greatest influence on the apparent naturalness as perceived by the user This only affects a very minor portion of the area

Opportunities for Solitude

The opportunity for solitude considers the following factors: size of area, topographic screening, vegetative screening, distance from perimeter to core, and human intrusions. Overall the area has limited potential to provide solitude because of its narrowness and the fact that it is adjacent to developed areas

Primitive Recreation Opportunities

The same factors used for rating solitude plus the following are used for rating primitive recreation: diversity of opportunities, challenge, and absence of facilities The overall capability to provide for Primitive Recreation is low for the same reason that opportunity for solitude are low.

The opportunities that do exist include hiking, backpacking, camping, hunting, ski touring, horseback riding, photography, nature study, viewing outstanding scenery, and acquiring general knowledge and understanding

Challenging Experiences

This attribute considers the areas ability to offer opportunities for unusual adventure, excitement, challenge, self-reliance, initiative, and judgment Challenging features include such things as dangerous animals, climatic disturbance, avalanche potential, terrain features (i e , cliffs, quicksand, sink holes), fast-moving water, glaciers, and a lack of dominant visual features on which to orient oneself This area has few hazardous features

Special Features

There have been occasional sightings of peregrine falcons in and near the area. The peregrine is Federally listed as an endangered species The area is not suitable nesting habitat but could possibly used for hunting prey. There have been reports of wolverines in and near the area also. It is classified as a sensitive species by the Regional Forester. Plants that are classified as sensitive which have been reported in the area are Peck's milkvetch (Asrtagulus peckii), Newberry's gentian (Gentiana newberrii), and Suksdorf's (Silene suksdorfii).

Historic and Scientific Study

The remaining portion of this RA receives an "infrequent" rating for the geological and ecological features present. This rating is given to features found throughout the High Cascade physiographic province.

Availability and Resource Potential

Refer to Table C-1

Management Considerations

Where there are lodgepole pine stands, the mountain pine beetle has infested them at, or near, epidemic levels on the Forest for several decades. Entomologists have predicted that this epidemic will continue for another 10 to 15 years until the beetles' major food supply of lodgepole pine is either consumed or made unavailable. In the southern portion of the Roadless Areas this activity may be setting the stage for a catastrophic fire.

NEED

Nearby Wilderness and Its Use

The Three Sisters Wilderness (94,247 acres on Deschutes National Forest) is the nearest Wilderness and is located adjacent to the northern

APPENDIX C
THREE SISTERS ROADLESS AREA (RARE NO. 06192)

boundary. It is currently being used at about 35 percent capacity.[2]

Statistics for fiscal year 1983 indicates use for the Deschutes portion of the Three Sisters Wilderness was 48,900 RVDs.[2] About 30 percent of the use came from local use, about 55 percent from other in-State locations, and about 15 percent from out of State.[3]

In considering local use, Deschutes County, with a population of 63,300 in 1983, represents the majority of the Forest Influence Area.

Distance from Population Centers

The Forest Influence Area includes the following towns: Sisters, Redmond, Tumalo, Bend, Sunriver, LaPine, Crescent, and Gilchrist. All of these are *within 60 miles of the Three Sisters Wilderness* Bend, with the largest population (17,840), is 25 miles from the Wilderness by road This distance is not excessive for people interested in a wilderness experience

Ecosystem Representation

No rare or unique ecosystems are known to exist within the RA

Congressional and Proponent Interest

In February of 1983, the Three Sisters RA was included in the proposed Wilderness Bill H.R. 1149. This bill was not enacted. Most of the original roadless area evaluated in the RARE II process was included as Wilderness in the Oregon Wilderness Act of 1984 The Congressional Review of roadless areas within the National Forests in Oregon did not include this area within the 1984 Wilderness Legislation (Public Law 98-328).

Public Input

During the RARE II evaluation process, the Forest Service requested public comment. These comments were than analyzed to determine the preferred treatment of the RAs by people in the private sector The results showed that 74 percent of the respondents wanted wilderness designation, while 26 percent wanted nonwilderness designation

Other Public Scoping Results

Two public workshops were held to discuss Roadless Areas in early 1984. Public comments were also requested through the "Forest Plan Report " With the exception of some areas with a history of snowmobile use, there was high interest in designating the area as Wilderness The 1984 Oregon Wilderness Bill included the majority of the area as Wilderness and no comments were forthcoming on the remainder of the area

WILDERNESS POTENTIAL

This roadless area is a narrow strip of land contiguous to the Three Sisters Wilderness

About 90% of the area is forested mostly with lodgepole pine These lodgepole pine stands have been heavily damaged by mountain pine beatle Squaw Creek which runs through the area is now designated as a Wild and Scenic River

Primary recreation uses of the area have been light and include hiking, mountain biking, cross-country skiing, horseback riding and some snowmobiling

The area has the same general appearance as the adjacent lands in the Three Sisters Wilderness and is in a natural condition, though it is affected by high levels of activity adjacent to it

The area itself offers little opportunity for solitude though if it were Wilderness the more interior portions would offer greater solitary opportunities. The opportunities for primitive recreation is limited also though mayn semi-primitive oppportunities

exist. The area offers few challenging experience opportunities.

The Wilderness potential of this area is moderate.

[2] 1983 RIM Data
[3] This data based on analysis of 1981 wilderness permits for the Three Sisters Wilderness Area

Table C-10 SUMMARY OF THREE SISTERS ROADLESS AREA DEVELOPMENT BY ALTERNATIVE

	No Change	ALT. A	ALT. B	ALT. C	ALT. E	ALT. G
Total Unroaded Acres	8315	8315	8315	8315	8315	8315
Acres Available for Development	6163	6163	6667	8315	5785	91
Acres Unavailable for Development[1]	2152	2152	1648	0	2530	8224
Acres Available for Winter Recreation/Geothermal[2]	0	0	400	843	0	0
Acres of Timber Harvest [3]						
Decade 1[6]	0	0	0	0	0	0
Decade 2	0	0	0	0	0	0
Decade 5[7]	0	0	0	0	0	0
Cumulative Miles of Road Construction [4]						
Decade 1	0 00	0 00	0 00	0 00	0 00	0 00
Decade 2	0 00	0 00	0 00	0 00	0.00	0 00
Decade 5	0 00	0 00	0.00	0 00	0 00	0 00
Acres Remaining Undeveloped After [5]						
Decade 1	8315	8315	8315	8315	8315	8315
Decade 2	8315	8315	8315	8315	8315	8315
Decade 3	8315	8315	8315	8315	8315	8315

[1]Includes management strategies which primarily exclude roading such as Research Natural Areas, some forms of undeveloped recreation, and the Bend Municipal Watershed

[2]The acres assigned to the winter recreation and geothermal strategy are available for roading but it is difficult to predict when that would occur since it is dependent upon leasing and exploration Some exploration could be expected in the first decade but it is impossible to say how much and where

[3]The acres scheduled for timber harvest would also have associated roads so that total acres impacted would be somewhat higher than shown above

[4]Based on a coefficient of 01 mile of collector and local roads per acre harvested The unpredictable impacts of geothermal exploration and development are not included

[5]Includes only the impacts of scheduled timber harvesting Does not consider geothermal exploration or some development that might occur because of the mountain pine beetle epidemic in lodgepole pine

[6]First decade basically represents the life of a Plan for any alternative

[7]The fifth decade represents the potential if an alternative were continued for 5 decades

APPENDIX C
WALDO ROADLESS AREA (RARE NO. 6106)

DESCRIPTION--THE EXISTING CONDITION

History

The Waldo Roadless Area (RA) was included in the RARE I and RARE II analysis processes. The primary changes occurred in 1983 when approximately 33 acres of the Applejack Sale near Cultus Lake were excluded from the RA. This area was originally logged during the Lucky Sale in 1973. These areas were excluded based on the premise that logging activities are inconsistent with Roadless Area values. Passage of the Oregon Wilderness Act of 1984 added all but a small portion of the RA near Cultus Lake and the Three Sisters Wilderness This description pertains to the remaining portion

Location and Access

The Waldo Roadless Area now contains 4,992 acres and lies within the following township·

T. 20 S., R 7 E ,W M

The area is located adjacent to the north, south, and west shores of Cultus Lake, in the Bend District of the Deschutes National Forest, Deschutes County, Oregon.

Access is gained by traveling west from Bend, Oregon, on Highway 46 for 45 miles, then on Forest Road 4635 to Cultus Lake

Approximately 8 miles of trail are located within the RA The following trails pass through the area: No 6 and No. 15.

Geography and Topography

The topography of the RA is hummocky and slopes gently to the east The area contains two lakes and several small streams.

The elevation ranges from 6200 feet on the flank of Cultus Mountain to 4700 feet near Cultus Lake

Precipitation ranges from 35 to 50 inches per year and falls primarily in the form of snow. The snow usually melts out by late June or early July. The porous volcanic soils cause most of the moisture to soak directly into the ground. Very little runoff occurs Wet meadows are scattered throughout the RA

Soil Types

The soil types described here are based on the Deschutes National Forest Soil Resource Inventory.[1]

The soils are the high elevation type with a shallow to moderately deep, sandy brown Maxama ash over a stony glacial till or glacial scoured bedrock. Numerous natural depressions contain lakes or meadows. Talus and rock outcrops are common on steep slopes A bleached gray layer occurs in the surface soils under mountain hemlock.

[1] Daniel H Larsen, Soil Resource Inventory, Deschutes National Forest, Pacific Northwest Region, 1976

APPENDIX C
WALDO ROADLESS AREA (RARE NO. 6106)

LAND TYPE	LANDFORM	PERCENT SLOPE	ELEVATION
5	Wet Meadows	0-30	
12	Talus Slopes	20-70	
16	Sloping Uneven Glaciated Lands	15-70	4300-6500
17	Gentle Uneven Glaciated Lands	0-30	4200-6500
19	Glaciated Uplands	-<20	4700-6000
20	Glaciated Uplands with Many Lakes	0-30	5300-6000
22	Glaciated Moraines & Valley Walls	25-60	5300-6000
25	Uneven Glaciated Lands	10-40	4400-5400
69	Steep Side Slopes & Ridges	30-60	4500-5800

Vegetation

The plant communities present in the Deschutes portion of the RA include mountain hemlock/grouse huckleberry, lodgepole pine/grouse huckleberry, mixed conifer/manzanita, lodgepole pine/ manzanita, mixed conifer snowbrush/sedge, and wet meadows.

Lodgepole pine stands are infested by the mountain pine beetle to endemic proportions. This condition will probably worsen Lodgepole pine comprises about 10 percent of the Forest

Ecosystem Type

The RA is predominantly mixed conifer forest, with a ponderosa pine, white fir, red fir, and Douglas fir composition on Cultus Mountain, and white fir/red fir/lodgepole pine mixtures further west and north. Mountain hemlock forests are minutely represented on the west side of the RA. Lodgepole pine stands account for less than one-quarter of the RA Englemann spruce bottomlands comprise 1 percent or less.

Wet meadows are essentially the only nonforested ecosystems, making up less than 1 percent of the RA.

Overmature ("old growth") and mature successional stages of Forest types, specified above, dominate the area. The only early-successional stages are found in a wildfire burn on the east slope of Cultus Mountain, where grass-forb and shrub-seedling stages are represented.

Wildlife species present are typical of represented ecosystems Species favoring early successional stages are not abundant here

Big Game

The area is summer range for mule deer of the Fort Rock and Upper Deschutes Game Management Unit deer herds that winter from Silver Lake north to Cabin Lake, and along the Deschutes River.

A few elk also summer in the area on the west side of the RA While exact wintering ranges have not been confirmed, it is suspected that these elk move westward over the Cascade Divide to sites on the Willamette National Forest

Endangered, Threatened, and Sensitive Species

No Federally-listed endangered or threatened species (wildlife, fish, plants) are known to reside in or use the area. The large trees on the east flanks of Cultus Mountain are suitable for winter roost sites for bald eagles that winter on the north end of Crane Prairie but no known activity has yet been documented.

APPENDIX C
WALDO ROADLESS AREA (RARE NO. 6106)

Regional Forester-designated sensitive species known in the RA include the spotted owl and wolverine. A pair of adult spotted owls were observed on the lower east slope of Cultus Mountain in 1983 and 1984, and single birds have been sighted there as far back as 1973 It is thought that this vicinity supports a nesting pair and probably has at least since 1973. The mixed conifer forests on Cultus Mountain are probably the only suitable habitat for spotted owls in the RA.

A wolverine was reported in the Many Lakes Basin (the west half of the RA) in 1972

No systematic surveys for sensitive plants has been implemented in the RA and no species are known to occur there.

Fisheries

Deer Lake, accessible by primitive road because of its location on the edge of the RA, is the only fish-producing lake in the RA. It is approximately 55 acres in size and relatively deep at 20 feet. Brook trout and rainbow trout are stocked by the Oregon Department of Fish and Wildlife Cultus and Little Cultus Lake border just outside the RA

Current Uses

Approximately 50 percent of the RA is allocated to the Dispersed Recreation, Unroaded Option; about 7 percent is allocated to the Old Growth option; and the remaining 43 percent is visual management. The two Old Growth areas lie just west of Little Cultus Lake and on the east flank of Cultus Mountain.

The Recreation Opportunity Spectrum (ROS) inventory category is "Semiprimitive Motorized." Primary recreation uses are hiking, horseback riding, fishing, hunting, and snowmobiling along the southern boundary. For fiscal year 1983, the area received 1,500 recreation visitor days (RVDs) for horseback riding, 2,500 RVDs for hiking, 500 RVDs for snowmobiling, and 1,000 RVDs for fishing.

Appearance

The RA appears as a hummocky country with a dense, mixed conifer forest. It is characterized by small lakes, potholes, and wet meadows. Rock outcroppings are common throughout the area Cultus Mountain is the predominate landform

Surroundings

The RA is bounded on the north and west by the Three Sisters Wilderness which is protected under the Wilderness Act of 1964. This area is further discussed in the "Need" section

The road corridor is allocated to Dispersed Recreation, Roaded This option is the same as Dispersed Recreation, Unroaded except that low standard roads are allowed Roads are basically tracks and use is low.

Most of the area to the east is allocated to the Visual Management Option. Cultus Lake lies along this eastern boundary This Lake and the associated recreational development have the greatest influence upon the RA. They receive intensive recreational use during the summer season Uses include fishing, camping, waterskiing, wind surfing, and boating. Three campgrounds and a resort are located in the occupancy zone adjacent to the Lakes. Recreation use for these areas totaled 33,500 RVDs in fiscal year 1983.

Attractions

Major attractions within the Roadless Area include the many small lakes, wet meadows, scenery, natural forest, and wildlife

The summit of Cultus Mountain offers panoramic views of the surrounding region

APPENDIX C
WALDO ROADLESS AREA (RARE NO. 6106)

CAPABILITY

Manageability and Boundaries

The ability to manage an area as unroaded must be considered in the context of such factors as size, shape, and location.

Intensive motorized recreational use on Cultus Lake will affect the manageability of the RA Noise created by motorboats and the high level of activity would detract from an undeveloped recreation experience. This effect decreases proportionately to the distance traveled away from Cultus Lake.

The jeep road along the southern boundary affects the manageability in both positive and negative ways The road provides adequate opportunity for transportation access and trailheads. Conversely, jeep roads adjacent to undeveloped areas often require policing and signing

The eastern boundary presents a management problem because it is somewhat irregular and would require extensive posting or signs in order to be easily recognized

Natural Integrity

The majority of the RA is in a natural state and unaffected by human influences

The trail systems are fairly extensive and have a significant effect upon the area adjacent to the trails Away from the trails, the impact involved is insignificant The impact could be corrected by discontinuing use and allowing time to heal the scars

Slash burning around the RA produces air pollution for short periods of time, but it has not affected natural processes within the RA.

Several undeveloped campsites are located around the lakes

Fish planting has disrupted the natural processes in the lakes

The natural processes have been most heavily affected by the suppression of wildfire in the area. The ecology and natural succession have been altered by the exclusion of fire

Apparent Naturalness

Of the human-caused effects discussed in the previous sections, the trails and the undeveloped campsites have the greatest influence on the apparent naturalness as perceived by the user The overall influence of this on the entire area low.

Opportunities for Solitude

The opportunity for solitude considers the following factors· size of area, topographic screening, vegetative screening, distance from perimeter of core, and human intrusions. Overall, the opportunity for solitude is limited because of the small size of the area and the activities that occur to the south and east of the area

Primitive Recreation Opportunities

Solitude plus the following additional factors are used for rating primitive recreation: diversity of opportunities, challenge, and absence of facilities. The overall opportunity for primitive recreation is limited due to the area's small size

Existing opportunities include hiking, fishing, nonmotorized watercraft use, swimming, backpacking, camping, hunting ski touring, horseback riding, photography, nature study, and acquiring general knowledge and understanding

Challenging Experiences

This attribute considers the RAs ability to offer opportunities for unusual adventure, excitement, challenge, self-reliance, initiative, and judgment. Challenging features include such things as dangerous animals, climatic disturbance,

avalanche potential, terrain features (i.e., cliffs, quicksand, sink holes), fast-moving water, glaciers, and a lack of dominant visual features on which to orient oneself This area has few hazardous features since it is gentle terrain with small lakes and streams.

Special Features

No Federally-listed endangered or threatened species are known to reside in or use the RA. The large trees on the east flank of Cultus Mountain are suitable winter roost sites for the bald eagles (threatened) that winter on the north end of Crane Prairie Reservoir, but no activity is occurring at the present time.

The spotted owl is the only known Regional Forest-designated sensitive animal species known to reside in the RA. The mixed conifer forests on Cultus Mountain are probably the only suitable habitat for spotted owls. Wolverines have been sighted near the area.

One unusual plant occurs in the RA, the Sundew (Drosera anglica). It is unique in that it entraps and digests small insects, though it is not a protected species. It is found in bogs and wet meadows.

Historic and Scientific Study

The Deschutes portion of the RA received an "outstanding" rating for its geological and ecological features. This rating is given to features not found elsewhere in the Western Cascades physiographic province. The small lakes, vegetative types, and rock formations provide a special opportunity for outdoor education and scientific study.

Availability and Resource Potentials

Refer to Table C-1.

Management Considerations

The mountain pine beetle have infested lodgepole pine stands to epidemic levels on the Forest. Entomologists predict this epidemic will continue for another 10 to 15 years until the beetles' major food supply of lodgepole pine is either consumed or destroyed In Roadless Areas, this activity may be setting the stage for a catastrophic fire

NEED

Nearby Wilderness and Its Use

The Three Sisters Wilderness (94,247 acres on Deschutes National Forest) is the nearest Wilderness and is located adjacent to the northern boundary It is currently being used at about 35 percent capacity.
Statistics for fiscal year 1983 indicate use for the Deschutes portion of the Three Sisters Wilderness was 48,900 RVDs [2] About 30 percent of the use came from local use, about 55 percent from other in-State locations, and about 15 percent from out of State.[3]

In considering local use, Deschutes County, which had a population of 63,300 in 1983, represents the majority of the Forest Influence Area

Distance From Population Centers

The Forest Influence Area includes the following towns: Sisters, Redmond, Tumalo, Bend, Sunriver, LaPine, Crescent, and Gilchrist All of these are within 60 miles of the Three Sisters Wilderness Bend, with the largest population (17,840), is 25 miles from the Three Sisters Wilderness by road. This distance is not excessive for people interested in a wilderness experience.

Ecosystem Representation

No rare or unique ecosystems are known to exist within the RA. The combinations of meadows and lakes do make it somewhat unusual, however

Congressional and Proponent Interest

In February or 1983, the Waldo RA was included in proposed Wilderness Bill H R. 1149 but the bill

was not enacted into law. With the passage of the Oregon Wilderness Act of 1984, all but a small portion of the RA near Cultus Lake was added to the Three Sisters Wilderness. The remaining portion was not included in the Wilderness because of manmade developments or irregular boundaries that would be hard to manage. The Congressional Review of roadless areas within the National Forests in Oregon did not include this area within the 1984 Wilderness Legislation (Public Law 98-328).

Public Input

The RARE II evaluation process showed that 20 percent of the respondents wanted wilderness designation, while 80 percent wanted nonwilderness designation.

[2] 1983 RIM Data
[3] This data based on analysis of 1981 Wilderness permits for the Three Sisters Wilderness

APPENDIX C
WALDO ROADLESS AREA (RARE NO. 6106)

Other Public Scoping Results

Two public workshops were conducted on Roadless Areas early in 1984. Public comments were also requested through the "Forest Plan Report." The preponderance of comments wanted the RA retained as undeveloped or Wilderness. Since much of the RA was included as Wilderness in the Oregon Wilderness Act of 1984, no comments have been received on the remainder of the area.

WILDERNESS POTENTIAL

Although relatively small, this area contains some interesting features. The ecosystem type is predominantly mixed conifer including Dougla fir, white pine and ponderosa pine. Less than one fourth is covered by lodgepole pine with some Engleman spruce bottomlands. For its size the area contains a great deal of botanic diversity as well as many small lakes and rock formations It contains several wet meadows, a few of which support the carnivorous plan Drosara Angelica, or sundew plant.

The area also contains habitat for the Northern Spotted Owl and Wolverine. A few elk also utilize the area.

The area currently receives a variety of recreation use including hiking, horseback riding, fishing, hunting, and snowmobiling along the southern boundary.

The area is predominantly hummocky, mixed conifer coverd east facing slopes. It is in a very natural state.

The area is bounded on the north and west by the Three Sisters Wilderness. The opportunities for solitude, primitive recreation, or challenging experiences are somewhat limited within this area.

The potential for Wilderness is low to moderate.

Table C-11 SUMMARY OF WALDO ROADLESS AREA DEVELOPMENT BY ALTERNATIVE

	No Change	ALT. A	ALT. B	ALT. C	ALT. E	ALT G
Total Unroaded Acres	4992	4992	4992	4992	4992	4992
Acres Available for Development	2119	2119	987	2174	928	991
Acres Unavailable for Development[1]	2837	2837	4005	2818	4064	4001
Acres Available for Winter Recreation/Geothermal[2]	0	0	0	0	1822	0
Acres of Timber Harvest.[3]						
Decade 1[6]	0	0	62	248	0	0
Decade 2	0	0	74	476	23	0
Decade 5[7]	898	898	851	1109	390	177
Cumulative Miles of Road Construction [4]						
Decade 1	0 00	0 00	0 6	2 5	0 00	0.00
Decade 2	0 00	0 00	0 7	4 8	0.20	0 00
Decade 5	9 0	9 0	8 5	11.1	3 9	1.8
Acres Remaining Undeveloped After [5]						
Decade 1	4992	4992	4930	4744	4992	4992
Decade 2	4992	4992	4918	4516	4969	4992
Decade 3	4094	4094	4141	3883	4602	4815

[1]Includes management strategies which primarily exclude roading such as Research Natural Areas, some forms of undeveloped recreation, and the Bend Municipal Watershed

[2]The acres assigned to the winter recreation and geothermal strategy are available for roading but it is difficult to predict when that would occur since it is dependent *upon leasing and exploration Some exploration could be expected in the first decade* but it is impossible to say how much and where

[3]The acres scheduled for timber harvest would also have associated roads so that total acres impacted would be somewhat higher than shown above

[4]Based on a coefficient of 01 mile of collector and local roads per acre harvested The unpredictable impacts of geothermal exploration and development are not included

[5]Includes only the impacts of scheduled timber harvesting Does not consider geothermal exploration or some development that might occur because of the mountain pine beetle epidemic in lodgepole pine

[6]First decade basically represents the life of a Plan for any alternative

[7]The fifth decade represents the potential if an alternative were continued for 5 decades

APPENDIX C
WEST AND SOUTH BACHELOR ROADLESS AREA (RARE NO. 06195)

DESCRIPTION--THE EXISTING CONDITION

History

The West and South Bachelor Roadless Area (RA) was included in both the RARE I and RARE II analysis process. Some boundaries have changed since 1979. Several minor adjustments were made along the northern boundary to exclude roads, developed recreation sites, and a cinder quarry. The western boundary was adjusted to exclude the Quinn Meadow Horse Camp and related improvements The eastern boundary was adjusted to exclude a portion of Forest Road 45, a paved road from Sunriver to Mt Bachelor.

These portions were excluded based on the premise that roads and other human developments were inconsistent with Roadless Area values

Location and Access

The West and South Bachelor RA contains 30,945 acres and lies within portions of the following townships:

T. 18 S., R. 8 E., W.M
T. 19 S., R. 8 E., W.M.
T. 18 S., R. 9 E , W.M.
T. 19 S., R. 9 E., W.M.

The RA occupies the south and west slope of Mt. Bachelor on the Bend District of the Deschutes National Forest, Deschutes County, Oregon

The RA can be reached by traveling west from Bend, Oregon, on Highway 46 (the Cascade Lakes Highway) for about 25 miles

There are about 20 miles of trail within the RA. The following trails pass through the area: No. 1, No. 31, and No. 99.

Geography and Topography

The topography of the RA ranges from steep to gentle forested terrain. Buttes, lava outcrops, and small lava flows are common. Mt. Bachelor is the most prominent feature Portions of Hosmer and Sparks Lakes are within the RA.

Precipitation ranges from 30 to 45 inches per year and falls primarily in the form of snow. The snow usually melts by late June or early July The porous volcanic soils causes most of the moisture to soak directly into the ground, and very little runoff occurs Quinn Creek is the only perennial creek in the area

Soil Types

The soil types are based on the Deschutes National Forest Soil Resource Inventory.[1]

Soils are mid to high elevation types which vary by topographic position The flat rough lava flows are covered with a shallow surface layer of sandy brown Mazama ash. Most of the soil is filtered deep into the cracks of the lava. The toeslope positions are a moderately deep soil with a sandy brown Mazama ash surface over a stony glacial till or talus material. The steeper sideslopes are a shallow sandy ash over talus or bedrock. A bleached grey soil occurs in the surface soils under mountain hemlock stands Rock outcrops are common in the lava flow flats or steep slopes.

[1] Daniel H Larsen, Soil Resource Inventory, Deschutes National Forest, Pacific Northwest Region, 1976

LAND TYPE	LANDFORM	PERCENT SLOPE	ELEVATION
74	Rough Lava Flows	0-10	4700-6000
84	Dissected Sideslopes	30-80	6000-7000
85	Toeslopes and Ridges	0-30	5400-6000

APPENDIX C
WEST AND SOUTH BACHELOR ROADLESS AREA (RARE NO. 06195)

Vegetation

Plant communities present are: mountain hemlock/ grouse huckleberry, lodgepole pine/grouse huckleberry, mixed conifer/manzanita, lodgepole pine/ manzanita, mixed conifer/snowbrush/sedge, mixed conifer/snowberry/forb and lodgepole pine/ sedge-needlegrass basins.

The mountain pine beetle infestation is becoming increasingly evident in the lodgepole pine communities

Ecosystem Type

About 95 percent of the area is forested The predominant type, mountain hemlock, comprises over half of the area. Mixed conifer forest accounts for about 33 percent of the area; lodgepole pine forest and ponderosa pine each make up less than 5 percent. The ponderosa pine is located in the east end at Edison Butte. Lodgepole occurs in widely scattered patches. Forested stands are generally in either "old growth" or "mature" successional stages.

The nonforested portions of the area are either cinder cones or moist meadows. Katsuk Butte is identified as a good representation of an undisturbed high-elevation forested cinder cone.

Riparian ecosystems occur along the Quinn and Sink Creek drainages. Moving upstream from the open meadows of Hosmer Lake, these riparian plant communities are narrow forested strips dominated by lodgepole pine, subalpine fir, and mountain hemlock with a grass/forb ground cover. No shrubs are present.

Mule deer belonging to the Upper Deschutes Herd Management Unit summer in the area. These deer come from the Tumalo and North Paulina winter ranges Generally, the mountain hemlock forests support relatively low deer densities because of limited availability and quality of forage. More use occurs along the riparian and meadow ecosystems.

Roosevelt elk summer near the riparian ecosystems and on the eastern end of the area.

Sparks Lake and Hosmer Lake lie partially inside the area. Sparks Lake is 600 acres and Hosmer is 250 acres in size. Both are less than 10 feet deep. Sparks Lake is a good brook trout fishery. Hosmer Lake is nationally known for its Atlantic salmon fishery. Both lakes offer scenic vistas that give them extraordinary qualities.

Current Uses

The primary use is dispersed recreation. The Recreation Opportunity Spectrum (ROS) inventoried category is Semiprimitive Nonmotorized with the exception of the lakes. The eastern third of the area is Semiprimitive Motorized during the winter. The entire area is open to snowmobiles on the Off Highway Vehicle (OHV) plan. Recreation uses are hiking (350 RVDs), horseback riding (100 RVDs), dispersed camping (14,057 RVDs), fishing (1,500 RVDs), hunting (100 RVDs), nordic skiing (12,564 RVDs), viewing scenery (8,263 RVDs), spelunking (100 RVDs), snowmobiling (2,899 RVDs), and bicycling (90 RVDs).

As of March 1985, geothermal leases have been filed on some 35 to 40 sections in the RA

The Mt. Bachelor Ski Area has a cleared and signed catch line around the base of Mt Bachelor. The permit area is not included in a roadless area.

Appearance

The terrain varies from flat forested terrain on the west side of the RA to steep slopes on Mt Bachelor and Kwolh Butte. Small lava flows occur throughout the area. With the exception of the two lakes, very little water is present. Most of the area is densely forested, but it does not offer a great variety of vegetation. Mt Bachelor is the dominant landform.

Mountain pine beetle has infested the lodgepole pine stands, which is affecting the scenic quality of the RA

APPENDIX C
WEST AND SOUTH BACHELOR ROADLESS AREA (RARE NO. 06195)

Surroundings

The northern half of Mt. Bachelor is under special-use permit to the ski resort, Mt Bachelor, Inc., one of the most popular downhill ski areas in the Pacific Northwest. It has a present capacity of 12,000 Persons At One Time (PAOT). The resort plans to expand to 23,000 PAOT under the approved master plan. Recreational use totaled 283,300 RVDs for 1983.

The proximity of the Cascade Lakes Highway and associated recreational development tend to have a great effect upon the RA. Recreational use in the adjacent developed sites totaled 110,600 RVDs in fiscal year 1983. Eleven campgrounds, 4 picnic sites, 32 summer homes, 1 horse camp, and 2 resorts are located in the occupancy zone adjacent to the lakes. The resort at Elk Lake remains open year round to serve recreationists.

Lands to the south and east are managed primarily for wood and forage production Logging activities are prevalent. Other uses include firewood cutting and snowmobiling.

A paved road from Sunriver to Mt. Bachelor (Forest Road 45) follows the eastern boundary for a short distance.

Cinder quarries exist at Red Crater and opposite Todd Lake junction.

Attractions

Major attractions within the RA include Mt. Bachelor, Hosmer and Sparks Lakes, and many lava caves, wildlife, and scenery. Easy access and excellent snow depth make the area attractive to winter users. The summit of Mt. Bachelor offers panoramic views of the Cascades and the surrounding area.

CAPABILITY

Manageability and Boundaries

The ability to manage an area as roadless must be considered before a recommendation can be made Factors such as size, shape, and location are important.

The intensive recreational development along the Cascade Lakes Highway will affect the manageability of the RA. Traffic noise and high level of activity would detract from a primitive recreation experience.

The southern and eastern boundaries present a management problem because they are irregular and do not follow clear topographic or geographic lines. The boundary would require extensive posting in order to be easily recognized

Existing roads offer adequate opportunity for transportation access and trailheads.

The existing trail system adequately serves the area.

The mountain pine beetle infestation may be setting the stage for a catastrophic fire in lower elevations

Natural Integrity

The vast majority of the RA is in a natural state and unaffected by human influences

The trail system has a heavy impact upon the immediate area

Slash burning around the RA produces air pollution for short periods of time but, overall, has not affected natural processes within the RA.

Fish planting has disrupted the natural processes in the lakes.

Some undeveloped campsites are located around the lakes.

APPENDIX C
WEST AND SOUTH BACHELOR ROADLESS AREA (RARE NO. 06195)

Two historic cabins are located within the RA.

Vegetative clearing has been done along the Mt Bachelor catch line

The natural processes have been most heavily affected by wildlife suppression in the area

Apparent Naturalness

The trails, undeveloped campsites, and catch line will have the greatest influence on the apparent naturalness as perceived by the user, but this only affects a very small percentage of the area

Opportunities for Solitude

The opportunity for solitude is based on the following factors: size of area, topographic screening, distance from perimeter to core, and human intrusions. Overall the area can provide for solitude except for the sounds of civilization near the developed recreation areas and busy highways.

Primitive Recreation Opportunities

Solitude and the additional factors are used for evaluating primitive recreation. diversity of opportunities, challenge and absence of facilities. The interior of the area can provide for primitive recreation but the edges are influenced by development and human activity.

Existing opportunities include hiking, fishing, nonmotorized watercraft use, swimming, backpacking, camping, hunting, ski touring, horseback riding, photography, nature study, viewing outstanding scenery, and acquiring general knowledge and appreciation for nature and the environment

Challenging Experiences

This attribute is based on the RAs ability to offer opportunities for unusual adventure, excitement, challenge, self-reliance, initiative, and judgment. Challenging features include dangerous animals, climatic disturbance, avalanche potential, terrain features (i.e. cliffs, quicksand, sink holes), fast-moving water, glaciers, and a lack of dominant visual features on which to orient oneself. A few hazardous features are present in the area

Special Features

No Endangered or Threatened species are known or suspected to occur in the area One Sensitive species--the Newberry's gentian (Gentiana newberryi)--is recorded at Sparks Meadows (1976) and may occur in the meadows around Hosmer Lake

Historic and Scientific Study

The West and South Bachelor RA receives a "unique" rating due to the presence of the cultural, geological, and ecological features of which there are few known occurrences

These features include historical cabins, lava caves, threatened or endangered species, and scenery.

Availability and Resource Potential

Refer to Table C-1

Management Considerations

The mountain pine beetle infestation has reached epidemic proportions in the lodgepole pine stands Entomologists predict that this epidemic will continue for another 10 to 15 years until the beetles' major food supply of lodgepole pine is either consumed or destroyed. In Roadless Areas, this infestation may be setting the stage for a catastrophic fire. Wilderness designation might preclude treating these fuels by normal methods, thus reducing fire hazard

APPENDIX C
WEST AND SOUTH BACHELOR ROADLESS AREA (RARE NO. 06195)

NEED

Nearby Wilderness and Its Use

The Three Sisters Wilderness located north and west of the area (94,247 acres on Deschutes National Forest) is the nearest Wilderness. It is currently being used at about 35 percent capacity.

Statistics for fiscal year 1983 indicate use of the Deschutes portion of the Three Sisters Wilderness was 48,900 RVDs.[2] About 30 percent of the use came from the local area, about 55 percent from other in-State locations, and about 15 percent from out of state.[3]

In considering local use, Deschutes County represents the majority of the Forest Influence Area. The population of the County was 63,300 in 1983

Distance From Population Centers

The Forest Influence Area includes the following towns: Sisters, Redmond, Tumalo, Bend, Sunriver, LaPine, Crescent, and Gilchrist. All of these are within 100 miles of the Wilderness. Bend, with the largest population (17,840), is 25 miles from the Wilderness by road. This distance is not excessive for people interested in a wilderness experience.

Ecosystem Representation

No rare or unique ecosystems are known to exist within the RA.

Congressional and Proponent Interest

There has been no congressional interest in the RA, with some interest by proponents of wilderness in the private sector. The Congressional Review of roadless areas as within the National Forests in Oregon did not include this area within the 1984 Wilderness Legislation (Public Law 98-328).

Public Input

The RARE II evaluation process showed that 73 percent of the respondents wanted wilderness designation, while 27 percent wanted nonwilderness designation.

Other Public Scoping Results

Two public workshops were held on Roadless Areas in early 1984. Public comments were also requested through the Forest Plan Report. The comments slightly favored development or partial development of the area.

WILDERNESS POTENTIAL

The charcater of this area is dominated by lava flows eminating from Bachelor Butte. The area is 95% forested with Mountain Hemlock being the predominant type with mixed conifer also well represented.

The area is currently sused primarily for recreation. Dominant recreation uses include, dispersed camping, snowmobiling, nordic skiing The area also is used for mountain bike and ATV riding, hunting, fishing, viewing scenery and spelunking. The area contains some geothermal potentail.

The area is currently in a natural condition.

Opportunities for solitude, primitive recreation, and challenging experiences are moderate within this area

The potential for Wilderness is moderate.

[2] 1983 RIM Data
[3] This data based on analysis of 1981 wilderness permits for the Three Sisters Wilderness Area

Table C-12 SUMMARY OF WEST-SOUTH BACHELOR ROADLESS AREA DEVELOPMENT BY ALTERNATIVE

	No Change	ALT. A	ALT. B	ALT. C	ALT. E	ALT. G
Total Unroaded Acres	30,945	30,945	30,945	30,945	39,945	30,945
Acres Available for Development	5,234	5,234	4,868	13,983	8,221	7,877
Acres Unavailable for Development[1]	25,711	25,711	26,077	16,962	22,724	23,068
Acres Available for Winter Recreation/Geothermal[2]	0	0	6,773	7,248	12,655	0
Acres of Timber Harvest [3]						
Decade 1[6]	0	0	613	480	0	0
Decade 2	0	0	621	4611	165	0
Decade 5[7]	3939	3939	1295	12,364	2772	3257
Cumulative Miles of Road Construction [4]						
Decade 1	0	0	6 1	4 8	0	0.00
Decade 2	0	0	6.2	46 1	1.7	0 00
Decade 5	39 4	39 4	13 0	123.6	27.7	32 6
Acres Remaining Undeveloped After [5]						
Decade 1	30,945	30,945	30,332	30,465	30,945	30,945
Decade 2	30,945	30,945	30,324	26,334	30,780	30,945
Decade 3	27,006	27,006	29,650	18,851	28,173	27,688

[1]Includes management strategies which primarily exclude roading such as Research Natural Areas, some forms of undeveloped recreation, and the Bend Municipal *Watershed*

[2]The acres assigned to the winter recreation and geothermal strategy are available for roading but it is difficult to predict when that would occur since it is dependent upon leasing and exploration Some exploration could be expected in the first decade but it is impossible to say how much and where

[3]The acres scheduled for timber harvest would also have associated roads so that total acres impacted would be somewhat higher than shown above.

[4]Based on a coefficient of 01 mile of collector and local roads per acre harvested The unpredictable impacts of geothermal exploration and development are not included

[5]Includes only the impacts of scheduled timber harvesting Does not consider geothermal exploration or some development that might occur because of the mountain pine beetle epidemic in lodgepole pine

[6]First decade basically represents the life of a Plan for any alternative

[7]The fifth decade represents the potential if an alternative were continued for 5 decades

AVAILABILITY--OTHER RESOURCE POTENTIALS

	Mt Jefferson RA	Metolius Breaks RA	Three Sisters RA	W&S Bachelor RA	Bear Wallows RA	Bend Watershed RA
Recreation Special Values	None	Castle Rocks	None	Lava Tube Caves	None	Bridge Creek Spring
Current Uses	Hiking, horseback riding, hunting, dispersed camping, snowmobiling	Hiking, horseback riding, hunting, dispersed camping	Hiking, horseback riding, hunting, dispersed camping, snowmobiling	Hiking, horseback riding, dispersed camping, fishing, hunting, cross-country skiing, spelunking, snowmobiling, viewing scenery	Hunting	Hiking, horseback riding, hunting, dispersed camping, cross-country skiing, snowmobiling
Potential Uses	Cross-country skiing, nature study	Nature study, photography, viewing scenery	Cross-country skiing	Alpine skiing, bicycling	Hiking, backpacking, ski touring, horseback riding	Bicycling
Water	Small streams exist, there is no potential for enhancement or development	One small stream, some potential for erosion abatement in steep portions	Two small streams, no potential for enhancement	Portions of Hosmer and Sparks Lakes, potential exists to further develop both lakes for recreation	No water and no potential	The two streams are main water supply for the City of Bend; potential for more intense management protection of the watershed
Wildlife		One bald eagle nesting site with three nests, some potential for enhancement of turkey habitat and big game habitat (i e , planting oak, prescribed burning, etc)				
Livestock	Limited potential, densely forested, some steep ground, logging might increase openings and forage	No potential, steep ground and very little water	Limited potential, densely forested; logging might increase openings and forage	Limited potential, water is located mear developed recreation areas; generally densely forested and rocky	Limited potential, densely forested, logging might increase openings and forage	No potential, municipal watershed
Ecological		Some potential for protecting bald eagle site from mountain pine beetle damage	No special ecological considerations or potential			

AVAILABILITY--OTHER RESOURCE POTENTIALS (continued)

	Mt. Jefferson RA	Metolius Breaks RA	Three Sisters RA	W&S Bachelor RA	Bear Wallows RA	Bend Watershed RA
Minerals and Energy	No minerals, moderate geothermal potential, 5 to 20 kw per acre, one valid lease	No minerals, moderate geothermal potential due to steep terrain, no leases	No minerals, moderate geothermal potential, 5 to 20 kw per acre, no lease	No minerals, moderate geothermal potential, 5 to 20 kw per acre, no leases	No minerals, good potential for geothermal energy, 20 to 70 kw per acre, no leases	No minerals, good potential for geothermal energy, 20 to 70 kw per acre; development might conflict with watershed management
Special Uses (i.e , pipelines, highways, electronic sites, etc)	None	None	None	None	None	Small diversion dam and connecting ditch exist as part of Bend water supply, outfitter guides operate under special-use permits
Suitable Forest Land and Site Species:						
Ponderosa Pine	154	2768	392	1167	117	0
Lodgepole Pine	213	0	3800	665	4495	352
Mixed Conifer	2144	5396	2512	9289	2645	6827
Mountain Hemlock	0	0	678	12976	80	5429
Unsuitable Land	0	1169	74	3759	0	213
Nonforest	96	1574	859	3813	0	1429

AVAILABILITY--OTHER RESOURCE POTENTIALS (continued)

	Mt. Jefferson RA	Metolius Breaks RA	Three Sisters RA	W&S Bachelor RA	Bear Wallows RA	Bend Watershed RA
Stand Age Classification:						
Ponderosa Pine						
Regeneration	0	11	0	5	0	0
Seedlings and Saplings	53	336	0	0	0	0
Immature Sawtimber	0	208	0	69	0	0
Mature Sawtimber	101	2213	392	1093	117	0
Lodgepole Pine						
Regeneration	0	0	0	0	5	32
Seedlings and Saplings	0	0	0	90	0	0
Immature Sawtimber	0	0	0	261	0	0
Mature Sawtimber	213	0	3800	314	4490	4320
Mixed Conifer						
Regeneration	0	352	32	171	5	592
Seedlings and Saplings	288	533	0	0	0	342
Immature Sawtimber	192	202	0	0	27	101
Mature Sawtimber	1664	4309	2480	9188	2613	5792
Mountain Hemlock						
Regeneration	0	0	0	123	11	544
Seedlings and Saplings	0	0	0	16	0	0
Immature Sawtimber						
Mature Sawtimber	0	0	678	12837	69	4885
Volume						
Long Term Sustained Yield						

AVAILABILITY--OTHER RESOURCE POTENTIALS

	Waldo RA	Charlton RA	North Paulina RA	South Paulina RA	Maiden Peak
Recreation Special Values	None	None	Unique geological features	Unique geological features	Maiden Peak
Current Uses	Hiking, horseback riding, hunting, fishing, snowmobiling	Hiking, horseback riding, hunting, fishing, dispersed camping	Hiking, horseback riding, hunting, snowmobiling, cross-country skiing	Snowmobiling, horseback riding, hiking, cross-country skiing	Hiking, horseback riding, dispersed camping, hunting, fishing, cross-country skiing
Potential Uses	Cross-country skiing, nature study, bicycling	Cross-country skiing, bicycling	Nature study, and photography; bicycling on some trails	Bicycling on some trails, nature study and photography	Bicycling
Water	Two lakes and several small streams, no potential for enhancement	There are several small lakes and streams, there may be potential for additional recreation development of Taylor and Lemish Lakes	No water	No water	Charlton and Bobby Lakes, numerous small lakes and streams; potential exists for additional recreational development of Charlton and Bobby Lakes
Wildlife			One bald eagle nesting site; potential for additional site protection (preventing beetle damage)		
Livestock	No potential, narrow, irregular shape, and lies adjacent to developed recreation area; some steep ground	Densely forested, there may be some potential for use by livestock, logging might increase openings and forage	No potential due to lack of water and poor forage	No potential due to lake of water and poor forage	Densely forested, there may be some potential for use by livestosck, logging might increase openings and forage
Ecological			Bald eagle habitat will need protection		
Minerals and Energy	No minerals, moderate potential for geothermal energy, 5 to 20 kw per acre, no leases	No minerals, moderate geothermal potential, 5 to 20 kw per acre, leases on 2,500 acres have been applied for	No minerals, good potential for geothermal energy, 20 to 70 kw per acre, there are 14 valid leases	No minerals, good potential for geothermal energy, 20 to 70 kw per acre, there are 14 valid leases	No minerals, moderate geothermal potential, 5 to 20 kw per acre, no leases exist
Special Uses (i e , pipelines, highways, electronic sites, etc)	None	SCS maintains a snow measurement site near Blowdown Lake, there are four designated helispots using natural openings	None	None	A water diversion device exists on Charlton Lake, there are six designated helispots using natural openings

AVAILABILITY--OTHER RESOURCE POTENTIALS (continued)

	Waldo RA	Charlton RA	North Paulina RA	South Paulina RA	Maiden Peak
Suitable for Land and Site Species:					
Ponderosa Pine	0	0	128	96	0
Lodgepole Pine	517	1456	8347	3871	1467
Mixed Conifer	0	758	1435	1008	3728
Mountain Hemlock	677	4448	4107	1731	18784
Unsuitable Land	864	416	6560	1860	
Nonforest	272	165	1045	1349	
Stand Age Classification:					
Ponderosa Pine Regeneration	0	0	0	0	0
Seedlings and Saplings	0	0	11	0	0
Immature Sawtimber	0	0	0	0	0
Mature Sawtimber	0	0	117	96	0
Lodgepole Pine Regeneration	0	0	0	0	0
Seedlings and Saplings	0	0	278	261	0
Immature Sawtimber	0	0	53	21	0
Mature Sawtimber	517	1456	8016	3589	1467
Mixed Conifer Regeneration	0	0	0	0	48
Seedlings and Saplings	0	0	11	0	0
Immature Sawtimber	0	0	0	0	0
Mature Sawtimber	0	758	1424	1008	3680
Mountain Hemlock Regeneration	0	0	0	0	0
Seedlings and Saplings	0	0	614	0	32
Immature Sawtimber					
Mature Sawtimber	677	4448	3493	1731	18752
Volume Long Term Sustained Yield					

APPENDIX C
ENVIRONMENTAL CONSEQUENCES

General Activities

The decision to maintain some roadless areas and to develop others has environmental consequences. The effect of this decision varies by alternative depending upon how the roadless areas are managed

Consequences of Alternatives

In areas that are completely roadless, resources *such as wildlife, scenic quality, old growth forest,* and unroaded recreation opportunities remain adequately protected In unroaded areas where some roads are maintained, their impacts on these resources must be considered individually following the management strategies used in other roadless areas discussed in the Forest Plan. For example, because Alternatives C and D emphasize commodities, specific portions of the roadless areas have been designated to protect old growth and wildlife In contrast, in Alternatives G and H, specific areas have not been identified because there is abundant unroaded recreation areas where these resources are protected

Several other examples are helpful In Alternatives D, G, and H, all potential eagle habitat on the Forest is managed for eagles, including in roadless areas. In contrast, Alternative C places minimum emphasis on eagle habitat Forest-wide, as well as in those lands that had been considered roadless areas. Research natural areas are provided in all Alternatives, with the exception of C and D because of their commodity emphasis They do not occur in Alternative E because of their potential conflict with geothermal development which is emphasized in the alternative.

Alternative G maintains all roadless areas in a roadless condition Alternative C would retain the fewest acres (4 percent) in a roadless condition Alternatives B, E, F, and the Current Direction Alternative retain between 40 and 45 percent of the roadless areas Alternative D has the second lowest amount of roadless areas while Alternative H has the second largest amount Various alternatives preserve different roadless areas

Table ROADLESS AREA DESIGNATION BY MANAGEMENT STRATEGY-ACRES BY ALTERNATIVE shows the roadless areas in each Alternative

ROADLESS AREA DESIGNATION BY MANAGEMENT STRATEGY-ACRES BY ALTERNATIVE

ROADLESS AREA	MANAGEMENT STRATEGY	No Change	ALT.A	ALT. B	ALT C	ALT. E	ALT. G
Mt Jefferson	Metolius Special Forest	0	0	0	0	965	0
	Timber Production	1248	1248	1370	1509	0	0
	Scenic	976	976	784	688	818	0
	Spotted Owl Habitat	0	0	454	411	825	0
	Undeveloped Recreation	0	0	0	0	0	2491
	Old Growth	384	384	0	0	0	0
	TOTAL	**2608**	**2608**	**2608**	**2608**	**2608**	**2608**
Metolius Breaks	Wild & Scenic Rivers	0	0	0	0	785	0
	Metolius Heritage	0	0	0	0	10	0
	Metolius Wildlife Primitive	0	0	0	0	8380	0
	Timber Production	512	512	219	6806	130	2048
	Deer Habitat	773	773	1595	2901	315	0
	Scenic	624	624	0	0	0	416
	Eagle Habitat	0	0	368	192	797	528
	Wildlife MMR	0	0	0	203	0	0
	Developed Recreation	0	0	811	805	90	0
	Undeveloped Recreation	0	0	7583	0	0	7755
	Special Interest	1254	1254	331	0	330	160
	Old Growth	848	848	0	0	70	0
	Protection Mgmt (1978 Plan)	6896	6896	N/A	N/A	N/A	N/A
	TOTAL	**10907**	**10907**	**10907**	**10907**	**10907**	**10907**
Three Sisters	SOHAS	0	0	0	0	120	0
	Front Country	0	0	0	0	2000	0
	Timber Production	4075	4075	5206	6460	4145	0
	Scenic	2091	2091	480	276	139	0
	Developed Recreation	0	0	581	736	370	91
	Undeveloped Recreation	1237	1237	1648	0	1550	8224
	Winter Recreation	0	0	400	843	400	0
	Old Growth	272	272	0	0	0	0
	Protection Mgmt (1978 Plan)	640	640	N/A	N/A	N/A	N/A
	TOTAL	**8315**	**8315**	**8315**	**8315**	**8315**	**8315**

ROADLESS AREA DESIGNATION BY MANAGEMENT STRATEGY-ACRES BY ALTERNATIVE (continued)

ROADLESS AREA	MANAGEMENT STRATEGY	No Change	ALT.A	ALT B	ALT C	ALT. E	ALT. G
West and South Bachelor	SOHAS	0	0	0	0	356	0
	Timber Production	2747	2747	0	15131	4450	160
	Scenic	3339	3339	5642	0	4570	1861
	Eagle Habitat	0	0	96	91	0	91
	Osprey Habitat	0	0	0	0	0	0
	Wildlife MMR	0	0	80	608	0	59
	Developed Recreation	5344	5344	6150	7771	7870	5547
	Winter Recreation	0	0	6773	7248	12655	0
	Undeveloped Recreation	16827	16827	12108	0	0	22187
	Research Natural Area	944	944	0	0	944	944
	Old Growth	480	480	0	0	0	0
	Special Interest	0	0	91	96	100	96
	Protection Mgmt (1978 Plan)	1264	1264	N/A	N/A	N/A	N/A
	TOTAL	**30945**	**30945**	**30945**	**30945**	**30945**	**30945**
Bearwallows	Timber Production	901	901	5790	6990	0	1085
	Scenic	149	149	59	0	100	145
	Wildlife MMR	0	0	251	267	0	0
	Developed Recreation	0	0	80	80	100	0
	Undeveloped Recreation	309	309	0	0	0	6107
	Winter Recreation	0	0	1157	0	1007	0
	Old Growth	240	240	0	0	430	0
	Protection Mgmt (1978 Plan)	5738	5738	N/A	N/A	N/A	N/A
	TOTAL	**7337**	**7337**	**7337**	**7337**	**7337**	**7337**
Bend Watershed	Timber Production	747	747	2133	1920	0	1275
	Scenic	2090	2090	459	511	450	869
	Wildlife MMR	0	0	101	363	0	5
	Developed Recreation	0	0	11	11	10	11
	Undeveloped Recreation	7770	7770	5114	0	5210	8575
	Winter Recreation	0	0	2368	7941	3920	0
	Watershed	3643	3643	4064	3504	4030	3515
	Old Growth	0	0	0	0	275	0
	Front Country	0	0	0	0	355	0
	TOTAL	**14250**	**14250**	**14250**	**14250**	**14250**	**14250**

ROADLESS AREA DESIGNATION BY MANAGEMENT STRATEGY-ACRES BY ALTERNATIVE (continued)

ROADLESS AREA	MANAGEMENT STRATEGY	No Change	ALT.A	ALT B	ALT. C	ALT. E	ALT. G
Waldo	Timber Production	0	0	112	752	0	640
	Scenic	1584	1584	432	0	290	32
	Eagle Habitat	0	0	720	560	775	795
	Spotted Owl Habitat	0	0	784	784	1065	784
	Wildlife MMR	0	0	64	192	0	37
	Developed Recreation	0	0	240	1296	230	53
	Undeveloped Recreation	1888	1888	1829	1408	1822	1840
	Research Natural Area	811	811	811	0	811	811
	Old Growth	613	613	0	0	0	0
	Protection Mgmt (1978 Plan)	96	96	N/A	N/A	N/A	N/A
	TOTAL	**4992**	**4992**	**4992**	**4992**	**4992**	**4992**
Charlton	Timber Production	261	261	64	6523	615	80
	Scenic	363	363	385	0	410	0
	Wildlife MMR	0	0	11	208	0	0
	Undeveloped Recreation	6438	6438	6271	0	5688	6646
	Research Natural Area	181	181	512	512	530	517
	TOTAL	**7243**	**7243**	**7243**	**7243**	**7243**	**7243**
North Paulina	Timber Production	1536	1536	757	14709	870	0
	Scenic	12625	12625	4230	0	12941	421
	Eagle Habitat	0	0	603	603	602	603
	Wildlife MMR	0	0	144	251	0	27
	Developed Recreation	0	0	1360	1845	1911	1013
	Undeveloped Recreation	0	0	4160	0	3958	19451
	Winter Recreation	0	0	261	4107	0	0
	Special Interest Area	6746	6746	107	107	0	107
	Old Growth	715	715	0	0	1540	0
	TOTAL	**21622**	**21622**	**21622**	**21622**	**21622**	**21622**
South Paulina	Timber Production	0	0	800	4512	800	0
	Scenic	4682	4682	3707	0	3859	48
	Wildlife MMR	0	0	0	0	0	0
	Developed Recreation	0	0	2048	2150	1879	384
	Undeveloped Recreation	0	0	0	0	3270	9483
	Winter Recreation	0	0	3243	3130	0	0
	Special Interest	4965	4965	0	0	0	0
	Old Growth	267	267	0	0	0	0
	TOTAL	**9915**	**9915**	**9915**	**9915**	**9915**	**9915**

ROADLESS AREA DESIGNATION BY MANAGEMENT STRATEGY-ACRES BY ALTERNATIVE (continued)

ROADLESS AREA	MANAGEMENT STRATEGY	No Change	ALT.A	ALT. B	ALT C	ALT. E	ALT. G
Maiden Peak	SOHAS	0	0	0	0	900	0
	Bend Water Shed	0	0	0	0	830	0
	Wild & Scenic River	0	0	0	0	100	0
	Timber Production	555	555	9152	25135	970	448
	Scenic	2048	2048	875	0	900	309
	Eagle Habitat	0	0	688	683	110	720
	Osprey Habitat	0	0	0	0	0	341
	Wildlife MMR	0	0	224	683	224	0
	Developed Recreation	0	0	501	507	48	336
	Undeveloped Recreation	14171	14171	15568	0	23150	24854
	TOTAL	**27008**	**27008**	**27008**	**27008**	**27008**	**27008**

APPENDIX C
ENVIRONMENTAL CONSEQUENCES

Consequences by Resource

Roadless Areas

Prevailing soil, hydrologic, and atmospheric conditions prevailing within the area would be maintained

Evidence of man's influence and activities would diminish rather than increase through time. The naturalness, uniqueness, and representative ecosystems of the designated area would be maintained. Educational opportunities for the scientific study of natural ecological processes would increase.

Growth of insect or disease populations within unroaded areas may spread to adjacent lands

Wilderness

Additional areas for undeveloped recreation could reduce the numbers of recreation impact on existing wilderness areas. This may reduce the need to limit the number of wilderness users through administrative closures and wilderness reservations. Most undeveloped recreation are not as popular as those areas already included in Wilderness, so the effect on wilderness may not be significant Roadless lands adjacent to Wilderness areas would provide a buffer against the sights and sounds of development

Recreation

Unroaded areas provide opportunities for solitude, remoteness, primitive experiences, challenge, and unconfined recreation in a natural environment. These values are reduced as the areas are modified or developed.

Dispersed campsites and other heavily used areas may adversely affect soil and water in localized areas. Maintaining a large number of unroaded areas would improve the balance of ROS acres in the Semiprimitive Nonmotorized category

If the roadless areas are developed timber management activities will change the recreational opportunities available to the Forest visitor Indirect effects of increased timber management activities are increased opportunities for motorized dispersed recreation and the increased opportunity for winter recreation.

Through the application of appropriate prescriptions and their associated standards and guidelines, vegetative management in developed recreation areas can have the long term effect of improved visual quality for recreation settings

Dispersed campsites and other heavily used recreation areas may adversely affect soil and water in localized areas

In areas managed in an unroaded condition, evidence of man's influence and activities in unroaded areas would diminish rather than increase through time The naturalness, uniqueness, and representative ecosystems, and a high level of visual quality, would be maintained in roadless areas Educational opportunities for scientific study of natural ecological processes would increase

Timber

No timber would be available for harvest in the Unroaded Recreation Areas In the Winter Recreation Areas and Developed Recreation Areas timber harvest would be limited to the amount necessary to meet recreation objectives Added care and cost would be needed to meet the more restrictive objectives of Visual Management Areas

In the unroaded areas, plant community diversity will most likely increase, but the Forest's age class diversity would decrease over time Areas managed for primitive or semiprimitive recreation will eventually reach the climax plant succession stage In areas designated for scenic quality carefully designed vegetative manipulation, including timber harvest, can be used to enhance or maintain the areas visual quality.

An indirect affect of no timber harvest is a buildup of natural fuels which will increase the risk and severity of fire. The reduced vigor of the trees would also increase the risk of insects and disease

APPENDIX C
ENVIRONMENTAL CONSEQUENCES

If roadless areas are developed timber management is one activity that may occur. Timber management is comprised of a number of related silvicultural activities associated with the establishment, tending, harvesting and marketing of wood products from the National Forest

Silvicultural activities which affect the environment include site preparation, reforestation, plantation protection against animal damage, timber stand improvement including modification of competitive vegetation and thinning, and the harvesting of timber crops Other activities that are associated with the management of timbered stands include road construction and maintenance, logging operations, and the removal of residual fuels resulting from harvesting activities

The magnitude of the effects, both their short-term and long-term, and their direct and indirect is dependent upon the type of activities prescribed and the number of acres to which they are applied

Road construction associated with timber management represents a long term commitment of Forest resources Acreage dedicated to road systems is not available for production of trees or forage Timber harvesting and associated activities will compact soils on skid trails, log landings, and temporary roads Soil will be displaced in areas where timber is harvested and residues are treated These consequences will be localized and short-term, and can be mitigated

Timber management activities will have other long term effects on the timber resource As the Forest is converted from its existing natural stands to managed stands, volume growth will be increased Also, the younger managed stands will be more vigorous which will result in reduced risks of damage from insect and disease outbreaks. All of these long-term consequences will be realized sooner and to larger extents for alternatives which emphasize higher harvest levels.

Timber management activities will alter the structure and composition of Forest plant communities Timber harvesting can increase forage production

Road systems developed for timber management result in increased access to existing roadless areas which are often adjacent to Wilderness Areas Increased access could change visitor use patterns in these areas The potential to view and hear timber management activities from the Wilderness and roadless areas could also increase, thereby reducing the total wilderness experience Road construction and timber harvesting in roadless areas eliminate the Wilderness values associated with them and therefore eliminate options for future Wilderness considerations

Range

No commercial livestock grazing would be permitted in unroaded areas so there are no environmental consequences.

Wildlife Habitat

In the long term, unroaded recreation areas would benefit those animal species requiring natural old growth habitats but would reduce available habitat for species associated with early-stage vegetation Wildlife species associated with old growth Forests and tree snags, such as the northern three toed woodpecker, pine marten, and goshawks, would benefit from the unroaded recreation areas

Areas managed for primitive and semiprimitive recreation provide suitable habitat for wildlife species not adaptable to roaded or developed areas

If the roadless areas are developed timber harvesting increases forage availability for deer and elk It can also reduce hiding cover in the short term This can be mitigated by leaving screens, slash piling, or restricting human activity

Timber harvesting activities also reduce the natural habitat for cavity dependent species As timber harvesting increases, wildlife populations associated with mature and old growth stands will decrease and wildlife populations associated with younger stands will increase.

Old Growth

Unroaded recreation areas would provide a large amount of old growth. If the areas are developed, however, some of the old growth would be lost

Research Natural Areas

All areas not designated as unroaded recreation would be available for Research Natural Area status. In Research Natural Areas, timber would not be managed for commercial purposes. Roads would not be constructed within the area and management would emphasize preservation of the natural unique ecosystem Recreation would also be discouraged.

Scenic Quality

The impacts on roadless areas will relate directly to the number of those areas that are retained in roadless classification or released for some other management activity Managing some of the roadless areas to meet the visual quality objectives will result in them being roaded and therefore reducing or eliminating the wilderness values associated with them.

If the roadless areas are developed timber management activities will change the visual appearance of the areas during both the short and long terms Forest visitors will experience a change in Forest structure from the existing condition of natural stands with larger trees and mixed ages to a more uniform managed Forest with smaller trees and less dead material

Through the application of the appropriate prescriptions and their associated standards and guidelines, vegetative management in sensitive visual areas can have the long-term effect of enhanced visual quality.

Geothermal Resources

Some Roadless Areas have geothermal potential If developed the exploration and development of the geothermal resource could also affect roadless areas The extent to which geothermal and other resource management activities could potentially affect roadless areas can be determined by viewing Table C-1 These references show the acreages involved with different management strategies. Strategies which favor timber production and winter recreation/geothermal are generally compatible with geothermal exploration and development, so could affect the roadless character by creating roads. During the exploration phase some road construction may be required and, although the density of these roads would not likely be high, they would be higher than what currently exists In current roadless areas, it may be possible to use low density roads developed for winter recreation for exploration or the reciprocal, using the roads developed for exploration for winter recreation purposes. If a resource were discovered and developed, road density would increase Roadless areas could also be affected indirectly by noise, odors, and visuals from activities on adjacent areas

Human activity associated with exploration and development may affect wildlife habitat use patterns on an intermittent basis Exploration activities are generally low density and short term, ranging from a few days to a few months If development takes place, activity would be substantially increased during construction and development, but would ultimately reduce to a lower level during production The production phase would last for 30 or more years

The timing and location of the activities in relation to key habitat and use patterns would determine the significance of displacement or disturbance Potential conflicts would be greatest in areas where wildlife concentrate and during periods such as migration and reproduction

Stipulations that restrict the season of use will be used to mitigate the effects and protect sensitive wildlife habitat

Threatened and Endangered species habitats will be protected by limiting surface occupancy

The old growth resource should not be significantly affected by geothermal exploration and development. This is because the acreage affected by activities will be small and dispersed

Social and Economic

In roadless areas, spiritual and therapeutic values would improve for those who seek solitude, remoteness, escape, and peace and quiet Vicarious enjoyment would be greater for those

who find security in the knowledge such areas exist

Options for future generations to manage areas as wilderness would remain open if the areas are kept roadless, but would be reduced if the areas are modified or developed Areas that currently have a high degree of solitude, remoteness, opportunities for primitive experience, challenge, unconfined recreation, uniqueness, and natural integrity would have these qualities diminished if they are developed

As recreation use increases in the unroaded areas the number of person-caused fires would also increase. The potential damage is greatest in the unroaded areas because of larger accumulations of natural fuels and difficulty in fighting fires

Contrasts between these developed roadless areas and other timbered lands will diminish if they are developed.

Primitive and unconfined recreation opportunities will be lost due to management activities and human intrusions in areas that are developed Opportunities for other types of recreation, however, would increase Economic activities in tourist oriented sectors and those providing camping, hiking, and other personal outdoor equipment will decrease when areas are developed Economic benefits associated with the management, harvesting, manufacture, and retail sale in timber products from certain roadless areas will increase

Recreation and its related service sectors are becoming an increasingly important component of the Central Oregon economy and way of life to the extent that an alternative accommodates the increasing demands for a diverse spectrum of recreation opportunities This aspect of the Central Oregon lifestyles will remain stable and growing Over the long term, the service sectors of the economy which facilitate and accommodate Forest based recreationists will comprise a larger share of the local economic, jobs, income and tax base

Potential damage to cultural resources will be directly related to the amount of soil disturbing activities.

Visual quality will be maintained at a high level in areas that remain unroaded and it will be reduced as areas are developed

APPENDIX D

APPENDIX D
WILD AND SCENIC RIVERS

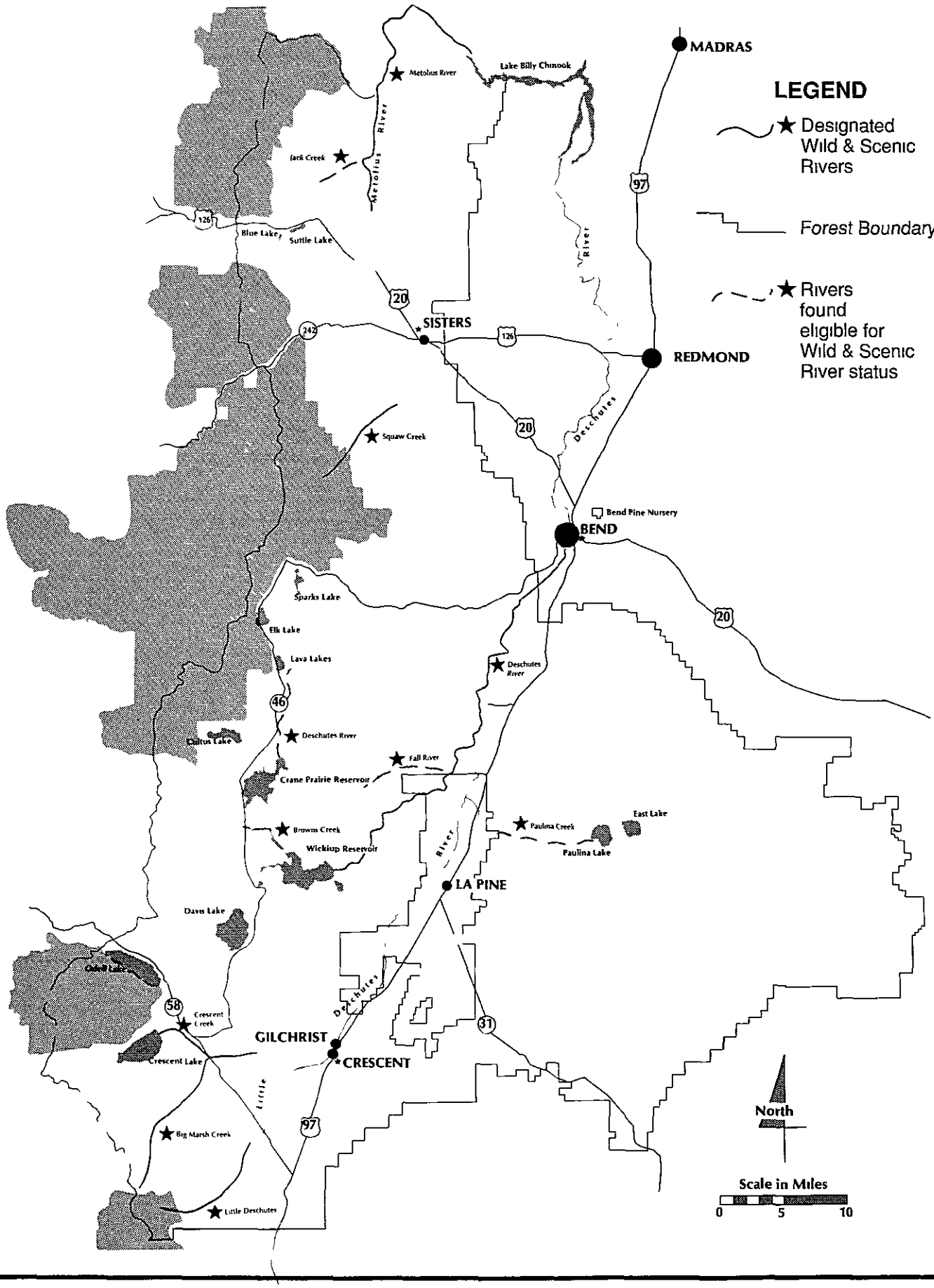
General Setting

Introduction

Segments of four rivers on and adjacent to the Deschutes National Forest were considered for eligibility as Wild and Scenic Rivers in the 1986 DEIS for the Proposed Land and Resource Management Plan These four rivers were considered because they were identified as possible candidates in the 1982 Nationwide Rivers Inventory. Segments of two of the rivers were recommended as eligible by the DEIS Since that time Congress has considered all of those same rivers for Wild and Scenic designation and designated significant portions of each as Wild and Scenic Rivers Table I is a summary of the results of this process. No additional consideration has been given to portions of those streams that were considered by the 1986 DEIS and subsequently acted upon by Congress.

Forest Service guidelines require that in addition to rivers identified in other studies, such as The Nationwide Rivers Inventory, any river determined by the Forest to have characteristics that identify it as a potential Wild and Scenic River must be addressed in the forest planning process The process requires a determination of eligibility for Wild and Scenic designation and subsequent study to determine a streams suitability for inclusion in the Wild and Scenic River System. Each of the eligible streams are protected by an appropriate management prescription until such time as suitability studies can be completed and appropriate recommendations can be made for inclusion in the Wild and Scenic River System

Wild and Scenic Rivers



APPENDIX D
WILD AND SCENIC RIVERS

TABLE I
Rivers Considered for Eligibility in 1986 DEIS Proposed Land Management Plan

River	1986 DEIS Miles	Recommended Eligible 1986 DEIS	Designated Ore. Omnibus Wild & Scenic Rivers Act
Big Marsh & Crescent Cr.	41	---	25 R
Little Deschutes	97	---	12 R
Deschutes	53	17 R	43 4 R 11.0 S
Metolius	29	11 R	11 5 R 17.1 S
Squaw	---	---	6 6 W 8 8 S

W = Wild River
S = Scenic River
R = Recreation River

Eligibility Process

As a result of Forest Service Policy and public comments received by the Forest in response to the 1986 DEIS for the Proposed Deschutes National Forest Land and Resource Management Plan 75 streams were considered for characteristics that could make them eligible as Wild and Scenic Rivers. They are listed in Table II. To be considered eligible for inclusion in the Wild and Scenic Rivers system, a river must be free-flowing and, with its adjacent land area, must possess one or more "outstandingly remarkable" value. Each stream was ranked by an interdisciplinary team against a standard set of criteria [1] to determine if the stream was free flowing and possessed resource values that might be considered outstandingly remarkable.

Streams that were determined to have unusually high resource values were brought forward for final consideration by the Forest Land Management Planning Interdisciplinary Team. The Interdisciplinary Team considered information provided by specialists and several interested members of the community They ranked the final group of streams against the standard criteria [1] to determine if the stream was free flowing and possessed an outstandingly remarkable value or outstanding combination of resource values The results of this process are summarized in Table III and described in detail on the following page.

APPENDIX D
WILD AND SCENIC RIVERS

TABLE II

Rivers Considered for Wild and Scenic Eligibility

Abbot Creek	Alder Creek	Antler Creek
Alden Creek	Basin Creek	Bear Valley Cr.
Bridge Creek	Browns Creek	Brush Creek
Burn Creek	Canyon Creek	Caudle Creek
Clover Creek	Cowhorn Creek	Crystal Creek
Cultus Creek	Cultus River	Douglas Creek
Deschutes River	Deer Creek	Devils Lake & Trib.
Dublin Creek	Fall Creek	Fall River
Fire Creek	Fly Creek	Hemlock Creek
Jack Creek	Jefferson Creek	Jungle Creek
Lake Creek	Little Creek	Little Deschutes River
Little Odell Creek	Mafler Creek	Maklaks Creek
Moore Creek	Mountain Creek	Odell Creek
No-See-Um Creek	Orphan Creek	Otter Creek
Paulina Creek	Pole Creek	Princess Creek
Quinn Creek	Quinta Creek	Rabbit Creek
Rainbow Creek	Ranger Creek	Resort Creek
Refrigerator Creek	Rhododendron Creek	Roaring Creek
Rosary Creek	S Fork Tumalo Creek	Snow Creek
Snow Creek	Soda Creek	Soloman Creek
Spruce Creek	Summit Creek	Swamp Creek
Thunder Creek	Trapper Creek	Triple Creek
Todd Creek	Trout Creek	Tumalo Creek
Cold Creek	West Bay Creek	Wharf Creek
Whitefish Creek	Mosquito Creek	Windigo Creek

[1]Criteria for determining the significance of resource values and stream rankings are available in the planning record

TABLE III
WILD and SCENIC RIVER
ELIGIBILITY DETERMINATION
Deschutes National Forest
Final Determination
March 1990

VALUES

River	Hydrological Geological	Scenic	Recreation	Fishery	Wildlife	Ecological Biological	Historical Cultural	Free Flowing	Remarks
Paulina Cr RM 3 6 Forest Bdry to Paulina Lake	O	O	S		M	M		yes	The outstanding values occur in 1/2 mile immediately below the Lake ELIGIBLE
Deschutes River Little Lava Lk to Crane Prairie	O	O	S	S	S	S	S	yes	ELIGIBLE
Browns Creek Springs in Sec 30 to Wickiup	M	M	M	O	M	M	M	yes	EILIGIBLE
Fall River Headwaters to Deschutes River	S	S	S	S	S	M	S	yes	Low dam at Hatchery ELIGIBLE Based upon its combination of substantial values
Jack Creek Head of Jack Creek to Metolius	M	S	M	O	M	S	M	yes	Irrigation Diversion at Jct with 28 Rd ELIGIBLE

APPENDIX D
WILD AND SCENIC RIVERS

VALUES (*continued*)

River	Hydrological Geological	Scenic	Recreation	Fishery	Wildlife	Ecological *Biological*	Historical *Cultural*	Free *Flowing*	*Remarks*
Roaring Creek Head to Canyon Creek	M	M	M	S	M	M	L	yes	NOT ELIGIBLE
Jefferson Creek Head to Metolius	S	S	M	S	M	M	M	yes	NOT ELIGIBLE
Odell Cr. Lake to Davis Lake	M	M	M	S	S	M	M	yes	NOT ELIGIBLE

O = Outstanding Value
S = Substantial Value
M = Moderate Value
L = Low Value

APPENDIX D
RIVERS

DESCRIPTION OF RIVERS

PAULINA CREEK (Lake to diversion)

Paulina Creek originates as out flow of Paulina Lake located in the Newberry caldera about 30 miles south and east of Bend Oregon. Shortly after leaving the lake, elevation 6331, the stream plummets over an approximately 100 foot falls. There are several other smaller falls further down the stream. The stream passes through mostly lodgepole pine stands and descends at a fairly rapid rate until it reaches the base of the mountain and runs onto private land. At this point most of the water in the stream is diverted for irrigation purposes.

LAND STATUS

Ownership: The entire 8 0 miles of steam considered in this process is located on National Forest System Lands

Mining Activities There are geothermal leases located along a significant portion of the stream.

Water Resource Development: Rights exist for storage of 3,780 Acre feet of irrigation water in Paulina Lake and subsequent removal of 7.5 CFS for irrigation purposes on the private land located adjacent to the National Forest.

R/W and Special Uses: Recreation special use permits have been issued in the past for guided mountain bike tours on trail 56 which parellels the stream. A small dam and fish screen are located at the outlet to Paulina Lake.

RIVER RESOURCE VALUES

Geological/Hydrologic - Outstanding Value: The Newberry caldera is one of the largest quaternary volcanoes in the continuous United States Paulina Creek is an unusual example of a stream that drains a lake within an expended crater. The falls is unique in that the creek has eroded through the overlaying flows and pyroclastic material and is now cutting on the intrusive welded material which makes up the rim of the caldera. This hydraulic control (nick point) is very resistant and accounts for the existence of the remarkable Paulina falls and the subsequent falls downstream. The only other known example of this phenomena is Yellowstone Lake and Yellowstone Falls.

Scenic - Outstanding Value: Upper Paulina Creek Falls is a unique scenic attraction that appears on numerous publications and postcards. It is an especially outstanding visual attraction in winter. The publication Waterfall Lovers Guide to the Pacific Northwest describes the upper falls as a 100 foot high segmented falls and rates it as exceptional and awe inspiring. A lower falls on Paulina Creek is considered a good scenic attraction in the same publication.

Recreation - Substantial Value The water related recreation opportunities created by Paulina and East Lakes attract visitors from all over the region. The creek and associated falls are only one of many attractions that make the caldera a popular recreation area.

Fisheries - Low Value. The fishery in Paulina Creek is dominated by rainbow trout. Small numbers of kokanee and chubs are washed from Paulina Lake into the upper reaches of the stream Most of the habitat in the upper five miles of stream are associated with plunge pools The quality of the habitat and associated fishery is low.

Wildlife - Moderate Value: The stream has a high value as a travel corridor for martin, mink and river otter that seasonally move along the drainage. It is important as an isolated oasis for deer and non-game critters since other water sources are miles from this one

Ecological/Biological - Moderate Value: The isolation of this stream from other water sources and its value as a travel corridor for man, animal and vegetative communities is special There are no known sensitive, threatened or endangered species within the corridor or directly associated with the stream.

Historical/Cultural - Substantial Value. Archaeologists have identified over twenty sites along the banks of Paulina Creek This indicates that this was one of the travel routes in and out of the caldera The importance of the obsidian flows in

APPENDIX D
RIVERS

the caldera to the native people has been irrefutably established Lithic quarry sites all around the flows attest to the fact they were quarrying the raw material and working it into large bifaces to transport to their campsites to further refine into tools. The sites along Paulina Creek appear to bear this out, as further reduction of the bifaces occurred all along the creek

We know a lot about the archaeology within the caldera, but there is still a lot we do not know Travel to and from, length of occupation, and duration of stay are just a few research questions still to be explored The sites along Paulina Creek are part of the bigger picture, which until now, has focused primarily only on the sites within the caldera

Eligibility: Paulina Creek is determined to be *eligible* as a Wild and Scenic River based upon the outstanding geologic and scenic values located near Paulina Lake outlet Paulina Creek would qualify as a recreation river

UPPER DESCHUTES RIVER (L. Lava Lake to Crane Prairie Reservior)

The head of the Deschutes River is considered to be Little Lava Lake. The Lake is located at an elevation of 4,739 feet near the crest of the Cascade Mountains approximately 33 miles southwest of Bend Oregon on the Deschutes National Forest This segment of the Deschutes River begins at river mile 252 and ends at Crane Prairie Reservoir, river mile 244, a distance of 8 miles

This portion of the river was designated a State Scenic Waterway in 1987. Virtually all of the remainder of the Deschutes River has been designated a Wild and Scenic River and State Scenic Waterway.

Vegetation along the stream consists of mostly pure lodgepole pine stands with occasional true fir and ponderosa pine intermixed in the stands Most of these stands are small mature pole sized trees infested with the Mountain Pine Beetle. There has been some timber harvest on adjoining areas. Shrub species include bitterbrush, manzanita, ceanothus, and currant. Forbs and grasses include sedge, penstemon, lupine, peavine, and fescue

LAND STATUS

Ownership: The entire eight miles of this segment of the river is located on National Forest System Lands.

Mining Activities: No potential for locatable minerals has been identified. There is good potential for Non-locatable minerals such as road rock in the corridor

Water Resource Development The lower end of the river segment flows into Crane Prairie Reservoir constructed in 1922 for irrigation water storage. There are no known water rights or hydroelectric sites in this segment of the river.

RIVER RESOURCE VALUES

Geologic/Hydrologic - Outstanding Value. The internal geologic structure of the Cascade Mountains are highly permeable Most of the rain and meltwater (30-60 inches of precipitation a year) infiltrates into the substrate and becomes part of a complex ground water system. Large springs discharge from complex perched systems near the base of the area (Chitwood 1976) The source of the Deschutes is flow from springs in Little Lava Lake and Blue Lagoon The water quality is excellent, almost as pure as distilled water and saturated with dissolved oxygen Because of the time it takes for snowmelt to work through the volcanic pile, peak flows are delayed until mid-summer It is the only known example in the western United States where regular peak flows are delayed in this manner

Scenic - Outstanding Value The river flows through a variety of landscape features, some of which are unique to the region; "blue lagoon" area, the "meadows" area, snow-capped mountain backdrops, etc The riparian vegetative type in the meadow areas is unique on the east side of the Cascades and is characterized by visual diversity that is truly outstanding in the region. A portion of the river can be viewed while driving the Cascade Lakes Highway.

Recreation - Substantial Value: There are many summer and winter recreation opportunities in both developed and dispersed recreation areas located in and adjacent to the river. Most of the recreation activities are accessed by a National Scenic Byway (Cascades Lakes Hiway) which travels along the river for several miles. The summer activities center around the summer resort at Lava Lake, Lava and Little Lava Lake campgrounds, Mile campground, Deschutes Bridge campground and Cow Meadow campground. Most of the users in this area are fishermen and picnickers. People travel from all over the United States to view and recreate in this area.

Fishery - Substantial Value: The upper Deschutes River has a high value for fisheries. It is the main spawning and rearing tributary for the Crane Prairie rainbows, kokanee and brook char. Crane Prairie Reservoir is regionally renowned for its quality of rainbow and lately, its bass fishery. The upper Deschutes River fishery is high quality for white fish and in the late summer and early fall the brook char move into the system, providing an excellent opportunity for fisherman to catch a trophy brookie. The state record brook char was caught in Blue Lagoon. This fish was suspected to be a resident and not a migrant from the reservoir

Wildlife - Substantial Value: The Bald Eagles forage in, and travel the upper Deschutes River from the lakes in the upper basin to Crane Prairie and Wickiup reservoirs. Osprey, wood ducks, buffleheads and goldeneyes nest along the river Fisher, otter, martin and mink utilize the corridor along with deer and many non-game species The combination of both the upper Deschutes River and Snow Creek is a haven for elk, being one of the top use areas for elk in the general area The meadow habitat is unsurpassed in quality.

Ecological/Biological - Substantial Value. The mosaic of wetlands and uplands provides a very diverse habitat for plants and associated wildlife species The complexity of habitat along with the expansive wetlands make the area very unique. Wire meadow contains Lycopodium and sundew and these two species are suspected to be in the upper Deschutes also

Historical/Cultural - Substantial Value. There is evidence to indicate that the drainage was used by Indian groups such as the Tenino, Molalla, and Northern Piutes for hunting and gathering

Various levels of cultural resource investigation have been conducted in recent years along the Deschutes River. There is a complex of prehistoric sites located around the Lava Lakes Initial testing revealed extensive materials and features indicative of a seasonally occupied base camp, apparently reused for at least 2 millenium Additional smaller prehistoric sites have been recorded along the length of the upper Deschutes. These sites are assumed to be related to hunting and gathering activities and indicate a travel route between Lava Lakes and Crane Prairie.

Historic evidence includes portions of historic wagon roads which parellel the river, historic accounts of trapping in the area, and later in the 1930's were Forest Service activities The Deschutes Bridge Guard Station includes an early log structure built at the site for Forest Service administration purposes.

Eligibility The headwaters of the Deschutes River have been determined to be *eligible* as a Wild and Scenic River based upon it's outstanding hydrological, geological and scenic values. This portion of the river qualifies as a recreation river.

BROWNS CREEK (springs in sec. 30 to Wickiup Reservoir)

The source of Browns Creek is located at an elevation of 4400 feet approximately 50 miles southwest of Bend, Oregon on the Deschutes National Forest. Three springs feed into Browns Creek at its source A short distance downstream from the source, the creek crosses a section of private land where several other springs and intermittent streams flow into the creek. It travels east approximately two miles from its source to Wickiup Reservoir.

Vegetation in the immediate area includes mostly mature stands of lodgepole pine with occasional true fir species and ponderosa pine. Shrub vegetation include snowbrush, manzanita,

chinkapin, bitterbrush, and currant. Major timber harvest activities have taken place along the stream to salvage beetle killed stands

LAND STATUS

Ownership

Deschutes National Forest	1.75 miles
Private ownership	.25 miles

Mining Little potential for locatable minerals has been identified Non locatable minerals such as rock or cinders may occur in the corridor

Water Resource Development: The lower end of Browns Creek flows into Wickiup Reservoir constructed in 1944 for irrigation water storage There are no known hydroelectric sites or outstanding water rights on the stream.

Special Uses and R/W None

RIVER RESOURCE VALUES

Geological/Hydrologic - Moderate Value: The water quality is excellent. The Creek is formed by a series of springs, providing the moisture for development of a beautiful wetlands complex at its source.

Scenic - Moderate Value The combination of springs and swamps are attractive landscape elements. The remainder of the stream would be considered somewhat common in scenic character

Recreation - Moderate Value. Heavy summer recreation visitor use occurs in this area due to Wickiup Reservoir Camping, fishing, and bird-watching are popular activities. In the fall, hunters use the area to camp and hunt for deer and waterfowl. This is also a time where fish viewing is available for the entire length of Browns Creek as brown trout and kokanee use this stream extensively

Fishery - Outstanding Value. The creek provides excellent spawning habitat for kokanee and excellent spawning and rearing habitat for brown trout. It is quite a thrill to be able to observe the spawning kokanee, accessing the creek on road 4280 The Oregon Department of Fish and Wildlife (ODFW) have maintained a brown trout egg gathering station on lower Browns Creek. The eggs gathered from the site are the only disease free brown trout eggs found in the state.

Wildlife - Moderate Value. Eagles and osprey use the creek for feeding. It is a major concentration area in the fall during and after the kokanee runs. Rough grouse use the headwater wetlands Deer, elk, mink, fishers, martin and many non-game species use the river and especially the meadow complex at the headwaters.

Ecological/Biological - Moderate Value: The wetlands provide excellent diversity of habitats for both wildlife and vegetation species. Lycopodium may exist in the wetland meadows.

Historical/Cultural - Moderate Value Several prehistoric sites have been located along the 2 miles of Browns Creek. None of these sites appear to be very extensive but indicate the area may have been intensively used for hunting and gathering activities during prehistoric times

Eligibility. Browns Creek was determined to be *eligible* as a recreation Wild and Scenic River based upon it's outstanding fishery values

FALL RIVER (source to conf with Deschutes River)

The source of Fall River is located at an elevation of 4280 feet approximately 20 miles southwest of Bend, Oregon on the Deschutes National Forest The legal description is SW 1/4, SW 1/4, NE 1/4, Section 10, Township 21 South, Range 9 East, Willamette Meridian. It is approximately 11 2 miles from the source of Fall River to its confluence with the Deschutes River close to Deschutes River Mile 205 It is the seventh largest first-order tributary of the Deschutes River The river flows in a shallow meandering channel, and is fed by underground springs at its source

Vegetation along Fall River is generally a mature lodgepole pine and bitterbrush plant community which predominates the LaPine Basin Region. These pine stands are the result of fires occurring

in the early 1870's and in the early 1890's. A variety of timber salvage and sanitation projects have occurred along the river corridor to deal with mountain pine beetle damage and improve forest productivity.

LANDSTATUS

Ownership:

U.S. Forest Service	4.2 miles
State of Oregon	.8 miles
Private	6.2 miles
TOTAL	11.2 Miles

Mining: No mining claims exist along the corridor and the possibility of discovery of locatable minerals is slim Non locatable minerals such as rock and cinders may occur in the corridor

Water Resources. Water is diverted from the steam for use at the Fall River Fish Hatchery.

Special Uses: None

RIVER RESOURCE VALUES

Geological/Hydrolocical - Substantial Value: The source of this river is largely due to a combination of permeable pumice soils and highly fractured basaltic bedrock which result in absorbed water carried underground for many miles This water is thrusted up to the surface where the basaltic bedrock encounters the impervious LaPine Basin sediments The springs at the headwaters of Fall river were formed when the last glacial meltoff caused enough sediment erosion to expose the basaltic lavas storing water. The springs have a very consistent flow (152 cfs) of excellent quality water. It is an excellent example of a full river bubbling out of the ground at virtually one location.

Scenic - Substantial Value: Some elements are attractive, but surrounding landscapes have only moderate diversity. There are some photo opportunities, but Fall River is not featured in publications, nor are people attracted to the river as a destination area based solely upon its scenic value.

Recreation - Substantial Value: The river receives mostly local use, but some regional angling use occurs. There are several opportunities for interpretation. Fall River Campground is located along the stream and has 9 tent/auto camp sites with a capacity of 45 PAOT. Several other viewpoints and fisherman access points also have been developed There is a 10 -15 foot fan type falls located approximately 1.5 miles from the streams confluence with the Deschutes River

Fishery - Substantial Value The water is highly productive but very, very cold. The stream is filled with submergent vegetation and provides excellent habitat for aquatic macroinvertbrates The stream is full of small brook char in the upper reaches and a few large brown trout are along the whole river. Fall River has been designated as wild trout waters with special regulations of flyfishing only. There is a water falls approximately 1.5 miles upstream of its confluence with the Deschutes River. This barrier prevents fish from moving upstream to spawn. White fish dominate in the river below the falls. This is a very important spawning tributary for the Deschutes River fish. The Fall River State Fish Hatchery is approximately 2 miles upstream of the falls. Water from the river is diverted for use in the hatchery. The continued high quality of the water is important for the proper function of the hatchery.

Wildlife - Substantial Value: Eagles and osprey nest and feed along the river. An elk herd resides in and around the headwater springs and adjoining areas. The submergent vegetation within the river is key winter forage for the elk. Deer, marten, herons, waterfowl and non-game animals all use the wetlands and adjoining uplands.

Ecological/Biological - Moderate Value: There is no know unique ecological/biological features associated with the river or its corridor.

Historical/Cultural - Substantial Value Several prehistoric groups such as the Tenino, Molalla, and Northern Paiute Indian cultures used the Fall River drainage for hunting and gathering. Several open-air lithic scatters ranging in size from 11 to 126 acres have been investigated near the headwaters. The Oregon Department of Fish and Wildlife Hatchery located along Fall River first

became operational in 1924 and a Forest Service guard station located near the source of the stream was built in the 1930s. Each have good potential for historical interpretation.

Eligibility: Fall River was determined to be *eligible* as a recreation Wild and Scenic River. Based upon its overall combination of substantial values the steam was given a rating of outstanding.

JACK CREEK (source to conf. with Metolius)

The source of Jack Creek is a large spring located in the NE 1/4 of Sec 1, T.13S R 8E. The stream flows in a general easterly direction for approximately 5 miles to its confluence with the Metolius River Approximately .9 miles of the stream is located on Private Land.

LAND STATUS

Ownership:

Deschutes National Forest	4.1 miles
Private	*9* miles
Total	5 0 Miles

Mining. There are no known sources for locatable or non locatable minerals in the area and the potential for these minerals is considered low. There are presently no geothermal leases in the area of Jack Creek

Water Resources: There are two permits for irrigation water diversion along Jack Creek. The Lungren permit is located in the NE 1/4 of Sec 31 T.12S R.9E Another is located in SE 1/4 of Section 28 T.12S R 9E and is held by Corbett

Special Uses. Several short access roads are located adjacent to Lundgren and Corbett property that would be in the river corridor

RIVER RESOURCE VALUES

Geologic/Hydrologic - Moderate Value: Jack Creek has excellent water quality. The water temperature is very cold (remaining below 50 degrees F) and the water quality is very near that of distilled water. The flow regime is very stable, with the majority of the water bubbling from two main spring groups. The creek bubbles up from a zone where an old glaciated lava flow terminates onto the till deposits. It is suspect that the glacial valley up canyon (which does not carry surface runoff) and the old lava flow are in combination the conduits for the subsurface water

Scenic - Substantial Value Many small-scale "detail" landscapes occur at the Head of Jack Creek This setting is photographed often and has appeared in several publications Other than the head of Jack Creek, the stream below lacks middleground, snow-capped peaks, and is tucked away in dense timber. The majority of the stream is considered common to the landscape character type.

Recreation - Moderate Value: An interpretive site for day use only exists at the "Head of Jack Creek" Interpretive opportunities at this site are outstanding and demonstrate how water (springs) influence the vegetative associations in a typical dry Ponderosa pine forest The opportunity is somewhat unique to the area and attracts people from throughout the region This site is not frequently a primary attraction for recreationists outside the local area. Jack Creek Campground is located approximately 1.5 miles downstream from the Head of Jack Creek

Fishery - Outstanding Value The stream possesses excellent riparian vegetation and stream bank conditions This excellent cold water habitat (and low nutrient conditions) favors the dominance of bull trout (Salvelinus Confluentus) (sensitive species) over other introduced fish species of the Metolius River basin Jack Creek accounts for the highest level of spawning bull trout adults within the Metolius Basin. Where this species is declining or remaining at a low status quo level in other drainages in Oregon and Washington, the bull trout is making a major comeback in the Metolius system The majority of the recruitment for the species is being spawned and reared in Jack, Canyon, Candle and Jefferson Creeks and their tributaries. The success of the species has been quantified by the ever increasing numbers of returning adult spawners in the above tributaries of the Metolius River It is believed that controls on harvest in the Metolius River and controls on

poaching has favored the recovery of the fish population

Wildlife - Moderate Value· Deer, mink, martin and non-game animals use the creek corridor.

Ecologic/Biological - Substantial Value. The diversity of vegetation within the stream corridor is high. Unique species like *Penstemon peckii* and Pacific Yew are examples of what exist there The upper end of the stream is in the mixed conifer belt. From here the creek descends into a landform occupied by an open ponderosa pine forest with *extensive understory of bitterbrush and other* brush species.

Historical/Cultural - Moderate Value: Some historic values at the mouth of Jack Creek and scattered prehistoric sites of moderate significance.

Eligibility: Jack Creek was determined to be *eligible* as a Wild and Scenic River based upon it's outstanding habitat value for Bull Trout The River would be considered a recreation river.

ROARING CREEK (source to conf. with Canyon Creek)

The source of this stream is Roaring Spring located in SW 1/4 Sec 18 T.12S.R.9E. From that point the stream proceeds in a south easterly direction for 1.75 mile to its confluence with Canyon Creek.

LAND STATUS

Ownership. The stream lies entirely on National Forest System Lands

Mining. There are no known locatable or non locatable mineral sources in the area. Geothermal leases held by Union Oil of California in sections 18 and 19 T 12S. R.9E. are part of a much larger lease area.

Water Resources: There are no diversions or other water uses established on Roaring Creek.

Special Uses. None

RIVER RESOURCE VALUES

Geologic/Hydrologic - Moderate Value: Roaring Creek is the major tributary of Canyon Creek. During the low flow period, Roaring Creek can contribute as much as 80% of the streamflow in lower Canyon Creek. Roaring Creek has excellent water quality. The water temperature is very cold (remaining below 50 degrees F) and the water chemistry borders on characteristics as distilled water. The flow regime is very stable, with the majority of the water bubbling from two main spring groups The creek bubbles up from a zone where a terminal moraine terminates onto the till deposits. It is suspected that the glacial valley up canyon (which does not carry surface runoff) is the conduit for the subsurface water.

Scenic - Moderate Value: Landscape elements of form, line, color, and texture are not unusual for this character type Some portions of the creek are visually attractive, but the overall character lacks diversity and uniqueness.

Recreation - Moderate Value The Metolius Windigo Trail runs parallel to the stream for a distance; Sheep Springs Horse Camp and several dispersed camping areas attract a moderate amount of recreationists from the local area.

Fishery - Substantial Value: The stream has excellent water quality, and possesses excellent riparian vegetation and stream bank conditions. The excellent cold water habitat (and low nutrient conditions) favors the dominance of bull trout (sensitive species) over other introduced fish species of the Metolius River basin Roaring Creek accounts for the highest level of spawning bull trout adults within the Canyon Creek drainage. Roaring and Jefferson Creeks run a close second in importance for spawning and rearing of the bull trout in the Metolius Basin Where this species is declining or remaining at a low status quo level in other drainages in Oregon and Washington, the bull trout is making a major comeback in the Metolius System The majority of the recruitment for the species is being spawned and reared in *Jack, Canyon, Candle and Jefferson Creeks and* their tributaries The success of the species has

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been quantified by the ever increasing numbers of returning adult spawners in the above tributaries of the Metolius River. It is believed that controls on harvest in the Metolius River and controls on poaching has favored the recovery of the fish population Rainbow trout and brook char are known to use the lower portions of Brush Creek and Canyon Creek

Wildlife - Moderate Value: Deer, mink, martin and non-game animals use the creek corridor

Ecologic/Biological - Moderate Value: The diversity of vegetation within the stream corridor is high Unique species like *Penstemon peckii* and Pacific Yew are examples of what exist there Roaring Creek begins in the mixed conifer forest and descends into a landform occupied by an open Ponderosa pine forest with extensive understory of bitterbrush and other brush species There is an extensive riparian zones along the lower portion of the creek and is typified by Ponderosa pine, white fir, western larch and the Douglas spiraea-common snowberry association

Historical/Cultural - Low Value: Only one identified prehistoric site, and it is not unique to the area

Eligibility: Roaring Creek was considered *not eligible* as a Wild and Scenic River

JEFFERSON CREEK (source to confluence with Metolius)

Jefferson Creek begins near the Hole in the Wall Park in the Mt. Jefferson Wilderness and travels 13 miles in a south easterly direction to its confluence with the Metolius River Approximately 10 4 miles of the stream lie inside the wilderness. The remaining 2 6 miles is entirely within the National Forest. Jefferson Creek serves as a portion of the boundary between the Deschutes National Forest and the Warm Springs Indian Reservation

LAND STATUS

Ownership. Jefferson Creek serves as the Deschutes National Forest Boundary. Lands to the north of the stream belong to the Warm Springs Indian Tribes.

Mining: There are no known mineral claims along the stream. Potential for such uses are small.

Water Resources: There are no known water rights or diversions along the stream.

Special Uses None

RIVER RESOURCE VALUES

Geologic/Hydrologic - Substantial Value: Jefferson Creek is a the major tributary of the Metolius River. Jefferson Creek has excellent water quality The water temperature is very cold (remaining below 50 degrees F). The flow regime reflects a seasonal snowmelt runoff pattern but maintains a high base flow. The creek originates from a zone at the base of Cathedral Rocks. A glacier formed the main valley, but this valley was partly filled by a lava flow (less than 5000 years old) which covered the whole valley bottom The creek is pushed over to the very north edge of the valley. Water is bubbling out of the lava flow all along the length of Jefferson Creek It is suspect that the glacial valley up canyon (which exhibits very little drainage density of surface drainage) is the conduit for much of the subsurface water.

Scenic - Substantial Value: Upper parts of the drainage are very scenic and offer a great deal of diversity and visual variety Lava flows, combined with glacial geologic features result in unique views However, much of this creek is hidden from view and it is rarely a scenic destination in itself

Recreation - Moderate Value: Trail is low use Candle Creek Campground is located near the confluence of Jefferson Creek with the Metolius River.

Fishery - Substantial Value With the excellent water quality, the stream also possesses excellent riparian vegetation and stream bank conditions. This excellent cold water habitat (and low nutrient conditions) favors the dominance of bull trout (sensitive species) over other introduced fish species of the Metolius River basin. Jefferson and Roaring Creeks run a close second in importance for spawning and rearing of the bull trout. Where this species is declining or remaining at a low

status quo level in other drainages in Oregon and Washington, the bull trout is making a major comeback in the Metolius System. The majority of the recruitment for the species is being spawned and reared in Jack, Canyon, Candle and Jefferson Creeks and their tributaries The success of the species has been quantified by the ever increasing numbers of returning adult spawners in the above tributaries of the Metolius River It is believed that controls on harvest in the Metolius River and controls on poaching has favored the recovery of the fish population.

Wildlife - Moderate Value: Deer, bear, mink, martin and non-game animals use the creek corridor.

Ecologic/Biological - Moderate Value: The diversity of vegetation within the stream corridor is high. The upper end is in alpine tundra and barrier lava fields, then the creek descends into the mixed conifer belt and further down into a landform occupied by an open ponderosa pine forest with extensive understory of bitterbrush and other brush species There is an extensive riparian zone along the lower portion of the creek and is typified by ponderosa pine, white fir, western larch and the Douglas spiraea-common snowberry association.

Historical/Cultural - Moderate Value: Some evidence of historic/traditional use by Warm Springs tribes.

Eligibility: Jefferson Creek was determined *not eligible* as a Wild and Scenic River

ODELL CREEK (Odell Lake to Davis Lake)

Odell Creek originates in Odell Lake at an elevation of 4,788 feet near the Crest of the Cascade Range along Oregon Highway 58. The stream travels in a north easterly direction for 7.1 miles and ends in Davis Lake at an elevation of 4,386 feet

LANDSTATUS

Ownership: Odell Creek is entirely on National Forest System Lands.

Mining: There are no known mineral claims along the stream

Water Resources: There are no known water rights or diversions along the stream.

Special Uses. There are several miscellaneous permits in place for bridges and telephone lines associated with highway 58 right of way.

RIVER RESOURCE VALUES

Geological/Hydrologic - Moderate Value: Odell Creek is the outlet for Odell Lake The outlet elevation is 4788 above mean sea-level The stream flows from the outlet (SW 1/4 Sec 26 T. 23 S., R 6 E) in a generally east-northeasterly direction until it flows into Davis Lake at an elevation of 4386' (Sec. 11 T. 23 S., R. 7 E) The historic outlet of Davis Lake has been blocked by a lava flow Water exits Davis Lake via lava tubes and subsurface flow and is postulated to enter Wickiup Reservoir and the Deschutes River below the reservoir Odell Creek has excellent water quality. The water temperature is very cold (remaining below 50 degrees F) and the water chemistry closely resembles the characteristics of distilled water. The flow regime reflects a seasonal snowmelt runoff pattern attentuated by the lake and it maintains a high base flow.

Scenic - Moderate Value Odell Creek offers a variety of visual elements in its landforms, geology, vegetative species and size-class diversity and in the water form itself. The creek varies from a relatively wide, flat-bottomed, slow stream to a more narrow faster stream, offering recreationists a diverse pallette of sights and sounds However, it is rarely photographed for its inherent beauty, and few people would travel to Odell Creek as a scenic destination in itself.

Recreation - Moderate Value: Recreation uses on Odell Creek ocurr mostly at its beginning and end Odell Lake Resort and Odell Creek campground are located on the lake near the streams origin and focuses many recreation activities from boating, fishing, and camping in the summer and some back country skiing use in the winter. The stream is used as a backup fishing location during times when fishing conditions are poor on the

lake. East and West Davis Lake Campgrounds stradle the stream at its confluence with Davis Lake.

Fishery - Substantial Value. The stream posses excellent water quality, excellent riparian vegetation and stream bank conditions. This excellent cold water habitat (and low nutrient conditions) favored the dominance of bull trout (sensitive species) over other introduced fish species of the Davis Lake basin. Odell Creek used to be an important stronghold for the spawning and rearing of the bull trout This species is declining and a recent quick survey did not find the species in the creek between Odell and Davis Lakes. The rainbow trout fishing in Davis Lake is of regional importance, drawing people from the western United States. It provides the opportunity to catch rainbow trout in the 5 pound plus category. All the recruitment, spawning and rearing habitat, for these rainbows are provided by Odell Creek The habitat quality in the creek is excellent The limiting factor for the growth of the fish is the low water temperature.

Wildlife - Substantial Value· The Bald Eagles use Odell Creek as a travel corridor from Davis Lake in the lower basin to Odell Lake in the upper basin Osprey, wood ducks, buffleheads and goldeyes nest along the river Fisher, otter, martin and mink utilize the corridor along with deer and many non-game species The combination of both Odell Creek and Ranger Creek is a haven for elk, being one of the top use areas for elk in the region. The meadow habitat is unsurpassed in quality. Rough grouse use these wetlands/riparian areas.

Ecologic/Biological - Moderate Value· The mosiac of wetlands and uplands provides a very unique, diverse habitat for plants and associated wildlife species The complexity of habitat along with the expansive wetlands make the area very unique The spruce wetlands provides an excellent refuge for big game and provide important thermal cover.

Historical/Cultural - Moderate Value· Most of Odell Creek has been surveyed for cultural resources. Significant cultural resource sites cluster around the mouth of the creek at Odell Lake. Archaeological site 35 KL 231, the Odell Lake Site is a significant site containing both a pre and a post Mazama component It was originally discovered in 1946 while excavating for the foundation of the lodge. Dr Luther S. Cressman did preliminary work at the site and identified it as one of the few known open-air Paleo-Indian occupations in central Oregon. The site has been determined eligbile for the National Register of Historic Places

Archaeologists have found few sites along the lower stretches of the river. This may be due to the more favorable locations around the lake itself.

Eligibility· Odell Creek was determined *not eligible* as a Wild and Scenic River.

APPENDIX E

APPENDIX E
RESEARCH NATURAL AREAS - DESCHUTES NATIONAL FOREST

INTRODUCTION

In a USDA, Forest Service, publication dated 1975 entitled, "Research Natural Area Needs in the Pacific Northwest," Jerry F Franklin, C T Dyrness, et al., at the Pacific Northwest Forest and Range Experiment Station, set forth guidelines for identifying and preserving natural ecological systems

Research Natural Areas (RNAs) are important elements in Forest Plans. They are tracts of land on which natural features are preserved in as nearly an undisturbed state as possible for scientific and educational purposes RNAs serve as a standard or baseline for comparison with areas influenced by man, as tracts for ecological and environmental study, and as reserves to protect typical as well as rare and endangered organisms. As baseline areas, field laboratories, and genetic reservoirs, they serve the scientist, the resource manager, and the public

In the Pacific Northwest there has long been a steadily increasing interest in preserving typical and unique examples of the natural environment by the Federal Agencies, by the States of Oregon and Washington, and by various private groups of professional societies However, a random accumulation of reserved tracts will not provide the representative system of RNAs needed. Features to be preserved may be important or unique ecosystems, habitats, or organisms and may be terrestrial, freshwater, or marine

Most tracts selected as Research Natural Areas are those where the features of interest are in as nearly an undisturbed state or natural condition as can be found. They do not necessarily have to be pristine, however, as examples of many ecosystems which are essentially free of human disturbance no longer exist. Research Natural Areas are, ideally, sufficiently large to protect the features of interest from significant unnatural influences

Region 6 (the States of Oregon and Washington) has been stratified into physiographic provinces covering both States. The Region has been further divided into planning areas The Deschutes National Forest is in Planning Area IV, along with the Ochoco, Fremont, and Winema National Forests. Another USDA, Forest Service, publication compiled by William E Hopkins, dated March 1976 entitled, "Guide to Research Natural Area Needs for Planning Area 4," describes the ecosystems our area can contribute to the Region's total.

BACKGROUND

The Forest has two (2) existing Research Natural Areas (RNAs) which are the Metolius RNA established June 1931, and Pringle Falls RNA established June 1936 Sixteen (16) potential RNAs were identified in the 1978 Land Management Plan These 16 areas (tracts) were selected as possible candidates to meet the RNA needs identified in previously-cited publications The RNAs on the Forest would be part of a Region 6 program requiring 365 tracts that would incorporate 960 individual ecosystems, habitats, or organisms

The 1978 Land Management Plan selected 11 of the 16 potential RNAs to be protected until detailed studies could be made Through the current planning effort under the National Forest Management Act (NFMA) we have reviewed all 16 potential RNAs plus any other opportunities that may have been overlooked.

The Research Natural Area Program has been coordinated within Planning Area IV and adjacent National Forests to the west It has been an effort to locate tracts that serve the RNA needs but at the same time not have a proliferation of duplications with like tracts serving the same purpose The main theme of our coordination has been to identify the best tracts to serve overall intended purposes and, therefore, eliminate each National Forest trying to do it all by themselves. Our Area IV Ecologist, Dr. William E Hopkins has taken the lead responsibility in accomplishing this task along with consultation from Dr Jerry F. Franklin, Chief Plant Ecologist, and Sarah E Green, Research Natural Area Scientist, from the Forestry Sciences Laboratory at Corvallis, Oregon

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RESEARCH NATURAL AREAS - DESCHUTES NATIONAL FOREST

FINDINGS

Area IV Ecologist, Bill Hopkins, field checked all potential tracts identified in the 1978 Land Management Plan In addition, using the published guidelines previously mentioned, Bill looked for other candidate tracts for specific needs identified

The following are brief statements about the potential tracts and their attributes that did not meet RNA needs or the RNA needs could be better served by an alternate tract

Basin Creek Drainage - This tract does not satisfy the need in that it is mostly dry lodgepole pine/sedge-lupine on the uplands with a very narrow border of Englemann spruce along the perennial stream The stream is high quality in terms of size and amount of flow but no grass-herb community exists Elevation would be in excess of 5500 feet and would not be as desirable as a stream passing through a mixed conifer forest at moderate (4000 to 5000 feet) elevation

West Lava Cast, Klawhop Lavas, Derrick Lavas, and Crescent Creek Lavas - Following consultation with Larry Chitwood, Forest Geologist, and other geologists, it was determined that locating a lava flow exhibiting pre-Mazama and post-Mazama ash best typified plant and animal succession in Central Oregon. The above-mentioned lavas were selected based on variously aged lava flows but in light of the impact of Mt. Mazama (Crater Lake) ash, a new direction was set to find examples of plant and animal succession on flows that were lightly impacted due to man's activity Mokst Butte contains both a forested cinder cone that is pre-Mazama and a forested cinder cone that is post-Mazama in addition to a lava flow situation between the two cones that is post-Mazama Therefore, the above potential tracts have been dropped from further consideration as potential RNAs and replaced by Mokst Butte.

Hidden Cave - Hidden Cave is an ice cave where there is some spring/summer melt creating a wet floor with some standing water. There is no actual spring with perennial flowing water, therefore, this site does not fit the description as identified as an RNA need

Pine Mountain - This tract was examined for RNA needs and found to be entirely too disturbed by man's activities to fill the needs

Hidden Pond Cinder Cone - Past logging on Sheridan Mountain was sufficient to make the layout of a meaningful unit very questionable in terms of securing enough land to represent all aspects Therefore, it does not fit the description as identified as an RNA need

Siah Butte - Logging from the 1930s and 1940s was still very evident on most of the Buttes in the general area around Siah Butte In addition, system roads also detracted from the overall desirable nature of the proposed area, therefore, it is no longer under consideration

Wahena Butte - This Butte is somewhat atypical in terms of height of cone and sparse vegetation This tract, therefore, is no longer being considered An adequate substitute has been identified on the Forest

Lava Top - Cone is atypical in terms of very rocky upper one-third portion of cone and sparse vegetation due to shallow soils Therefore, it does not meet RNA needs

After completing field work during the summer of 1981 the following tracts have been determined to meet RNA needs for purposes of research and education These tracts are candidates to be recommended for inclusion in a preferred alternative for preservation as natural ecosystems in the Research Natural Area Program

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RESEARCH NATURAL AREAS - DESCHUTES NATIONAL FOREST

Potential RNAs	Approximate Acres
Cache Mountain	300
Headwaters of Cultus River	250
Katsuk Butte	950
Many Lakes	700
Mokst Butte	1,250
Torrey-Charlton	520
Wechee Butte	360
TOTAL	**4,330**

APPENDIX E
ESTABLISHMENT REPORT FOR THE PROPOSED CACHE MOUNTAIN RESEARCH NATURAL AREA

Principal Distinguishing Features

Cache Mountain Research Natural Area (RNA) includes approximately 300 acres (122 hectares (ha)) of coniferous forest northeast of Mount Washington in the Oregon Cascades (Figure 1) The proposed area is situated two miles (3 2 kilometers (km)) east of the crest of the Cascade Range and is exposed to climatic factors coming through the Santiam Pass This maritime influence from west of the Cascades creates mesic plant communities in the RNA Four small lakes are included in the area. They are Peewee Lake, Four O'Clock Lake, and Hortense Lake, all five to ten acres (2 to 4 ha) in size, and 20-acre (8 ha) Torso Lake

The forests of the RNA are dominated by lodgepole pine (*Pinus contorta*)[1] and mountain hemlock (*Tsuga mertensiana*) in the west half, and a mixture of Douglas fir (*Pseudotsuga menziesii*), *Abies* species, mountain hemlock, Engelmann spruce (*Picea engelmannii*), western white pine (*Pinus monticola*), lodgepole pine and ponderosa pine (*Pinus ponderosa*) in the east half Six plant communities have been identified in the RNA ranging from moist meadows through mixed conifer forests to the relatively dry lodgepole/beargrass (*Xerophyllum tenax*) association The vegetation best fits into the *Abies grandis* Zone[2] of eastern Oregon The occurrence of mountain hemlock throughout the RNA appears to be a disjunct population from the *Tsuga mertensiana* Zone of western Oregon

Landscapes within the Research Natural Area include open water, steep-forested drainages, gently sloping glaciated uplands, and complex, rocky slopes Surface soils are loamy sand with several areas of exposed bedrock Slopes vary from near zero to 70 percent The RNA is bounded on the north by the Airstrip Burn 1967, on the south by the Santiam Wagon Road, and the east boundary is the base of Cache Mountain and Little Cache Mountain. Wildlife species are abundant and characteristic of mixed stands of the central Cascades Elevation ranges from 4400 feet (1342 meters (m)) to 4800 feet (1464 m).

Justification

Cache Mountain RNA fills the need for a lake at moderate elevations surrounded by mixed-coniferous forest This is a high priority need identified by the Research Natural Area Needs Workshop in 1973[3] Four lakes are included in the proposed area at elevations between 4400 feet (1342 m) and 4720 feet (1440 m) The mixed-conifer plant community occupies the east half of the RNA with the dominant tree species changing often

Torso Lake is the largest of the four lakes and is situated on the north boundary of the RNA at an elevation of 4400 feet (1342 m) It is 20 acres (8 ha) in size and has a small forested island in the center. The northern half is surrounded by land which has been scarred by wildfire At the south end is a small wet area dominated by sedges and deciduous shrubs. The surrounding forest is old-growth mixed-conifer with Pacific silver fir (*Abies amablis*) as the climatic climax A logging road runs along the west and south sides of the lake Short spur roads are common to the south of the lake and along a nearby Forest Service road The lake is accessible by vehicle and is heavily used for camping and fishing

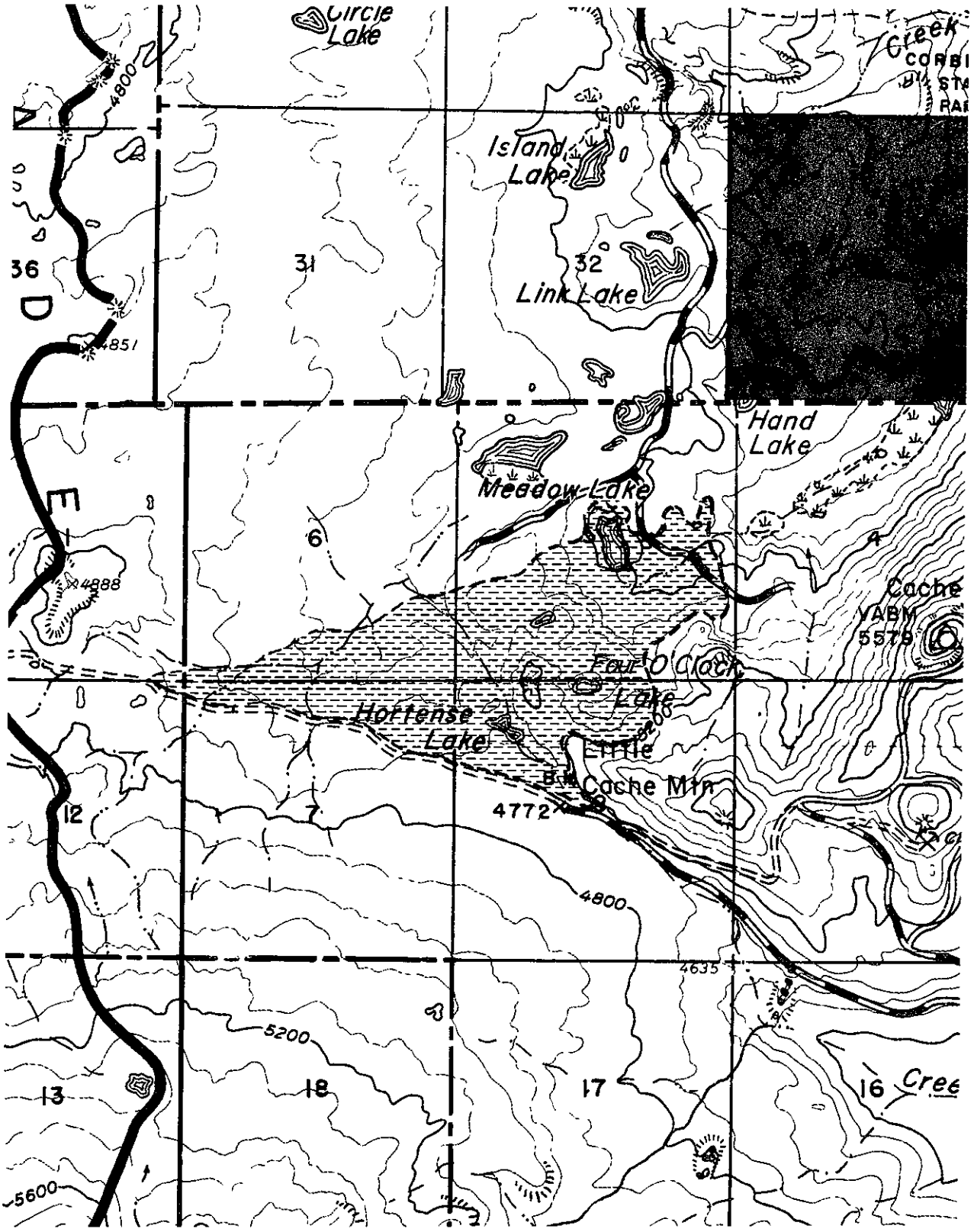
Peewee Lake is the most centrally located lake and is 2 to 5 acres (1 to 2 ha) in size It is about 1/4 mile (4 km) southwest of Torso Lake at an elevation of approximately 4640 feet (1415 m) The lake is bordered by a narrow region of deciduous shrubs, sedges, and mosses

[1]Common and scientific nomenclature follows Leo C Hitchcock and Arthur Cronquist, *Flora of the Pacific Northwest*, University of Washington Press, Seattle, Washington, 1973, 730 pages, illustrated

[2]Jerry F Franklin and C T Dyrness, *Natural Vegetation of Oregon and Washington*, U S Government Printing Office, Washington, D C , 1973, 417 pages, illustrated

[3]C T Dyrness, Jerry F Franklin, Chris Maser, Stanton A Cook, James D Hall, and Glenda Faxon, *Research Natural Area Needs in the Pacific Northwest*, Pacific Northwest Forest and Range Experiment Station, USDA Forest Service, Portland, Oregon, 1975, 231 pages

APPENDIX E
ESTABLISHMENT REPORT FOR THE PROPOSED CACHE MOUNTAIN RESEARCH NATURAL AREA



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The surrounding mixed-conifer forest contains lodgepole pine and the climax species is white fir (*Abies concolor*)[4]. This is the only lake in which Indian pond lily (*Nuphar polysepalum*) is found. The lake can be reached only by foot There is minor evidence of human use Four O'Clock Lake is approximately 1/2 mile (8 km) south of Torso Lake At 4720 feet (1440 m) it is the highest of the four lakes and apparently the least used The lake covers 5 to 10 acres (2 to 4 ha) and has a wide margin of deciduous shrubs dominated by birch (*Betula* species). The encircling forest is marked by many large old-growth Douglas fir among the other coniferous species. This lake is accessible only by foot A primitive jeep trail leads into Hortense Lake, the most southerly lake It is found at an elevation of about 4700 feet (1434 m) and is 10 acres (4 ha) in size Hortense Lake has the most extensive border of sedges of all the lakes Both mixed-conifer and lodgepole pine communities occur in the nearby forests An intermittent stream originating from the north end of the lake divides the RNA into east and west portions The shore of this lake shows signs of long-term recreational use Englemann spruce (*Picea engelmannii*) is present around each of the four lakes. Small meadows of tufted hairgrass (*Deschampsia caespitosa*) are found near Peewee and Hortense Lakes There is some use of the lakes by waterfowl Centered between the three smaller lakes is a rocky ridge which supports mountain juniper (*Juniperus communis*) and other sub-alpine and rock species

The mixed-conifer forest of the RNA is composed of Douglas fir, Pacific silver fir, white fir, mountain hemlock, Engelmann spruce, lodgepole pine, ponderosa pine, and western white pine Some understory dominants are big huckleberry (*Vaccinium membranaceum*), braken fern (*Pteridium* aquilinum), beargrass (*Xerophyllum tenax*), and starry solomon-plume (*Smilacina stellata*) Pacific silver fir is the climax (true species) in the northeastern portion of the RNA and white fir in the drier western portion. Other communities in the RNA include moist (hairgrass) meadows, lodgepole pine wetlands, Englemann spruce bottomlands and lodgepole-beargrass associations Large old-growth Douglas fir around 60 inches (152 centimeters (cm)) d.b.h.[5] are scattered throughout the more mesic eastern half of the proposed area Large mountain hemlock are found in every part of the RNA and are strikingly evident in the lodgepole-beargrass community found in the western half of the area. Mountain hemlock appears as disjunct stands within the proposed area The area offers examples of fire climax situations in which Douglas fir, lodgepole pine, and ponderosa pine are dominant tree species but are considered seral Adding to the diversity of vegetation is the shading influence of Cache and Little Cache Mountains on the eastern portion of the RNA

The proposed Cache Mountain RNA is located in the midst of highly productive commercial forest land A 20-acre (8 ha) section has been recently logged. The RNA is also in an area of heavy recreational use Human use is evident along the north and south boundaries and at most of the lakes

The RNA provides an opportunity to study mid-elevation aquatics in a mixed-conifer community Studies might include effect of elevation and surrounding vegetation on aquatic life Other research could involve the influence of maritime climate on the vegetation of eastern Oregon The area offers a wide variety of microclimates and research might include the relationship of plant communities to changes in topography, soil depths, aspects, percent slope, and soil moisture Major vegetation studies could be directed toward fire climax versus climatic climax Opportunities also exist in areas relative to recreation, fauna, and timber management

[4]Grand fir (*Abies grandis*) and white fir (*Abies concolor*) form a continuously varying biological complex in eastern Oregon Throughout this report we will refer to the complex as white fir (*Abies concolor*) Centered between the three smaller lakes is a rocky ridge which supports mountain juniper (*Juniperus communis*) and other sub-alpine and rock species

[5]d b h is an abbreviation of "diameter breast height" and is the diameter of the stem measured 54 inches (137 cm) above ground level

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ESTABLISHMENT REPORT FOR THE PROPOSED CACHE MOUNTAIN RESEARCH NATURAL AREA

Location

The proposed Cache Mountain Research Natural Area occupies approximately 300 acres (122 ha) in the Deschutes National Forest, Sisters Ranger District It lies at North Latitude 44° 22' and West Longitude 121° 48' The tract is located in Deschutes County 14 air miles (23 km) west-northwest of Sisters, Oregon The RNA includes portions of Sections 5, 6, 7, and 8, of T. 14 S , R 8 E , and Sections 1 and 12, of T. 14 S., R. 7-1/2 E , W M

It is possible to reach the RNA from two directions. For access from the north travel State Highway 126 northwest from Sisters, Oregon. In about 17 miles (27 km), 4 miles (6.4 km) past the Suttle Lake road, turn left on Forest Road 1316 to Elliot R. Corbett II Memorial State Park Follow this cindered road for 3 miles (4 8 km) and turn left onto an unmarked cindered road. This is Forest Road 1316A which gives access to the extreme northeast portion of the RNA To reach Torso Lake continue on the main road No 1316 and turn left on the dirt road immediately after No 1316A The lake can be seen from the main road The fire road which forms most of the north boundary of the RNA begins at Torso Lake and runs west It is suitable for foot or ATV travel Numerous short spur roads into the RNA branch off from this fire road For access to the southern portion of the RNA again take State Highway 126 northwest from Sisters, Oregon. In 11 miles (18 km) turn left onto Forest Road 1423, following signs to Cache Mountain and Toll Station. Pass the Toll Station in about 6 miles (9 7 km) following signs to Cache Mountain In 2 miles (3 2 km) the cindered road will turn into dirt road No 1315. A jeep trail to the right in about 1/4 mile (4 km) leads into Hortense Lake. Continue on Road 1315 to travel the south border of the RNA and for access by foot to the interior

Community Types

The major influences upon forest composition within the RNA appear to be fire and available soil moisture. Seral species such as lodgepole pine, ponderosa pine, Douglas fir, and western white pine are maintained by fire The climatic climax species, white fir and Pacific silver fir, appear only in the absence of fire. The variety within each plant community of the RNA is compounded by the effects of changing slope, aspect, landform and soil type on soil moisture. Ecologically, the communities encountered in the Cache Mountain RNA best fit into the *Abies grandis* Zone of eastern Oregon with an additional disjunct population from the *Tsuga mertensiana* Zone Soil drought is of minor significance Soils exhibit minimal development but have relatively deep accumulations of volcanic ash. Tree species in order of abundance are white fir, lodgepole pine, mountain hemlock, Douglas fir, Pacific silver fir, Engelmann spruce, western white pine, and ponderosa pine White fir is the major climax species in the western portion of the RNA with some areas where mountain hemlock may be minor climax or major seral In the eastern segment of the RNA Pacific silver fir is the major climax

Fire has been the most important factor in instigating seral stands dominated by lodgepole pine and Douglas fir. Present in limited numbers and localized areas are Engelmann spruce and western white pine Many of the seral species reach optimum development in the *Abies grandis* Zone.

Throughout the Cache Mountain RNA mountain hemlock occurs as scattered old growth and regeneration. Within the western portion of the RNA where lodgepole pine is the major seral species, stands occur in which mountain hemlock is dominant. In these stands hemlock is present in all ages and its regeneration is equal to that of the white fir The stands of mountain hemlock found in the Cache Mountain area exhibiting some similarity to the west side *Tsuga mertensiana* Zone are seen in the mixed-conifer community where mountain hemlock dominates the overstory, in that section of the RNA where Pacific silver fir is climax, and in the occurrence of seral lodgepole forests.

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Five plant communities have been identified in the RNA and may be correlated to Volland's types[6] as follows.

Unit	Plant Community	Location	Acreage
1	Moist (hairgrass) meadow MM-19	1/4 mile (4 km) north of Peewee Lake, 1/4 mile (.8 ha) south of Hortense Lake	2 (8 ha)
2	Lodgepole/blueberry/forb wetland CL-M3-11	1/10 mile (.16 km) south and east of Four O'Clock Lake	5 (2 ha)
3	Engelmann spruce bottomlands CW-C9-11	On shore of three smaller lakes	20 (8 ha)
4	Mixed conifer/snowberry/ forb CD-S6-13	East half of RNA	113 (46 ha)
5	Lodgepole pine/beargrass CL-M4-11	West half of RNA	150 (61 ha)

The moist (hairgrass) meadows of the RNA are permanent nonforest communities They are nonsuccessional herbaceous plant communities which occupy small, moist, essentially flat areas of the forest. At this time two have been found in the Cache Mountain RNA One is located just south of the fire road that forms the north boundary of the RNA and is about 1/4 mile (4 km) due north of Peewee Lake. The other meadow is divided by the jeep trail that leads to Hortense Lake from the south boundary Each is approximately one acre (4 ha) in size Both meadows are in excellent condition and are dominated by tufted hairgrass (*Deschampsia caespitosa*), beaked sedge (*Carex rostrata*), black alpine sedge (*Carex nigricans*), Baltic rush (*Juncus balticus*) and mosses

An isolated area of lodgepole pine/blueberry/forb wetland is found in a depression southeast of Four O'Clock Lake It covers about 5 acres (2 ha) and appears to be seasonally ponded Lodgepole pine is a topo-climac here due to the wet soil and concave landform The growth of the lodgepole is somewhat stunted with trees averaging 80 feet (24 m) in height and 8 inches (20 cm) d b.h. Basal area averages 90 feet^2 per acre (21 m^2 per ha) Regeneration is predominately lodgepole Large western white pine are found on the edges of the area. Dominant understory species are big huckleberry, grouseberry (*Vaccinium scoparium*), western bog blueberry (*Vaccinium occidentale*), and bearberry honeysuckle (*Lonicera involucrata*) The ground cover is primarily mosses with a few fescue (*Festuca* species) and cinquefoil (*Potentialla* species)

Engelmann spruce bottomlands surround the three smaller lakes in the RNA Engelmann spruce is present as mature trees in the overstory Some of the largest individuals occur around Hortense Lake, up to 40 inches (102 cm) in diameter and 130 feet (40 m) in height Occurrence of other tree species is the same as in the surrounding mixed conifer community Spruce comprises approximately ten percent of the stand of lodgepole pine, Douglas fir, some mountain hemlock and western white pine, and occasional ponderosa pine The spruce appears to be a seral species as little regeneration is found. Dominant understory species are big huckleberry, starry solomon-plume, western solomonplume (*Smilacina racemosa*), and western twinflower (*Linnaea borealis*)

[6]Leonard A Volland, *Plant Associations of the Central Oregon Pumice Zone*, USDA Forest Service, Pacific Northwest Region, Portland, Oregon, September, 1982, R6-Ecol-104-1982, 122 pages

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The Engelmann spruce bottomlands community is represented in a very narrow zone immediately around the lakes There is very little differentiation between this community and the surrounding mixed-conifer community except for the presence of the spruce The spruce community is not found around Torso Lake. In that mesic region of the RNA Engelmann spruce is a common component of the old-growth mixed-conifer forest and no change in vegetation occurs at Torso Lake

The mixed-conifer/snowberry/forb community has great variation within the RNA. In the most mesic northeast portion of the RNA this community is dominated by old-growth forest composed of Douglas fir, mountain hemlock, Engelmann spruce, western white pine, and ponderosa pine with understory species of Pacific silver fir and white fir In this area southeast of Torso Lake Pacific silver fir is the climatic climax. The canopy is about 160 feet (49 m) above ground and stems average between 24 and 40 inches (61 to 102 cm) d b h Douglas fir up to 60 inches (152 cm) in diameter are common Pacific silver fir averages 80 feet (24 m) tall and 10 inches (25 cm) in diameter. White fir is represented as sparse regeneration only Few lodgepole pine are present in this area Total basal area approaches 260 feet^2 per acre (61 m^2 per ha) The herbaceous layer is scanty with dominants of big huckleberry, starry solomon-plume and queen's cup (*Clintonia uniflora*). On another site 1/4 mile (4 km) to the southwest Pacific silver fir is absent, Douglas fir is dominant, white fir more common and occasional old-growth ponderosa pine is present. The forb component becomes much richer with additions of sidebells pyrola (*Pyrola secunda*), white trillium (*Trillium ovatum*), wild ginger (*Asarum caudatum*) and others West of Four O'Clock Lake mountain hemlock is dominant and lodgepole pine begins to appear On more xeric sites further west substantial increase in basal area of lodgepole pine and white fir is noted In most of these drier microclimates the tree species exist as pole stands Total basal areas are as low as 120 feet^2 per acre (30 m^2 per ha). Common within all the variations of the mixed conifer community are scattered old-growth Douglas fir up to 60 inches (152 cm) in diameter, large western white pine, all ages of mountain hemlock and beargrass and braken fern Another variation of this community is situated on the rocky ridge centered between the three smaller lakes Pole-size Douglas fir, lodgepole pine, white fir, and mountain hemlock are present on top of the ridge Shrubby species are mountain juniper, green-leaf manzanita (*Arctostaphylos patula*), pinemat manzanita (*Arctostaphylos nevadensis*), golden chinquapin (*Castanopsis chrysophylla*), myrtle pachistima (*Pachistima myrsinites*), and gland ocean-spray (*Holodiscus dumosus*). Shrubs dominate the understory and forbs are represented by Aster species, and cliff penstemon (*Penstemon rupicola*) Pinegrass (*Calamagrostis rubencens*), long-stolon sedge (*Carex pensylvanica*) and beargrass are common ground cover

The lodgepole pine/beargrass community dominates the western half of the RNA Trees average 90 feet (27 m) in height and 10 inches 25 cm) d b.h. Regeneration is white fir and mountain hemlock Understory dominants are big huckleberry, grouseberry, beargrass, and pinegrass Total basal area for all tree species averages 140 feet^2 per acre (33 m^2 per ha) Mountain hemlock is highly visible in this portion of the RNA Mature hemlock with varying amounts of regeneration is scattered throughout the community Its occurrence ranges from near zero to sites where it is dominant over lodgepole Lodgepole is the major seral species and white fir the climatic climax The presence of mountain hemlock east of the Cascades has been interpreted as an indicator of the sub-alpine *Abies lasiocarpa* Zone but is known to occur only in the northern Cascades of Washington and in the Wallowa Mountains of northeastern Oregon Many similarities exist between the vegetation of Cache Mountain RNA and that of the *Tsuga mertensiana* Zone of western Oregon and the Cascade crest as discussed earlier Mountain hemlock within the RNA appears to be a disjunct stand from the *Tsuga mertensiana* Zone However, in this case mountain hemlock appears to be a climax in this area

Additional communities in the RNA not cataloged by Volland include the aquatic communities of the four lakes and the narrow riparian zone around each lake. The lakes are clear, cold, and oligotrophic. Estimated maximum depth is 30 feet (9 m). Yellow pond lily is the only vascular plant in evidence The riparian zone is shrub dominated

and varies in width from lake to lake At its maximum it is approximately 20 feet (6 m) wide. Birch (*Betula* species) and big huckleberry dominate the shrub layer in which Scouler willow (*Salix* scouleriana) and Menzies' spirea (*Spirea douglasii* var. *menziesii*) also occur. The herbaceous layer is dominated by starry solomon-plume, western solomon-plume and western twinflower.

Cache Mountain Research Natural Area falls within Kuchler's[7].

It is also included in the SAF Cover Type [8]

[7]A W Kuchler, *Potential Natural Vegetation of the Conterminous United States*, American Geographical Society, Special Publication Number 36, illustrated

[8]Society of American Foresters, *Forest Cover Types of North America*, Exclusive of Mexicol, Society of American Foresters, Washington, D C , 1954, 67 pages, illustrated

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ESTABLISHMENT REPORT FOR THE PROPOSED CACHE MOUNTAIN RESEARCH NATURAL AREA

Table 1, PARTIAL LIST OF VASCULAR PLANTS OF CACHE MOUNTAIN RESEARCH NATURAL AREA

	Scientific Name	Common Name
TREES	Abies amabilis	Pacific silver fir
	Abies concolor	white fir
	Picea engelmannii	Engelmann spruce
	Pinus contorta	lodgepole pine
	Pinus monticola	western white pine
	Pinus ponderosa	ponderosa pine
	Pseudotsuga menziesii	Douglas fir
	Tsuga mertensiana	mountain hemlock
SHRUBS	Acer circinatum	vine maple
	Amelanchier alnifolia	western serviceberry
	Arctostaphylos nevadensis	pinemat manzanita
	Arctostaphylos patula	green-leaf manzanita
	Berberis repens	creeping oregongrape
	Betula species	birch species
	Castanopsis chrysophylla	golden chinquapin
	Holodiscus dumosus	gland ocean-spray
	Juniperus communis	mountain juniper
	Lonicera involucrata	bearberry honeysuckle
	Pachistima myrsinites	mountain lover
	Ribes lacustre	prickly currant
	Ribes viscosissimum	sticky currant
	Rosa gymnocarpa	baldhip rose
	Rubus parviflorus	thimbleberry
	Rubus ursinus	Pacific blackberry
	Salix scouleriana	Scouler willow
	Sambucus cerulea	blue elderberry
	Symphoricarpos albus	common snowberry
	Vaccinium membranaceum	big huckleberry
	Vaccinium occidentale	western bog blueberry
	Vaccinium scoparium	grouseberry
GRASSES	Calamagrostic rubescens	pinegrass
	Deschampsia cespitosa	tufted hairgrass
	Festuca species	fescue species
	Sitanion hystrix	bottlebrush squirreltail
	Stipa occidentalis	western needlegrass
SEDGES AND RUSHES	Carex nigricans	black alpine sedge
	Carex pensylvanica	long-stolon sedge
	Carex rostrata	beakes sedge
	Juncus balticus	Baltic sedge

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ESTABLISHMENT REPORT FOR THE PROPOSED CACHE MOUNTAIN RESEARCH NATURAL AREA

Table 1, PARTIAL LIST OF VASCULAR PLANTS OF CACHE MOUNTAIN RESEARCH NATURAL AREA (continued)

	Scientific Name	Common Name
FORBS	Achillea millefolium	western yarrow
	Anaphalis margaritacea	pearly-everlasting
	Anemone deltoidea	threeleaf anemone
	Aquilegia formosa	red columbine
	Arabis species	rockcress species
	Asarum caudatum	wild ginger
	Aster subspisatus	Douglas' aster
	Chimaphila menziesii	little prince's-pine
	Chimaphila umbellata	prince's-pine
	Cirsium vulgare	common thistle
	Clintonia uniflora	queen's cup
	Fragaria vesca	woods strawberry
	Fragaria virginiana	broadpetal strawberry
	Galium aparine	cleavers
	Gilia aggregata	scarlet gilia
	Goodyera oblongifolia	western rattlesnake-plantain
	Hieraceum albiflorum	white hawkweed
	Hypopitys monotropa	fringed pinesap
	Lilium columbianum	tiger lily
	Linnaea borealis	western twinflower
	Lupinus wyethii	Wyeth's lupine
	Mimulus species	monkey-flower species
	Montia parvifolia	streambank spring beauty
	Nuphar polysepalum	Indian pond lily
	Osmorhiza chilensis	mountain sweet-cicely
	Pedicularis racemosa	leafy lousewort
	Penstemmon cinicola	ash penstemmon
	Penstemmon montanus montanus	mountain beardtongue
	Penstemmon rupicola	cliff penstemmon
	Phacelia hastata	white-leaf phacelia
	Potentialla species	cinquefoil species
	Pteridium aquilinum	braken fern
	Pyrola secunda	sidebells pyrola
	Smilacina racemosa	western solomon-plume
	Smilacina stellata	starry solomon-plume
	Solidage species	goldenrod species
	Tiarella trifoliata	coolwort foamflower
	Trillium ovatum	white trillium
	Viola species	violet species
	Xerophyllum tenax	beargrass

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ESTABLISHMENT REPORT FOR THE PROPOSED HEADWATERS OF THE CULTUS RIVER RESEARCH NATURAL AREA

Protection and Management

See direction in Forest Plan for Research Natural Areas.

TIMBER RESOURCES: Cache Mountain RNA.

The existing timber resources are best described as a composite of "stands." The 1978 stand mapping and classification project included all Proposed Research Natural Areas and is used as the basic description of Timber Resources.

Principal Distinguishing Features

The Headwaters of the Cultus River Research Natural Area (RNA) is a 250-acre (101 hectare (ha)) area located on the east slope of the Oregon Cascades. This part of Central Oregon is noted for extensive pumice deposits and numerous lava flows The central feature in the RNA is a series of large, perennial springs emerging from the base of Bench Mark Butte (Figure 2). The butte is composed of a broken lava flow with short steep pitches and draws, ending in a 150-foot (46 meter (m)) slope of blocky basalt. Old growth ponderosa pine (*Pinus ponderosa*)[1] with an understory of mixed conifers dominates the vegetation of the butte. The Cultus River emerges from the base of Bench Mark Butte approximately 50 feet (15 m) wide and 12 inches (30 centimeters (cm)) deep. It seldom reaches depths of over 2 feet (6 m) within the RNA. The river is clear, cold, and fast flowing. Several tributary streams also originate from the butte. Spawning populations of trout and kokanee utilize the river in the fall The portion of the RNA below the butte is a nearly flat, glaciated plain with well-drained, coarse-textured pumice soil.

Plant communities vary with distance from the River. Engelmann spruce (*Picea engelmanii*) is found in the river banks and grades into lodgepole pine (*Pinus contorta*) away from the river This is a moist lodgepole community with abundant understory and herbaceous layer. Furthest from the Cultus River the lodgepole stands are associated with scattered bitterbrush and scant ground cover. Prominent wildlife species include Roosevelt elk, mule deer, coyote, bobcat, bluegrouse, bald eagle, osprey, great blue heron, racoon, and otter (Table 3) Many smaller mammals are also present. The area is bounded on three sides by system roads and on the north by a primitive jeep trail Overall slope is less than 10 percent with a southerly aspect. Elevational limits are 4450 feet (1357 m) to 4700 feet (1434 m)

Justification

The Headwaters of the Cultus River RNA fills the need for a large, upwelling cold spring as identified by the Research Natural Area Needs Workshop in 1973.[2] Cultus River emerges from the base of a 150-foot high (46 m) toeslope of blocky basalt This slope is the terminus of the lava flow which forms Bench Mark Butte The river is nearly 50 feet (16 m) wide at its origin and about 12 inches (30 cm) deep. Along the base of the butte are several other springs which form tributary streams contributing to the river Two of these streams are seasonal and produce a variety of terrestrial and aquatic vegetation. These wet areas support an Engelmann spruce community with seral lodgepole pine and understory of white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), and mountain hemlock (*Tsuga mertensiana*) Numerous shrub species are present and forbs, sedges, and grasses are abundant.

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The slope of the Butte above the origin of the river supports a shrub dominant vegetation of bitterbrush (*Purshia tridentata*), green-leaf manzanita (*Arcotostaphylos patula*), snowbrush (*Ceanothus velutinus*), and gland ocean-spray (*Holodiscus dumosus*) The top of the butte has a varying topography of short benches and scattered drainages. Ponderosa pine dominates the overstory with some as large as 170 feet (52 m) in height and 50 inches (127 cm) in diameter Regeneration consists of Douglas fir, white fir, western hemlock, ponderosa pine, lodgepole pine, and Engelmann spruce Dominant understory species are prince's-pine (*Chimaphila umbellata*) and pinegrass (*Calama-grostis rubescens*). The butte has been selectively logged and many overgrown skid roads are evident. Old growth Douglas fir was the apparent object of the logging

[1]Common and scientific names follow Leo C Hichcock and Arthur Cronquist, *Flora of the Pacific Northwest*, University of Washington Press, Seattle, Washington, 1973, 730 pages, illustrated

[2]C T Dyrness, Jerry F Franklin, Chris Maser, Stanton A Cook, James D Hall, and Glenda Faxon, *Research Natural Area Needs in the Pacific Northwest*, Pacific Northwest Forest and Range Experiment Station, USDA Forest Service, Portland, Oregon, 1975, 231 pages

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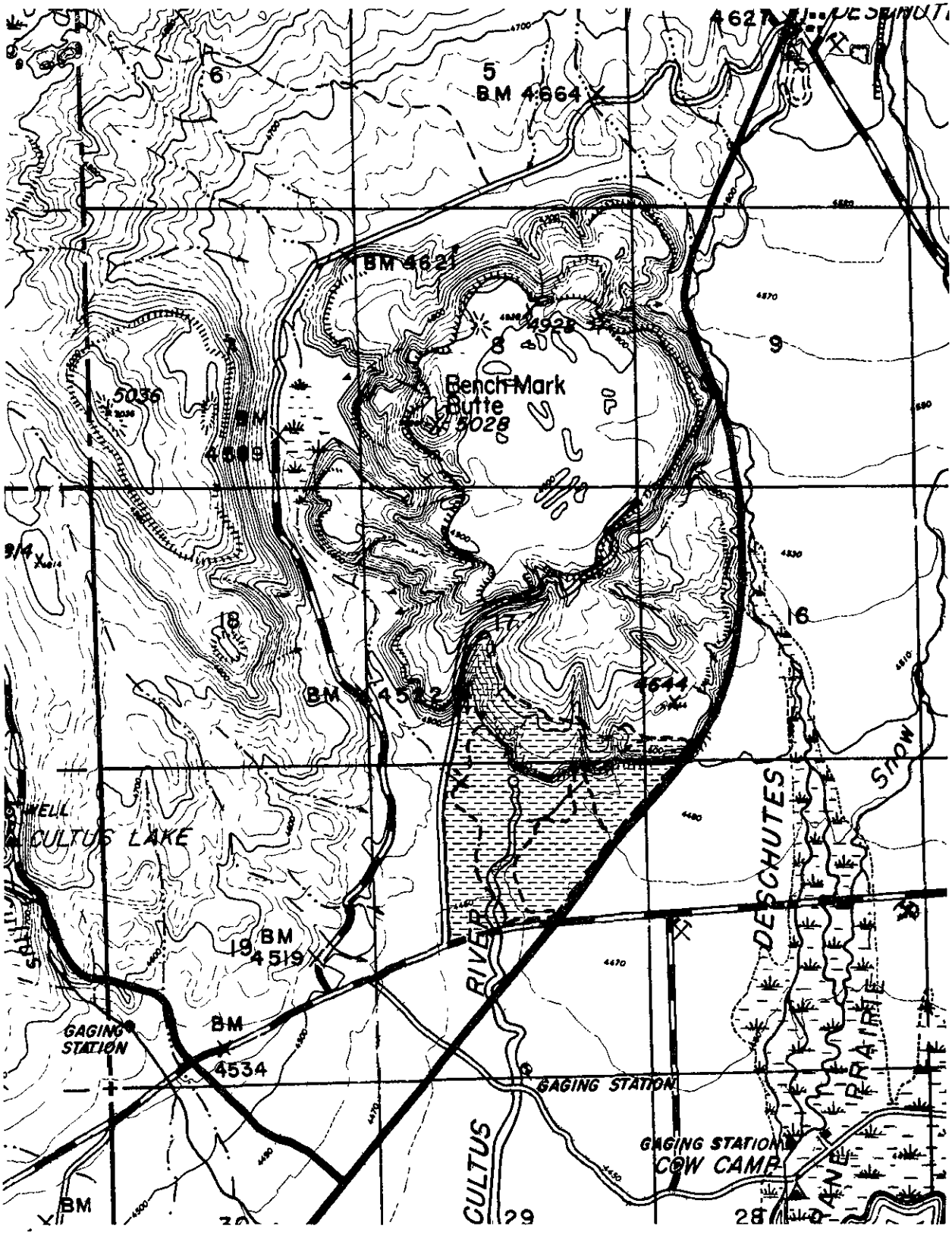
ESTABLISHMENT REPORT FOR THE PROPOSED HEADWATERS OF THE CULTUS RIVER RESEARCH NATURAL AREA



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As distance from the River increases, the Engelmann spruce grades into a moist lodgepole pine community with some large white fir. The understory is represented by regeneration of lodgepole, Engelmann spruce, Douglas fir, and western white pine (*Pinus monticola*) The shrub layer becomes less dense further from the river and grasses become more important This lodgepole community gradually becomes a dry lodgepole type with a scant ground layer of bitterbrush, squaw carpet (*Ceanothus prostratus*), grasses, and sedges The seasonally wet tributary streams support a variety of vegetation and represent several community types Each channel differs in the length of time water is present during the year These streams typify successional stages from stream to meadow to forest

The RNA is located in the midst of typical commercial forest land The proposed north, west, and southern boundaries border active timber sales and public cutting areas The RNA is bounded on the east by the heavily used Cascade Lakes Highway. There is some evidence of human impact, primarily along the west and southern limits of the RNA On the west boundary there are several fire pits and vehicle turnouts within the proposed area A few trees have been cut for firewood On the southern edge a graveled turnout exists on the west side of the river. There is also a game trail running north along the west side of the river which shows evidence of human use

The Headwaters of the Cultus River offers a prime example of large, upwelling cold springs The RNA also exhibits a wide range of habitats related to soil moisture, topography, and soil type Soil moisture is reflected by vegetation types ranging from aquatic to mixed conifer to lodgepole-bitterbrush Land types include a broken lava flow, basalt toeslope, open water, and pumice covered glacial plain. Soil types vary from exposed basalt to loamy sand The RNA provides an opportunity to study riparian vegetation communities and their relationship to upland dry sites Studies might include comparison of species and water table, topography, or soil parent material. Additional research could involve stream-meadow-forest succession Aquatic studies could also be done within the RNA, as well as various comparisons contrasting the butte and the river bottomlands

Location

The proposed Headwaters of the Cultus River Research Natural Area occupies approximately 250 acres (101 ha) in the Deschutes National Forest at North Latitude 43° 50', West Longitude 121° 46' The tract is located in Deschutes County, 29 air miles (46 kilometers (km)) southwest of Bend, Oregon The boundaries of the RNA are accessible by the Cascade Lakes Highway on the east, Forest Road 2022 on the south, and Forest Road 2022B on the west In addition, the north edge is bounded by a primitive jeep trail The interior of the RNA can be reached by foot and only primitive game trails exist at this time The RNA is located in Sections 17 and 20, of T 20 S , R 8 E , W M

To reach the Cultus River follow signs in Bend, Oregon, towards Century Drive and Bachelor Butte Century Drive becomes the Cascade Lakes Highway outside of the city limits Follow the Cascade Lakes Highway approximately 36 miles (58 km) past Elk Lake and the Lava Lakes In another 5 miles (8 km) the RNA will be on the right and a Forest Service sign for Road 2022 will follow. Turn right onto 2022 to travel the southern boundary of the Natural Area.

Community Types

The major influences on the forest composition within the RNA are soil type and soil moisture A sharp contrast exists between species found on the broken lava of the butte and species found on the glacial till below the butte. Community changes also occur below the Butte along a gradient based on distance from the river In addition, microhabitats exist on the edge of the lava flow forming Bench Mark Butte, and in the seasonally wet streams of the river Tree species in order of abundance below the butte are lodgepole pine, Engelmann spruce, ponderosa pine, white fir, Douglas fir, silver fir (*Abies amablis*), and western pine On top of the butte the order becomes ponderosa pine, lodgepole pine, Douglas fir, white fir, mountain hemlock, and Engelmann

spruce. Ecologically, the communities encountered in the RNA best fit into the *Abies grandis-Abies concolor* Zone of South-Central Oregon [3] This Zone is characterized by less extreme moisture and temperature regimes than other Eastern Oregon zones. It has generally higher precipitation and lower temperatures than lower forested zones and higher temperatures with less snow accumulation than sub-alpine zones. Soils generally exhibit minimal development. Lodgepole pine, ponderosa pine, and Douglas fir often dominate seral stands in the Zone. Engelmann spruce may be present in localized wet and frosty areas.

Four plant associations are represented in the RNA and may be roughly correlated to Volland's community types[4] as follows.

Unit	Plant Community	Location	Acreage
1	Engelmann spruce bottomlands, CW-C9-11	Nearest river and tributaries	90
2	Lodgepole/blueberry/forb wetland CL-M3-12	Moist areas near river	40
3	Lodgepole/bitterbrush/sedge CL-S2-12	Dry pumice flats furthest from river	40
4	Ponderosa/bitterbrush manzanita/needlegrass CP-S2-13	Top of Butte	80

Unit 1 is located along the river and near its tributary streams. The dominant tree species, Engelmann spruce, is associated with wet areas within the forests of Central Oregon Most of this community in the RNA occurs within 100 feet (31 m) of open water. All ages of spruce are present with an average basal area of 100 feet^2 per acre (23.3 m^2 per ha). The average size of the spruce approximates 70 feet (21 m) in height and 11 inches (28 cm) d.b h The largest have a diameter of 34 inches (86 cm) and are about 90 feet (27 m) tall. Many mature lodgepole pine are present in this unit along with regeneration under 20 feet (6 m). The mature lodgepole averages 100 feet (31 m) in height and 12 inches (31 cm) d b.h. A few lodgepole snags are also near the River The basal area of the lodgepole varies from near zero to 100 feet^2 per acre (23.3 m^2 per ha) among the spruce. The canopy within the unit is fairly open with about 60 percent cover A few dense spruce patches occur along riverbanks with a nearly closed canopy

White fir occurs in the understory reaching heights of 50 feet (15 m) and diameters of 5 inches (13 cm) Western twinflower (*Linnaea borealis*), black alpine sedge (*Carex nigricans*), and beaked sedge (*Carex rostrata*) dominate the ground cover A variety of low shrub species are included in this unit, but in no greater numbers The slope of the unit is near zero.

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Unit 2 appears not far from the river and its tributaries where the water table is shallow year-round Lodgepole pine is the dominant tree species and is present as a two-aged stand Mature trees average 100 feet (31 m) in height and 8 inches (20 cm) in diameter with dense regeneration about 20 feet (6 m) tall. The largest lodgepole reach 120 feet (37 m) in height and d.b.h. of 14 inches (36 cm). Average basal area is 120 feet^2 per acre (28 m^2 per ha) The abundance of soil moisture within this unit creates a climax lodgepole forest with occasional pole sized white fir, and silver fir. Species present as regeneration include Douglas fir, mountain hemlock, Engelmann spruce, ponderosa pine, and western white pine. Common shrub species are pinemat manzanita (*Arctostaphylos nevadensis*), prince's-pine, and big huckleberry (*Vaccinium membranaceum*). Pinegrass dominates the ground cover and many species of forbs are present.

In Unit 3 the decrease in soil moisture becomes more obvious. Few tree species other than the climax lodgepole pine are found. Ponderosa pine and white fir saplings are rare. The lodgepole stand is two-aged and less dense than the Unit 2 with a basal area of 100 feet^2 per acre (23.3 m^2 per ha). The shrub layer is scattered on the dry pumice soil, with bitterbrush dominant Squaw carpet and pinemat manzanita are common shrubs, squaw currant (*Ribes cereum*) and snowbrush, occasional. Long stolon sedge (*Carex pensylvanica*) dominates the sparse ground cover. Several species of grasses are also present. Dominant forbs are broad-petal strawberry (*Fragaria virginiana*), prairie lupine (*Lupinus lepidus*), and American vetch (*Vicia americana*) Percent slope for both Units 2 and 3 are near zero

Unit 4 represents the ponderosa pine/bitterbrush-manzanita/needlegrass plant community of Bench Mark Butte Old growth ponderosa pine dominates the broken lavas for the butte. The largest individuals reach 170 feet (52 m) in height and 50 inches (127 cm) d.b.h Many are in the range of 160 feet (49 m) tall with diameters of 30 inches (76 cm). Most of these bear deep fire scars Other tree species are present only as regeneration including Douglas fir, lodgepole pine, white fir, Engelmann spruce, and mountain hemlock There is also a small amount of ponderosa pine regrowth It appears from the size and number of Douglas fir stumps on the butte, that Douglas fir may have been codominant with ponderosa pine before the area was logged Stumps are as large as 60 inches (152 cm) in diameter Based on reproductive success ponderosa pine and Douglas fir are seral species with white fir the climax species Total basal area for all tree species approximates 120 feet^2 per acre (28 m^2 per ha). In the shrub layer bitterbrush and green-leaf manzanita are present in generally equal amounts and there is a scattering of snowbrush Lower shrubs such as prince's-pine, squaw carpet, and grouse huckleberry (*Vaccinium scoparium*) are most prevalent On the overgrown skid roads greenleaf and pinemat manzanita are most common. Pinegrass and long stolon sedge dominate many areas of the herbaceous layer Common forbs include broadpetal strawberry, fireweed (*Epilobium angustifolium*), ash penstemmon (*Penstemon cinicola*) and white-flowered hawkweed (*Hieraceum albiflorum*)

The Headwaters of the Cultus River Research Natural Area falls within Kuchler's [5]

It is also included in the SAF Cover Type [6]

[3]Jerry F Franklin and C T Dyrness, *Natural Vegetation of Oregon and Washington*, U S Government Printing Office, Washington, D C , 1973, 417 pages, illustrated

[4]Leonard A Volland, *Plant Associations of the Central Oregon Pumice Zone*, USDA Forest Service, Pacific Northwest Region, Portland, Oregon September, 1982 R6-Ecol-104-1982, 122 pages

[5]A W Kuchler, *Potential Natural Vegetation of the Conterminous United States*, American Geographical Society, Special Publication Number 36, 1964, illustrated

[6]Society of American Foresters, *Forest Cover Types of North America, Exclusive of Mexico*, Society of American Foresters, Washington, D C , 1954, 67 pages, illustrated

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Physical and Climatic Conditions

The RNA is composed of two major topographic types. Bench Mark Butte is an old lava flow composed of a series of benches with numerous rock outcroppings and steep drainages The rough broken lavas support a stony, shallow soil which is readily permeable. The overall slope of the butte is less than 10 percent with a southerly aspect. The terminus of the butte is a 50 percent slope of sparsely vegetated blocky basalt The Cultus River emerges at the base of the 150 foot (46 m) slope from under the large basalt stones

The area below the butte is a flat, glaciated plain covered with a fine pumice soil. Elevation is approximately 4450 feet (1357 m) near the river and 4700 feet (1434 m) at the highest point on the butte within the RNA

The climate of Central Oregon is typified by cold winters, hot summers, a short growing season, and low annual precipitation. Wide diurnal temperature fluctuations of 10° C. to 16° C are common The summers are very dry and a high proportion of annual precipitation falls as snow The nearest weather record is at Wickiup Dam, 11 miles (18 km) to the southeast of the Cultus River. The data in Table 2 is an average of the period from 1944 to 1978 at Wickiup Dam.

Table 1, PARTIAL LIST OF VASCULAR PLANTS OF HEADWATERS OF THE CULTUS RIVER RESEARCH NATURAL AREA

	Scientific Name	Common Name
TREES	Abies amablis	Silver fir
	Abies concolor	White fir
	Picea engelmannii	Engelmann spruce
	Pinus contorta	Lodgepole pine
	Pinus monticola	Western white pine
	Pinus ponderosa	Ponderosa pine
	Pseudotsuga menziesii	Douglas fir
	Tsuga mertensiana	mountain hemlock

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Table 1, PARTIAL LIST OF VASCULAR PLANTS OF HEADWATERS OF THE CULTUS RIVER RESEARCH NATURAL AREA (continued)

	Scientific Name	Common Name
SHRUBS	Amelanchier alnifolia	Western serviceberry
	Arctostaphylos nevadensis	Pinemat manzanita
	Arctostaphylos patula	Green-leaf manzanita
	Castanopsis chrysophylla	Golden chinquapin
	Ceanothus prostratus	Squaw carpet
	Ceanothus velutinus	Snowbrush
	Chimaphila umbellata	Prince's-pine
	Chrysothamnus viscidiflorus	Green rabbit-brush
	Cornus canadensis	Bunchberry
	Holodiscus dumosus	Gland ocean-spray
	Lonicera involucrata	Bearberry honeysuckle
	Pachistima myrsinites	myrtle pachistima
	Purshia tridentata	Bitterbrush
	Ribes cereum	Squaw currant
	Rosa woodsii	Pearhip rose
	Spirea betulifolia	Shiny-leaf spirea
	Symphoricarpos spp.	Snowberry species
	Vaccinium membranaceum	Big huckleberry
	Vaccinium scoparium	Grouse huckleberry
GRASSES	Calamagrostis rubescens	Pinegrass
	Elymus canadensis	Canada wildrye
	Festuca occidentalis	Western fescue
	Melica subulata	Alaska oniongrass
	Sitanion hystrix	Bottlebrush squirreltail
	Stipa occidentalis	Western needlegrass
	Trisetum canescens	Tall trisetum
SEDGES AND RUSHES	Carex nigricans	Black alpine sedge
	Carex pensylvanica	Long stolon sedge
	Carex rostrata	Beaked sedge
	Juncus balticus	Baltic rush

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Table 1, PARTIAL LIST OF VASCULAR PLANTS OF HEADWATERS OF THE CULTUS RIVER RESEARCH NATURAL AREA (continued)

	Scientific Name	Common Name
FORBS	Achillea millefolium	Western yarrow
	Aconitum columbianum	Columbian monkshood
	Agoseris glauca	Pale agoseris
	Anemone lyallii	Lyall's anemone
	Antennaria microphylla	Rosy pussy-toes
	Aquilegia formosa	Red columbine
	Calochortus eurycarpus	Wide-fruit mariposa
	Castelleja miniata	Scarlet paintbrush
	Cirsium spp.	Thistle species
	Clintonia uniflora	Queen's cup
	Epilobium angustifolium	Fireweed
	Epilobium glandulosum	Common willow-herb
	Equisetum palustre	Marsh horsetail
	Fragaria virginiana	Broadpetal strawberry
	Galium spp.	Bedstraw species
	Geum aleppicum	Yellow avens
	Habenaria sparsiflora	Canyon bog-orchid
	Hieraceum albiflorum	White-flowered hawkweed
	Hypericum formosum	Western St Jon's-wort
	Linnaea borealis	Western twinflower
	Lupinus lepidus	Prairie lupine
	Lupinus polyphyllus	Bigleaf lupine
	Mimulus guttatus	Yellow monkey-flower
	Mimulus primuloides	Primrose monkey-flower
	Pedicularis racemosa	Leafy lousewort
	Penstemmon cinicola	Ash penstemmon
	Polygonum bistortoides	American bistort
	Potentialla rivalis	Brook cinquefoil
	Prunella vulgaris	Self-heal
	Pterospora andromedea	Woodland pinedrops
	Pyrola secunda	Sidebells pyrola
	Rununculus spp.	Buttercup species
	Sidalcea spp.	Checker-mallow species
	Sisyrinchium spp.	Sisrinchium species
	Smilacina stellata	Starry solomon-plume
	Spraguea umbellata	Umbellate pussypaws
	Trifolium longipes	Long-stalked clover
	Veratrum californicum	California false hellebore
	Veronica americana	American brooktime
	Vicia americana	American vetch
	Viola nuttallii	Nuttall violet

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Table 2, AVERAGE TEMPERATURE AND PRECIPITATION AT WICKIUP DAM BASED ON AVERAGE YEARS 1944 TO 1978

	Temperature		Precipitation	
	°F	°C	Inches	mm
Average Annual	42 7	5.9	20.49	5,204
Average January	25.8	-3 4		
Average July	60.9	15.9		
Average June-August			0.77	196

TIMBER RESOURCES: Cultus River RNA.

The existing timber resources are best described as a composite of "stands" The 1978 stand mapping and classification project included all Proposed Natural Areas and is used as the basic description of Timber Resources.

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ESTABLISHMENT REPORT FOR THE PROPOSED KATSUK BUTTE RESEARCH NATURAL AREA

Principal Distinguishing Features

Katsuk Butte Research Natural Area (RNA) involves approximately 950 acres (385 hectares (ha)) of subalpine terrain 3 miles (4.8 kilometers (km)) east of the crest of the Oregon Cascades (Figure 3). The RNA is located 5 miles (8 km) south of the Three Sisters peaks It is bounded on the north by Devils Lake and the Cascade Lakes Highway, and on the east by Sparks Lake. This is an area formed by numerous lava flows, pumice, ash, and cinder deposits Glaciation has left many shallow lakes in broad valleys The majority of the proposed RNA is occupied by two cinder cones, Talapus Butte and Katsuk Butte Both cones are over 6000 feet (1830 meters (m)) in elevation at their summits. The buttes are steep sided and nearly symmetrical with central craters and slopes composed of cinders, pumice, and ash. Included within the RNA are the two cinder cones, three craters, lava flows, and a small pond with sphagnum moss (*Sphagnum* species) on its shores. The forest is dominated by mountain hemlock (*Tsuga mertensiana*)[1] throughout most of the RNA. Lodgepole pine (*Pinus contorta*) dominates in small areas on the rims and in the craters of the cones, and on the south side of Katsuk Butte Subalpine fir (*Abies lasiocarpa*) is common in every part of the RNA Other coniferous species are present in minor amounts. Natural regeneration of tree species is sparse. The herbaceous layer is simple, and almost totally lacking as the canopy closes. Soils are pumiceous loamy sands, often very shallow. Slopes range from near zero in the craters to 80 percent on the sides of the cinder cones. Elevational limits are 5280 feet (1610 m) to 6165 feet (1880 m) The area is summer range for mule deer.

Justification

Katsuk Butte RNA fills the need for a high elevation, undisturbed, entirely forested cinder cone This is a high priority need identified by the Research Natural Area Needs Workshop[2] in 1973 Katsuk Butte RNA is occupied by two large cinder cones, Talapus Butte to the north and Katsuk Butte to the south. The base of the cones are at an average elevation of 5600 feet (1708 m) The summit of Talapus Butte is 6158 feet (1878 m) in elevation The highest point on Katsuk Butte is at 6165 feet (1880 m). The cinder cones occupy an approximate total area of 575 acres (773 ha). They are pre-Mazama, more than 10,000 years old. The sides of the cones have an average 50 percent slope and are entirely forested. Each of the buttes has a central crater about 2 acres (8 ha) in size The walls of the craters are steep, up to 80 percent slope. Talapus Butte's crater has several rock cliffs and is about 200 feet (61 m) deep. Katsuk Butte's crater is smooth walled and has a depth of about 150 feet (46 m). The floor and walls of both are covered with cinders, pumice, and ash The vegetation of the craters is dominated by sedges and grasses Lodgepole pine is the only tree species which can survive in the extreme soils and microclimate of the craters A sharp contrast in vegetation can be seen in both craters result of lingering snowpack on the eastern half An imaginary line running northeast to the southwest would divide the vegetation Brewer's sedge (*Carex breweri*) dominates the ground layer in the east half of Hall's sedge (*Carex halliana*) the west half of the craters. Lodgepole pine is more abundant and somewhat larger on the northwest side of the craters.

[1]Common and scientific nomenclature follows Leo C Hitchcock and Arthur Cronquist, *Flora of the Pacific Northwest*, University of Washington Press, Seattle, Washington, 1973, 730 pages, illustrated

[2]C T Dyrness, Jerry F Franklin, Chris Maser, Stanton A Cook, James D Hall, and Glenda Faxon, *Research Natural Area Needs in the Pacific Northwest*, Pacific Northwest Forest and Range Experiment Station, USDA Forest Service, Portland, Oregon, 1975, 231 pages

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Climax lodgepole pine communities occur on sites with extremely immature or shallow soils. These stands are found on the rims and in the craters of the buttes, and on major lava flows Seral lodgepole stands are present in areas of recent crown fire or soil disturbance. The mountain hemlock community occupies the remaining forested portions of the RNA. In much of this community there is very little understory. Mountain hemlock is dominant with subalpine fir (*Abies lasiocarpa*) the next most common tree species. Lodgepole pine, whitebark pine (*Pinus albicaulis*), ponderosa pine (*Pinus ponderosa*), western white pine (*Pinus monticola*), white fir (*Abies concolor*)[3], and Pacific silver fir (*Abies amablis*) are present in minor amounts. The ground layer is scanty Common species include grouse huckleberry (*Vaccinium scoparium*), sticky currant (*Ribes viscosissimum*), long-stolon sedge (*Carex pensylvanica*), smooth woodrush (*Luzula hitchcockii*), sidebells pyrola (*Pyrola secunda*), woodland bread-tongue (*Nothochelone nemorosa*) and white hawkweed (*Hieracium albiflorum*).

[3]Grand fir (*Abies grandis*) and white fir (*Abies concolor*) form a continuously varying biological complex in eastern Oregon Throughout this report the complex will be referred to as white fir (*Abies concolor*)

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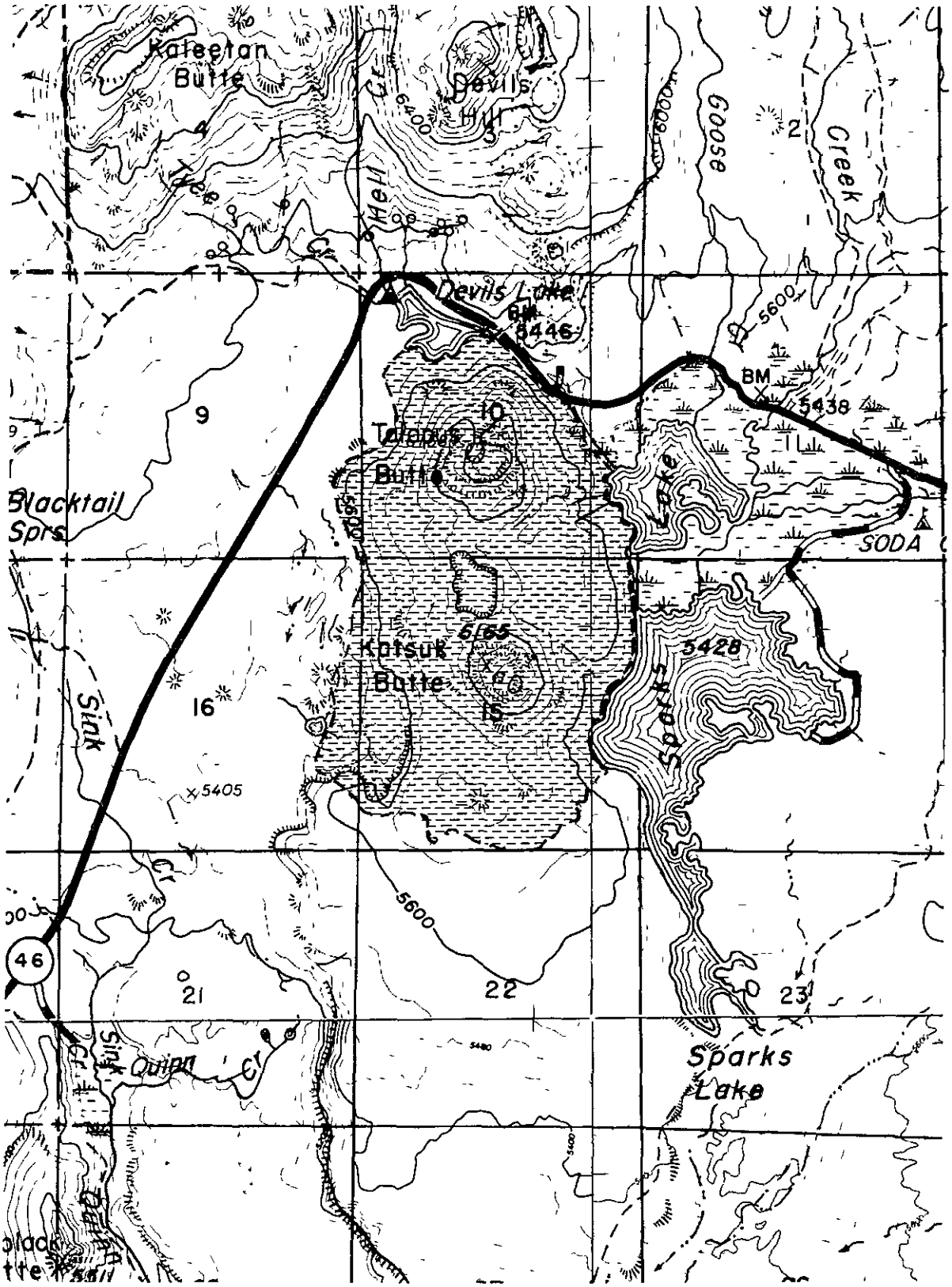

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The portion of the RNA surrounding the cinder cones is composed of lava flows overlain with cinders, pumice, and ash. These lava flows, as well as the cinder cones, originate from a buried fissure which runs the length of the RNA from north to south. The third crater within the RNA is a pit crater located midway between the two buttes. This is believed to be an area in which molten rock drained out from under a hardened crust, leaving a depression Steep walls in several parts of the crater and a central domelike hill of lava are indicators of this origin Many minor and a few major rock outcroppings within the Katsuk Butte RNA are evidence of the lava flows. The largest exposed lava flow is located southwest of Katsuk Butte. The exposed portion is approximately 1/4 mile (.4 km) long, 1/8 mile (.2 km) wide, and 100 to 200 feet (31 to 61 m) thick. The entire RNA has been covered by ash and pumice from several sources. Talapus Butte and Katsuk Butte could have contributed to the deposits over 10,000 years ago. Mazama ash from 7000 years ago is known to cover the area. The lava outcrops, cindered slopes, and pumice areas all add to the diversity of the proposed RNA

A small pond less than 1 acre (3 ha) in size adds another landform and community type to the RNA. The pond supports several aquatic plant species including bogbean (Menyanthes trifoliata), Indian pond lily (*Nuphar polysepalum*), and broad-leaved pondweed (*Potamogeton natans*). The area around the pond averaging 6 feet (1.8 m) wide is nonforested. Sphagnum moss and black alpine sedge (*Carex nigricans*) dominate the shore vegetation.

Katsuk Butte RNA is surrounded by popular recreational land. The heavily used Cascade Lakes Highway runs within a few feet to 1 mile (1.6 km) of the boundaries of the RNA. Both Devils Lake and Sparks Lake, bounding the RNA on the north and east, attract outdoor enthusiasts.

Many hiking trails originate from the Cascade Lakes Highway. At this time the only disturbance to the RNA is the maintained trail around the south end of Devils Lake forming the northern boundary, and possible grazing by domestic livestock near the pond.

The Katsuk Butte Research Natural Area would provide an outstanding geological study area Research possibilities related to vulcanism are abundant The variety of surface soils from cinders and pumice to sandy loam to exposed lava represented in the RNA suggests soil and plant community studies The craters and rims of the buttes present opportunities for research on extreme soils and in severe microhabitats The area would provide substantial acreage of sub-alpine mountain hemlock community.

Location

The proposed Katsuk Butte RNA occupies approximately 950 acres (385 ha) in the Deschutes National Forest, Bend Ranger District It is located at North Latitude 44° 02' and West Longitude 121° 44' The tract is in Deschutes County, 21 air miles (33 6 km) west of Bend, Oregon. The RNA involves portions of Sections 9, 10, 15, and 16, T 18 S , R 8 E., W M

To reach the RNA follow signs west out of Bend, Oregon towards Century Drive and Bachelor Butte Six miles (9.6 km) west of Bend, Century Drive becomes the Cascade Lakes Highway. In 22 additional miles (35.4 km) turn left into Devils Lake Campground and park. The trail around the south end of Devils Lake is accessible from the parking lot Follow the trail to the northern boundary of the RNA in about one-fourth mile (4 km). All access to the interior is by foot The majority of the terrain is quite steep

Community Types

Plant communities within the RNA reflect changes in the volcanic soils, slope aspect, and fire history Surface soils include saturated peaty-loam around the pond to the sandy loams of the mountain hemlock community, exposed lava flows supporting lodgepole pine and shrub communities, and cinder and pumice dominated by lodgepole, sedges, or forbs Mountain hemlock dominates throughout most of the RNA

Lodgepole pine is prevalent in areas of recent fire, immature soils, and steep south slopes Subalpine fir and western white pine of all ages

are common. Ponderosa pine and whitebark pine are present on rocky summits, mainly as old growth. Mountain hemlock regeneration is on all sites except some dominated by lodgepole pine. Mountain hemlock is the major climax species Lodgepole pine occurs as topoclimax, fire climax, and a subordinate seral species Ecologically, the communities encountered in the Katsuk Butte RNA best fit into the *Tsuga mertensiana* Zone[4] of the crest of the Oregon Cascades This zone is characterized by old growth mountain hemlock forests with seral lodgepole pine and subalpine fir. Understories are often depauperate or dominated by grouseberry.

Four plant communities have been identified in the RNA Two may be correlated to Volland's[5] plant communities as follows

Unit	Plant Community	Location	Acreage
1	Lodgepole pine/grouse huckleberry CL-S4-12	Rims, craters, larger lava flows, south slope Katsuk Butte, old burns	75 (30 ha)
2	Mountain hemlock/grouse huckleberry CM-S1-11	Remaining forested area	875 (354 ha)

The largest representation of the lodgepole/grouse huckleberry community is found on the south slope of Katsuk Butte. The butte has an average slope of 40 percent within this community. Lodgepole pine is the dominant tree species and is presently primarily as old growth This situation appears to be a result of the coarse soil, dry southern exposure and frequent fires. Subalpine fir and mountain hemlock are seen as all ages. The shrub layer is composed of squaw currant (*Ribes cereum*), sticky currant, and green-leaf manzanita (*Arctostaphylos patula*). Rabbitbrush goldenweed (*Haplopappus bloomeri*), silvery lupine (*Lupinus argenteus*), American vetch (*Vicia americana*), pearly-everlasting (Anaphalis *margaritacea*), western needlegrass (*Stipa occidentalis*), and bottlebrush squirreltail (*Sitanion hystrix*) are common in the ground layer.

[4]Jerry F Franklin and C T Dyrness, *Natural Vegetation of Oregon and Washington*, U S Government Printing Office, Washington, D C , 1973, 417 pages, illustrated

[5]Leonard A Volland, *Plant Associations of the Central Oregon Pumice Zone*, USDA Forest Service, Pacific Northwest Region, Portland, Oregon, September, 1982 R6-Ecol-104-1982, 122 pages

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Total tree Basal area approximates 150 to 200 feet² per acre (35 to 47 m² per ha) with lodgepole pine averaging 100 feet² per acre (23 m² per ha). Stands are pole-sized. Regeneration is dominated by mountain hemlock and subalpine fir A variation of this community is observed on the lava flow to the southwest of Katsuk Butte. Vegetation is much the same as just described but is interspersed with areas much simpler botanically. In these small patches lodgepole clearly dominates the overstory. Both sticky currant and squaw currant are found in the scanty shrub layer. Silvery lupine is the sole herb. These areas appear to be immature, possibly recently burned and slow to recover. In other parts of the RNA the incidence of lodgepole may increase as a result of shallow undeveloped soils. These areas are found on the rims of both buttes and on pumice and cinders not included in the craters. The rim of Katsuk Butte exhibits lodgepole pine with dominantly lupine ground layers Generally, the rims support a variety of tree species and lodgepole pine may dominate small areas Whitebark pine and ponderosa pine are present in small amounts. Sedges, grasses, pinemat manzanita (*Arctostaphylos nevadensis*) and gland ocean-spray (*Holodiscus dumosus*) dominate the understory Other common species on the rims include rushes (*Juncus* species), rabbitbrush goldenweed, and greenleaf manzanita The three craters within the RNA produce a topoclimax of lodgepole pine as a result of the coarse, immature soils and extreme cold microclimates. The pit crater in the center of the RNA is about 100 feet (31 m) deep. The floor of the crater is covered with coarse pumice and cinders. All ages of lodgepole are present, averaging 30 feet (9 m) in height and 5 inches (13 cm) d b h [6] Rare mountain hemlock and subalpine fir are found as regeneration. There is no shrub layer Parry's rush (*Juncus parryi*) and Brewer's sedge dominate the ground layer. The craters of Talapus and Katsuk Buttes are very similar to each other. They are quite deep and steep sides so that the southeast halves are shaded much of the time This results in that half of the craters having a noticeably more severe microclimate There is a clear division of plant species between the east and west portions of the craters. Brewer's sedge dominates the eastern half and Hall's sedge the west half of each crater Fescue (*Festuca* species) and pussy-toes (*Antennaria* species) individuals are in greater numbers on the east side Few species of trees are found in the craters Lodgepole is clearly dominant, occurring as scattered, stunted individuals Stems are noticeably smaller and fewer in the eastern halves of the craters

The mountain hemlock/grouse huckleberry community occupies the remaining forested portion of the RNA There is considerable variety within this plant community. Nearly pure stands of mountain hemlock are seen on the north slope of Talapus Butte. Soils are shallow and rocky Slope averages 50 percent Basal areas average 240 feet² per acre (56 m² per ha) for mountain hemlock, 20 feet² per acre (7 m² per ha) for both lodgepole pine and subalpine fir. Stems average 70 feet (21 m) in height and 8 inches (20 cm) in diameter for mountain hemlock, 80 feet (24 m) and 10 inches (25 cm) for lodgepole pine and 60 feet (18 m) and 8 inches (20 cm) d b h for subalpine fir Regeneration is dominated by hemlock and subalpine fir. A few small white fir and western white pine are present. Snow pressure has produced stems rather uniformly curved (pistol butt) at the bases. The snow depth in the RNA as reflected by the lichens on the tree trunks averages 15 feet. The understory in this community is depauperate, often dominated by grouse huckleberry. Areas occur in which there is no understory

As crown cover decreases understory increases. Some herbs found include woodland beard-tongue, sidebells pyrola (*Pyrola secunda*), western rattlesnake-plantain (*Goodyera oblongifolia*) and smooth woodrush (*Luzula hitchcockii*). The largest hemlock in the RNA reach 40 inches (102 cm) in diameter and 120 feet (37 m) in height Subalpine fir may be as large as 27 inches (69 cm) d b h and 120 feet (37 m) tall On coarser pumice soils

[6] d b h is an abbreviation of "diameter breast height" and is the diameter of the tree stem measured 54 inches (137 cm) above ground level

stems are smaller than on the north side of Talapus Butte Basal areas decrease to about 130 feet² per acre (30 m² per ha) for hemlock, 40 feet² per acre (9 m² per ha) for lodgepole, and less than 20 feet² per acre (5 m² per ha) for subalpine fir. Common but scant understory species are sticky currant and sidebells pyrola On the east slopes of Talapus Butte Pacific silver fir and white fir are common but still subordinate regeneration. On rocky outcrops within the hemlock community additional shrubs are found. Under the tree canopy bearberry honeysuckle (*Lonicera involucrata*), big huckleberry (*Vaccinium membranaceum*), and many lichens are seen. On cindered slopes on the north side of Talapus Butte trees are few and stunted. Hemlock dominates with several old whitebark pine and ponderosa pine The dominant shrub is pinemat manzanita. Dominant herbs are Davidson's penstemmon (*Penstemon davidsonii*) and creamy sedum (*Sedum oregonese*).

Other common species are gland ocean-spray and Newberry's fleeceflower (*Polygonum newberryi*). On lava outcrops within the hemlock community some new species are found These include the rock-brake fern (*Cryptogramma crispa*), lace lip-fern (*Cheilanthes gracillima*), myrtle pachistima (*Pachistima myrsinites*) and mountain juniper (*Juniperus communis*). Large old ponderosa pine about 30 inches (76 cm) in diameter and 60 feet (18 m) tall are often found along the edges of the lava flows

The other two plant communities found in the Katsuk Butte RNA are associated with the small pond on the northeast boundary of the RNA. They are both nonforested communities which have not been described by Volland. The third plant community is the pond The pond is less than an acre (.4 ha) in size and is somewhat stagnant. Substantial amounts of bogbean, Indian pond lily and broad-leaved pondweed are present in the pond. The fourth plant community is similar to the *Carex-Sphagnum* community described by Campbell [7] This is a bog community and is found surrounding the pond. Sphagnum moss dominates the ground layer on the northwest edge of the pond. Black alpine sedge is the most common species on the rest of the shore Other common species include western bog blueberry (*Vaccinium occidentale*), western swamp laurel (*Kalmia occidentalis*), purple cinquefoil (*Potentilla palustris*), angelica (*Angelica species*), and slimstem reedgrass (*Calamagrostis neglecta*) This community averages 6 feet (2 m) wide and occupies an approximate total area of 1/10 acre (.04 ha) Hemlock and subalpine fir regeneration is encroaching from the surrounding mountain hemlock community.

Katsuk Butte Research Natural Area falls within Kuchler's[8]. It is also included in the SAF Cover Type[9].

Protection and Management

See direction in Forest Plan for Research Natural Areas

[7]Alcetta Gilbert Campbell, *Vegetative Ecology of Hunt's Cove, Mt Jefferson, Oregon*, 1973, 89 pages, illustrated (Unpublished MS thesis on file at OSU, Corvallis, Oregon)

[8]A W Kuchler, *Potential Natural Vegetation of the Conterminous United States*, American Geographical Society, Special Publication Number 36, illustrated

[9]Society of American Foresters, *Forest Cover Types of North America, Exclusive of Mexico*, Society of American Foresters, Washington, D C , 1954, 67 pages, illustrated

APPENDIX E
ESTABLISHMENT REPORT FOR THE PROPOSED KATSUK BUTTE RESEARCH NATURAL AREA

Table 1, PARTIAL LIST OF VASCULAR PLANTS OF KATSUK BUTTE RESEARCH NATURAL AREA

	Scientific Name	Common Name
TREES	Abies amablis	Pacific silver fir
	Abies concolor	white fir
	Abies lasiocarpa	subalpine fir
	Pinus albicaulis	white bark pine
	Pinus contorta	lodgepole pine
	Pinus monticola	western white pine
	Pinus ponderosa	ponderosa pine
	Tsuga mertensiana	mountain hemlock
SHRUBS	Arctostaphylos nevadensis	pinemat manzanita
	Arctostaphylos patula	green-leaf manzanita
	Chimaphila umbellata	prince's-pine
	Holodiscus dumosus	gland ocean-spray
	Kalmia occidentalis	western swamp laurel
	Lonicera involucrata	bearberry honeysuckle
	Pachistima myrsinites	mountain lover
	Ribes cereum	squaw currant
	Ribes viscosissimum	sticky currant
	Vaccinium membranaceum	big huckleberry
	Vaccinium occidentale	western bog blueberry
	Vaccinium scoparium	grouseberry
SEDGES AND RUSHES	Carex breweri	Brewer's sedge
	Carex halliana	Hall's sedge
	Carex nigricans	black alpine sedge
	Carex pensylvanica	long-stolon sedge
	Juncus parryi	Parry's rush
GRASSES	Calamagrostis neglecta	slimstem reedgrass
	Calamagrostis rubescens	pinegrass
	Danthonia intermedia	timber oatgrass
	Elymus cinereus	giant wildrye
	Fetuca species	fescue species
	Sitanion hystrix	bottlebrush squirreltail
	Stipa occidentalis	western needlegrass

APPENDIX E
ESTABLISHMENT REPORT FOR THE PROPOSED KATSUK BUTTE RESEARCH NATURAL AREA

Table 1, PARTIAL LIST OF VASCULAR PLANTS OF KATSUK BUTTE RESEARCH NATURAL AREA (continued)

	Scientific Name	Common Name
FORBS	Anaphalis margaritacea	pearly-everlasting
	Anemone drummondii	Drummond's anemone
	Angelica species	angelica species
	Antennaria microphylla	rosy pussy-toes
	Cheilanthes gracillima	lace lip-fern
	Circium species	thistle species
	Cryptogramma crispa	rock-brake
	Eriogonum species	buckwheat species
	Goodyera oblongifolia	western rattlesnake-plantain
	Haplopappus bloomeri	rabbitbrush goldenweed
	Hieraceum albiflorum	white hawkweed
	Hypopitys monotropa	fringed pinesap
	Lupinus wyethii	Wyeth's lupine
	Luzula hitchcockii	smooth woodrush

TIMBER RESOURCES: Katsuk Butte RNA.

The existing timber resources are best described as a composite of "stands." The 1978 stand mapping and classification project included all Proposed Research Natural Area's and is used as a basic description of Timber Resources.

APPENDIX E
ESTABLISHMENT REPORT FOR THE PROPOSED MOKST BUTTE RESEARCH NATURAL AREA

Principal Distinguishing Features

Mokst Butte Research Natural Area (RNA) occupies approximately 1,250 acres (506 hectares (ha)) in the central Oregon pumice plateau. This is an area of numerous small cinder cones, extensive pumice deposits, and young lava flows (Figure 4). The geology of the proposed RNA is perhaps its most outstanding feature. Three geologic time periods are represented in the RNA The oldest geologic feature is the unnamed cinder cone on the south boundary. The cinder cone is pre-Mazaman, more than 6,600 years old It is about 400 feet (122 meters (m)) high and occupies about 90 acres (37 ha). The cone and the area immediately to its west are covered with about 2 feet (6 m) of Mazama ash from about 6,600 years ago The entire RNA was covered with Mazama ash but most has since been buried by more recent local ash and lava eruptions Two other smaller areas within the RNA also exhibit uncovered Mazama ash

Mokst Butte originated about 6,000 years ago and drastically altered the surrounding landscape During the first eruption the cone of Mokst Butte was formed and ash was carried by the wind to the northeast The cindery ash was deposited about 2 inches (5 centimeters (cm)) deep To the northwest of Mokst Butte a cinder and spatter rampart formed, aligned along a fissure The main Mokst Butte lava flow also occurred at this time It covers more than half the proposed RNA The second eruption built the cone higher Ash was again blown to the northeast and deposited on the earlier lava flow. A second, smaller eruption of lava also happened at this time It is located south and east of Mokst Butte and is free of ash or cinders. It is darker in color and has noticeably less vegetation than the abutting older flow Today Mokst Butte is an undisturbed, forested cinder cone. The cone rises about 450 feet (137 m) above the surrounding terrain to an elevation of 6162 feet (1879 m) at the summit. Prevailing southwesterly winds at the time of formation have resulted in a semi-circular shape to the butte.

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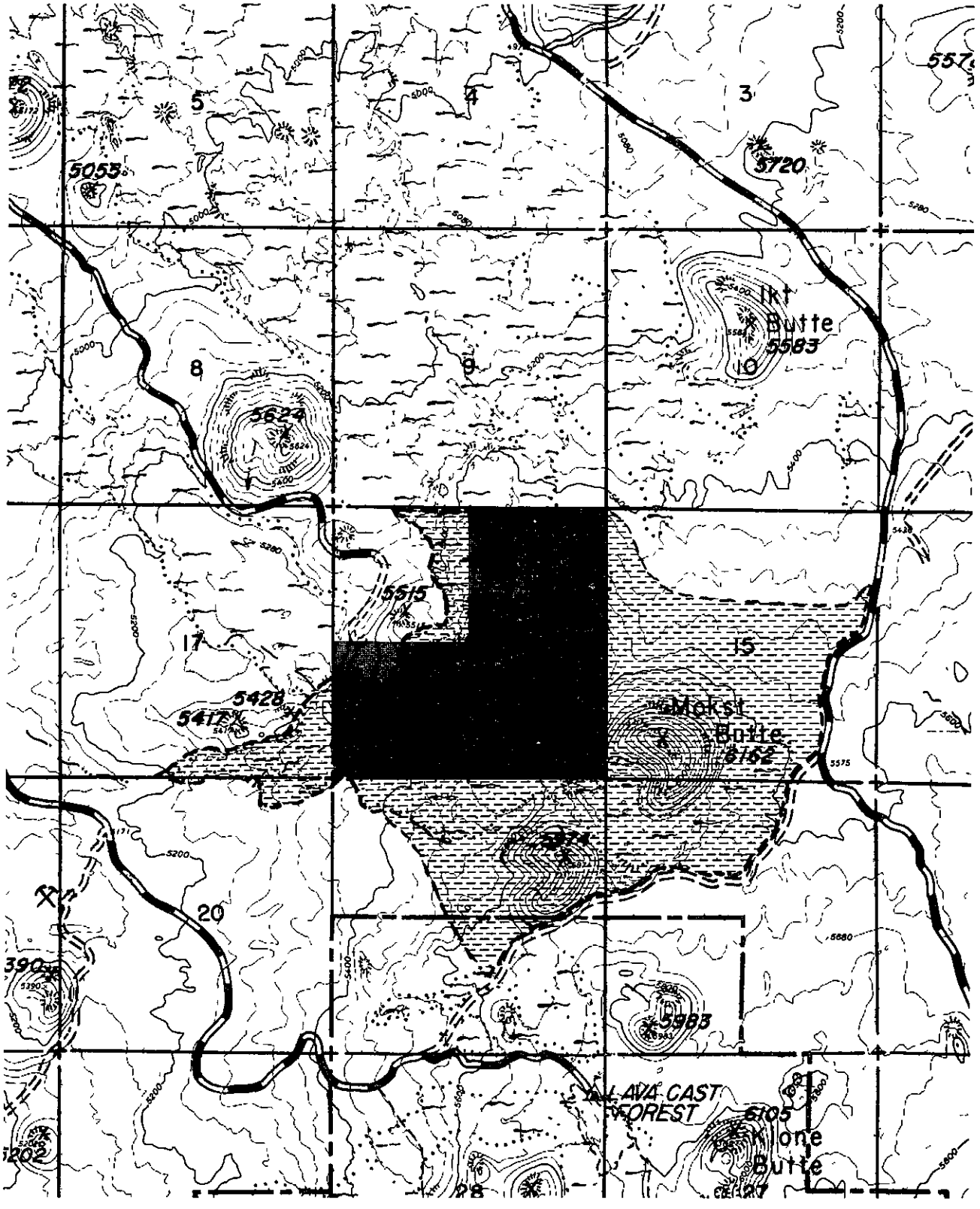
ESTABLISHMENT REPORT FOR THE PROPOSED MOKST BUTTE RESEARCH NATURAL AREA



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ESTABLISHMENT REPORT FOR THE PROPOSED MOKST BUTTE RESEARCH NATURAL AREA

The forests of Mokst Butte RNA are composed primarily of ponderosa pine (*Pinus ponderosa*)[1], lodgepole pine (*Pinus contorta*) and white fir (*Abies concolor*)[2] Ponderosa pine dominates on the older lava flow, the south slope of the small cinder cone and the rims of both cones Lodgepole pine is scattered throughout the RNA and is most common on the flats to the east of the small cone and on the north side of Mokst Butte. White fir dominates the northern slopes of both cones. There is a strong shrub component throughout the RNA and a simple forb layer Surface soils vary from basaltic lava and coarse-textured cinders and scoria to pumiceous loamy sands and sand. Slopes range from zero to 80 percent. Elevational limits are 5240 feet (1598 m) to 6162 feet (1879 m)

Justification

Mokst Butte RNA fills two needs identified by the Research Natural Area Needs Workshop[3] in 1973 It meets the high priority need for an entire, forested cinder cone with white fir and the medium priority need for a recent lava flow Mokst Butte is entirely forested on its northerly slopes The southern exposure of the butte is a very steep slope down to the cone's fissure There is little vegetation on the south slopes The rim of the cone is sparsely vegetated Ponderosa pine is the dominant tree species on the rim Lodgepole pine, whitebark pine (*Pinus albicaulis*), and white fir are present in smaller amounts. The shrub layer is well represented. White fir becomes dominant on the upper third of the north slope of Mokst Butte Lodgepole pine dominates on the lower third Western white pine (*Pinus monticola*) is abundant and ponderosa pine scattered on the north slope. Regeneration is predominately white fir Elevations on the cone range from 5600 feet (1708 m) at the base to 6162 feet (1879 m) at the summit. The north side has an average slope of 45 percent, the south side 80 percent There is no sign of disturbance on the butte

The two lava flows included in the RNA originated from fissures associated with Mokst Butte. The older lava flow covers about 650 acres (263 ha) of the RNA The lava is blocky and slightly weathered The flow has numerous small valleys and ridges and many large pinnacles A small mount of Mokst ash is found on the lava Shrubs are the dominant form of vegetation on the lava flows, Gland ocean-spray (*Holodiscus dumosus*), squaw currant (*Ribes cereum*), pinemat manzanita (*Arctostaphylos nevadensis*) and mountain juniper (*Juniperus communis*) are common Ponderosa pine is the dominant tree species on the lava Lodgepole pine, whitebark pine, western white pine, and white fir are also present Most are mature trees and are widely scattered. Stems are often broken and contorted The younger, smaller lava flow is located south and east of Mokst Butte The lava is darker and has sharper edges The flow covers approximately 100 acres (41 ha) The vegetation is primarily gland ocean-spray Elevations of the lava flows falls between 5240 feet (1598 m) and 5720 feet (1745 m)

Many interesting geological features are present in the proposed RNA The RNA would provide representations of pre-Mazama and post-Mazama cinder cones. Areas of Mazama ash and local Mokst ash and lava lie side by side Lava flows with and without ash and cinders are present A rampart, several fissures, and some small spatter cones are also included in the RNA The Mokst Butte RNA offers many opportunities for geologic studies Vegetation research might include plant communities and succession on lavas The potential for white fir might interest Silviculturists

[1]Common and scientific nomenclature follows Leo C Hitchcock and Arthur Cronquist, *Flora of the Pacific Northwest*, University of Washington Press, Seattle, Washington, 1973, 730 pages, illustrated

[2]White fir (*Abies concolor*) and grand fir (*Abies grandis*) form a continously varying biological complex in central Oregon Throughout this paper the complex will be referred to as white fir

[3]C T Dyrness, Jerry F Franklin, Chris Maser, Stanton A Cook, James D Hall, and Glenda Faxon, *Research Natural Area Needs in the Pacific Northwest*, Pacific Northwest Forest and Range Experiment Station, USDA Forest Service, Portland, Oregon, 1975, 231 pages

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ESTABLISHMENT REPORT FOR THE PROPOSED MOKST BUTTE RESEARCH NATURAL AREA

Mokst Butte is in the midst of typical commercial forest land. Nearly all of the proposed area has been selectively logged Mokst Butte is undisturbed. Approximately 600 acres (243 ha) of the proposed area is privately owned. About 20 acres (8 ha) is currently included in the Lava Cast Forest. The remainder of the RNA is federally owned and managed.

Mokst Butte RNA occupies approximately 1250 acres (506 ha) in the Deschutes National Forest, Fort Rock Ranger District. It is located at North Latitude 43° 50' and West Longitude 121° 15'. The tract is in Deschutes County, 13 air miles (21 kilometers) south of Bend, Oregon. The RNA includes portions of Sections 15, 16, 17, 20, and 21, of T. 20 S , R. 12 E., W M

The RNA may be reached from the east or west. For access from the east follow Federal Highway 97 south out of Bend, Oregon. In about 7 miles (11 km) turn left onto Forest Road No. 1942, following signs to Lava Cast Forest. In another 8 miles (13 km) turn right onto Forest Road No. 195 to Lava Cast Forest. Road No. 195 is the southeastern boundary of the RNA Take the right hand fork designated No. 9720 to continue along the boundary, the east edge of the smaller lava flow and the south side of the unnamed cinder cone. For access from the west again take Federal Highway 97 south out of Bend. In 12 miles (19 km) turn left onto Forest Road No 195, following signs to Lava Cast Forest. In about 7 miles (11 km) turn left onto spur road No. 9720/860. In about a mile (1.6 km) this logging road meets the south edge of the major lava flow at the corner shared by Sections 16, 17, 20, and 21. Another alternative is to continue on No. 195 about 2-1/2 miles (4 km) past logging spur No. 9720/860 to the south boundary of the RNA at the base of the small cinder cone

Community Types

Plant communities within the RNA reflect changes in the volcanic soils and changing slope aspect. The central Oregon pumice plateau is known for its forests composed primarily of lodgepole pine and ponderosa pine. Preponderance of these species are a result of the coarse-textured, immature pumice soils. The lodgepole and ponderosa pine communities are considered to be topodaphic climaxes Tree species in order of abundance in the RNA are ponderosa pine, lodgepole pine, white fir, western white pine, and white bark pine. White fir is the climatic climax The communities encountered in the Mokst Butte RNA best fit into the *Pinus ponderosa* and *Pinus contorta* Zones[4] of central Oregon. These zones are characterized by seral or edaphic climaxes of lodgepole and ponderosa pine. On pumice soils sclerophyllous shrubs increase in importance Herbaceous flora is depauperate. The zones are climatically harsh with a short growing season, low summer precipitation and wide diurnal temperature fluctuations

Five plant associations have been identified in the RNA The first four may be correlated to Volland's[5] plant communities as follows·

[4]Jerry F Franklin and C T Dyrness, *Natural Vegetation of Oregon and Washington*, U S Government Printing Office, Washington, D C , 417 pages, illustrated

[5]Leonard A Volland, *Plant Communities of the Central Oregon Pumice Zone*, USDA Forest Service, Pacific Northwest Region, Portland, Oregon, January, 1976, 133 pages, illustrated

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Unit	Plant Community	Location	Acreage
1	Lodgepole/currant-bitterbrush/needlegrass CL-S2-15		50 acres (20 ha)
2	Ponderosa/bitterbrush-manzanita/needlegrass CP-S2-13	North of Mokst Butte on shallow soils	100 acres (41 ha)
3	Ponderosa/bitterbrush-snowbrush/needlegrass CP-S3-11	Rims and south slopes of both cinder cones, top of rampart	10 acres (4 ha)
4	Mixed conifer/snowbrush CW-S1-14	North slopes both cinder cones, west of small cone, "island" in lava flow, northwest of Mokst Butte	340 acres (138 ha)
5	Lava community	Both lava flows	750 acres (304 ha)

The lodgepole/currant-bitterbrush/needlegrass community is represented by two small areas on the eastern boundary of the RNA This plant community is a topodaphic climax of the sandy, pumiceous, ash and lapilli soils Slopes are near zero. Lodgepole dominates both overstory and regeneration. The stands have been recently thinned Thinned basal areas are between 100 feet² per acre (23 m² per ha) and 140 feet² per acre (33 m² per ha) Remaining stems are 5 to 10 inches (13 to 25 cm) in diameter and 30 to 80 feet (9 to 24 m) tall Cubic foot site class is 50 to 83 feet per year. The understory is depauperate Squaw currant dominates the shrub layer. Bitterbrush (*Purshia tridentata*) is common Thurber's needlegrass (*Stipa thurberiana*) dominates the ground layer.

The ponderosa/bitterbrush-manzanita/needlegrass plant community occurs on the shallow, stony soils north of Mokst Butte In this area Mokst lava flows have been covered with ash from later eruptions of the butte Ponderosa pine occur as a topodaphic climax. All ages of lodgepole pine are present. Stands have been recently thinned to an average basal area of 70 feet² per acre (16 m² per ha). Remaining mature trees average 70 to 80 feet (21 to 24 m) in height and 16 inches (41 cm) d.b.h. Regeneration is primarily ponderosa pine Little lodgepole is present. Bitterbrush and green-leaf manzanita (*Arctostaphylos patula*) dominate the shrub layer Pinemat manzanita and gland ocean-spray are common on lava outcrops Thurber's needlegrass dominates the ground layer

The ponderosa/bitterbrush-snowbrush/needlegrass community occupies the rims and south slopes of both cinder cones and highest part of the rampart to the northwest of Mokst Butte. Soils are deep accumulations of coarse cinders, ash, and pumice Ponderosa pine is again a topodaphic climax The ponderosa pine overstory is scattered This community begins about a third of the way up the south side of the small cinder cone Slope averages 50 percent Surface soils are composed of large red cinders Regeneration is all ponderosa pine As the slope is ascended the basal area of ponderosa pine decreases and green-leaf manzanita increases Basal area of ponderosa pine averages 70 feet² per acre (16 m² per ha) Stems average 15 inches (38 cm) in diameter and 80 feet (24 m) in height Largest individuals reach 38 inches (97 cm) d b h. Many of the older trees bear fire scars The entire butte has been selectively logged. Common

snowbrush (*Ceanothus velutinus*) and green-leaf manzanita are the dominant shrubs. Squaw currant is common. Some bitterbrush and gland ocean-spray are found on the rim of the cone. Herbs and grasses are rare Davidson's penstemon (*Penstemon davidsonii*), toothleaf pyrola (*Pyrola dentata*), whitevein pyrola (*Pyrola picta*) and rockcress species (*Arabis* species) are some of the herbs found on the small cinder cone. The rim and south slope of Mokst Butte are sparsely vegetated. The south slope of the cone is actually the south facing crater wall The slope of the crater wall is close to 80 percent Most of the ponderosa pine is concentrated not far below the rim. On the rim a few small ponderosa pine, lodgepole pine, white bark pine, and white fir are found. Shrubs dominate the vegetation. Green-leaf manzanita is most abundant with pinemat manzanita and snowbrush less so. No herbs or grasses have been recorded The highest part of the lava and cinder rampart to the northwest of Mokst Butte is also included in this community. The fissure of the rampart is about 100 feet (31 m) deep The summit is very rocky with shallow accumulations of cinder and ash Ponderosa pine, green-leaf manzanita, and bitterbrush are found on the rim of the fissure The outer slopes of the rampart grade into the mixed conifer community.

The mixed conifer/snowbrush plant community covers the largest area of the RNA. Approximately 340 acres (138 ha) are included in this community. It is found on the north slopes of both cinder cones and in the crater of the small cone. In addition, three remnants of Mazama ash also support mixed conifer stands. The exclusion of fire in this century has enabled white fir to dominate over seral ponderosa pine White fir is the climatic climax. Lodgepole pine is common but seral

South of the pre-Mazaman cinder cone lodgepole dominates the overstory but regeneration includes white fir, ponderosa pine, and lodgepole pine.

Common snowbrush is the dominant shrub with squaw currant subordinate. Scouler willow is occasional. Prince's-pine (*Chimaphila umbellata*) dominates the ground layer. In the crater of the small cinder cone and near the rim on the north side of the cone, lodgepole becomes subordinate to white fir and ponderosa pine Ponderosa pine occurs as scattered overstory. White fir is present as all ages and dominates regeneration Shrubs are green-leaf manzanita, bitterbrush, squaw currant, and snowbrush Prince's-pine is the dominant herb On the north slope of the small cinder cone the incidence of ponderosa and lodgepole pine decreases. White fir are large and numerous, dominating both overstory and regeneration Ponderosa pine is seen only as scattered old growth. Both mature and seedling lodgepole are present. Western white pine regeneration is common. Basal areas approximate 100 feet^2 per acre (23 m^2 per ha) for white fir, 60 feet^2 per acre (14 m^2 per ha) for ponderosa pine, 20 feet^2 per acre (5 m^2 per ha) for lodgepole pine and less than 20 feet^2 per acre (less than 5 m^2 per ha) for western white pine. White fir averages 6 inches (15 cm) in diameter and 70 feet (21 m) in height, with many 16 inches (41 cm) and up to 40 inches (102 cm) d b h and 120 feet (37 m) tall. Basal areas approximate 100 feet^2 per acre (23 m^2 per ha) for white fir, 60 feet^2 per acre (14 m^2 per ha) for ponderosa pine, 20 feet^2 per acre (5 m^2 per ha) for lodgepole pine and less than 20 feet^2 per acre (less than 5 m^2 per ha) for western white pine White fir averages 6 inches (15 cm) in diameter and 70 feet (21 m) in height, with many 16 inches (41 cm) and up to 40 inches (102 cm) d b h and 120 feet (37 m) tall Ponderosa pine averages 32 inches (81 cm) d b h and 90 to 100 feet (27 to 31 m) in height, up to 40 inches (102 cm) d.b h Lodgepole and western white pine average 6 inches (15 cm) diameter and 70 feet (21 m) in height. Western white pine occur up to 15 inches (38 cm) in diameter Snowbrush dominates the shrub layer with density decreasing as the canopy increases Prince's-pine dominates the ground layer. Whitevein pyrola and sticky currant (*Ribes viscosissimum*) are common. Pines increase at the base of the cone The larger, older Mokst lava flow abuts the base of the small cinder cone on its north and east sides A skid road runs along much of the southern edge of the lava flow Between the lava flow and the cinder cone are many of the largest trees in the RNA. Basal areas are less than on the cone Shrubs and grasses are more abundant Several species not common in other parts (ponderosa pine, pinemat manzanita and

APPENDIX E
ESTABLISHMENT REPORT FOR THE PROPOSED MOKST BUTTE RESEARCH NATURAL AREA

green-leaf manzanita) are present Stems are smaller than on the cone The incidence of western white pine is less. Lodgepole increases on lava outcrops. At the northern base of Mokst Butte old growth ponderosa pine are frequently observed. Lodgepole, white fir, bitterbrush, snowbrush, and green-leaf manzanita are all common. The area has been thinned. White fir dominates the regeneration. The largest individuals are ponderosa pine, the most numerous, lodgepole pine White bark pine is occasional. Green-leaf manzanita increases with disturbance. The boundary of the partial cut is at the base of the butte. On the lower third of the butte snowbrush is dominant. Scouler willow, gland ocean-spray and green-leaf manzanita are common Lodgepole dominates the overstory. Ponderosa pine and white fir dominate the regeneration Western white pine of all ages are abundant. Sticky currant increases as the butte is ascended Slope averages 45 percent. Soils are shallow and rocky. Shrubs decrease as canopy increases About halfway up the slope fireweed, Davidson's penstemon, and toothleaf pyrola are common Basal areas are 120 feet² per acre (28 m² per ha) of lodgepole pine and western white pine, and less than 20 feet² per acre (5 m² per ha) each of white fir, white bark pine and ponderosa pine. Stems are pole-sized On the upper third of the slope white fir increases until stands are nearly pure white fir. Sidebells pyrola (*Pyrola secunda*), prince's-pine, sticky currant and mosses occupy the ground layer Patches of long stolon sedge and large ponderosa pine are occasional just below the rim of the butte. The remaining representations of the mixed conifer community occur on two isolated areas of Mazama pumice The first of these is an "island" of about 30 acres (12 ha) within the major lava flow. The area is isolated by the surrounding lava. It is privately owned and has been recently heavily logged Nearly all ponderosa pine has been removed. Many large white fir remain Ponderosa pine, lodgepole pine, white fir, and western white pine are all present. White fir dominates the regeneration. Common species include snowbrush, squaw currant, pinemat manzanita, prince's-pine, Thurber's needlegrass, long stolon sedge and Ross' sedge (*Carex rossii*). Bitterbrush is rare The other area of Mazama pumice is located east of the major lava flow, north of Mokst Butte It occurs on all sides of the rampart northwest of Mokst Butte Vegetation is similar to the area west of the small cinder cone More Scouler willow and snowbrush is present on the east slope of the rampart

The fifth plant community is found on the lava flows of Mokst Butte RNA Very little soil is available to vegetation A thin deposit of Mokst ash can be seen in some portions of the older flow Vegetation is sparse Pines are most successful in this harsh site Estimated total basal area is 20 feet² per acre (5 m² per ha) Regeneration is meager Many of the mature trees in the lava are stunted, broken or contorted. Ponderosa pine and lodgepole pine are dominant. White fir, white bark pine, and western white pine are occasional. Regeneration is mostly lodgepole Shrubs are the dominant form of vegetation on the lavas. Gland ocean-spray is the dominant shrub Other species commonly seen are squaw currant, mountain juniper, and pinemat manzanita No snowbrush has been found on the lava Davidson's penstemon is the dominant herb. Uncommon species include green-leaf manzanita, western serviceberry, ash penstemon (*Penstemon cinicola*) and lava alumroot (*Heuchera cylindrica*) The younger lava flow east of Mokst Butte has very little vegetation It appears to be in very early stages of succession The only shrub noted is gland ocean-spray Very few lodgepole pine have been found and those only as seedlings. No other plant species have been recorded

The Mokst Butte Research Natural Area falls within Kuchler's[7], it is also included in the SAF Cover Type[8]

[7]A W Kuchler, *Potential Natural Vegetation of the Conterminous United States*, American Geographical Society, Special Publication Number 36, illustrated

[8]Society of American Foresters, *Forest Cover Types of North America, Exclusive of Mexico*, Society of American Foresters, Washington, D C , 1954, 67 pages, illustrated

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Table 1, PARTIAL LIST OF VASCULAR PLANTS OF MOKST RESEARCH NATURAL AREA

	Scientific Name	Common Name
TREES	Abies concolor	white fir
	Pinus albicaulis	white bark pine
	Pinus contorta	lodgepole pine
	Pinus monticola	western white pine
	Pinus ponderosa	ponderosa pine
	Populus tremuloides	quaking aspen
SHRUBS	Amelanchier alnifolia	western serviceberry
	Arctostaphylos nevadensis	pinemat manzanita
	Arctostaphylos patula	green-leaf manzanita
	Ceanothus velutinus	snowbrush
	Chimaphila umbellata	prince's-pine
	Holodiscus dumosus	gland ocean-spray
	Juniperous communis	mountain juniper
	Purshia tridentata	bitterbrush
	Ribes cereum	squaw currant
	Ribes viscocissimum	sticky currant
	Salix scouleriana	Scouler willow
	Symphoricarpos albus	common snowberry
GRASSES AND SEDGES	Carex pensylvanica	long stolon sedge
	Carex rossii	Ross' sedge
	Festuca idahoensis	Idaho fescue
	Sitanion hystrix	bottlebrush squirreltail
	Stipa thurberiana	Thurber's needlegrass
FORBS	Arabis species	rockcress species
	Epilobium augustifolium	fireweed
	Eriogonum umbellatum	sulfur buckwheat
	Fragaria virginiana	broadpetal strawberry
	Heuchera cylindrica	lava alumroot
	Penstemon davidsonii	Davidson's penstemon
	Penstemon cinicola	ash penstemon
	Pyrola asarifolia	alpine pyrola
	Pyrola dentata	toothleaf pyrola
	Pyrola picta	whitevein pyrola
	Pyrola secunda	sidebells pyrola

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Protection and Management

See direction in Forest Plan for Research Natural Area

TIMBER RESOURCES: Mokst Butte RNA.

The existing timber resources are best described as a composite of "stands." The 1978 stand mapping and classification project included all Proposed Research Natural Areas and is used as the basic description of Timber Resources.

APPENDIX E
ESTABLISHMENT REPORT FOR THE PROPOSED MANY LAKES RESEARCH NATURAL AREA

Principal Distinguishing Features

The Many Lakes Research Natural Area (RNA) includes approximately 700 acres (284 hectares (ha)) 3 miles (4.8 kilometers (km)) east of the crest of the Oregon Cascades (Figure 5). The RNA is located 20 miles (32 km) south of the South Sisters on glaciated uplands. This is a highly diverse area of numerous small lakes, wet meadows and bogs, steep slopes and rock escarpments. Two major lakes are found in the area. Jay Lake in the northwest corner of the RNA is approximately 10 acres (4 ha) in size. Raft Lake is 1/4 mile (.4 km) to the south, also about 10 acres (4 ha) and is the deepest lake in the RNA. Sphagnum (*Sphagnum* species) bogs occupy up to 125 acres (51 ha) of the proposed area. A wide variety of vegetation is present as a result of the many landtypes. Forests are composed primarily of lodgepole pine (*Pinus contorata*)[1] and mountain hemlock (*Tsuga mertensiana*) on drier sites and Englemann spruce (*Picea* engelmannii), mountain hemlock and white fir (*Abies concolor*)[2] in moist areas.

Wetland herbs and shrubs are abundant. Predominate wildlife species include Roosevelt elk, mule deer, blacktail deer, black bear, wolverine, marten, blue grouse, bald eagle, osprey and herons. Soils range from peat to pumiceous sands. Slopes vary from zero to 50 percent. Elevation falls between 4780 feet (1458 meters (m)) and 5080 feet (1549 m).

Justification

The Many Lakes RNA fills two needs identified by the Research Natural Area Needs Workshop in 1973[3]. It fills the high priority need for a typical bog area and the need for subalpine permanent ponds and bog. The large bogs and several smaller are present in the proposed area and involve over 125 acres (51 ha). These bogs are at elevations between 4800 feet (1464 m) and 4940 feet (1507 m). The major bog in the northeast corner of the RNA has several small, relatively deep ponds and streams near its center. Sphagnum moss dominates the vegetation. Sedges (*Carex* species), rushes (*Juncus* species) and great sundew (*Drosera anglica*) are common in the wetter portions of the bogs. The only other known occurrences of great sundew east of the Cascades are in Gearhart Marsh and 7-Mile Marsh in south-central Oregon The drier edges of the bogs support shrub species including bog birch (*Betula glandulosa*), willow (*Salix* species), western bog blueberry (*Vaccinium occidentale*), western swamp laurel (*Kalmia occidentalis*) and Menzies' spirea (*Spirea douglasii*) Englemann spruce is dominant on the edge of the bogs Lodgepole pine regains dominance as soils become drier The other large bog further south is not as wet as the first discussed. Open water is represented by one small stream. Shrubs are more prevalent and some Englemann spruce and lodgepole pine are found within the bog as well as on the borders.

Seventeen small permanent lakes and ponds are present within the proposed RNA. They range in size from about 1 acre (4 ha) to approximately 17 acres (7 ha) The deepest is 10 acres (4 ha). The highest is Raft Lake at an elevation of 4980 feet (1519 m). Raft Lake possesses a thermocline which protects fish from winter kill. Most of the lakes and ponds including 10 acre (4 ha) Jay Lake are seldom over 3 feet (9 m) deep

[1]Common and scientific nomenclature follows Leo C Hitchcock and Arthur Cronquist, *Flora of the Pacific Northwest*, University of Washington Press, Seattle, Washington, 1973, 730 pages, illustrated

[2]Grand fir (*Abies grandis*) and white fir (*Abies concolor*) form a continuously varying biological complex in eastern Oregon Throughout this report the complex will be referred to as white fir (*Abies concolor*)

[3]C T Dyrness, Jerry F Franklin, Chris Maser, Stanton A Cook, James D Hall, and Glenda Faxon, *Research Natural Area Needs in the Pacific Northwest*, Pacific Northwest Forest and Range Experiment Station, USDA, Forest Service, Portland, Oregon, 1975, 231 pages

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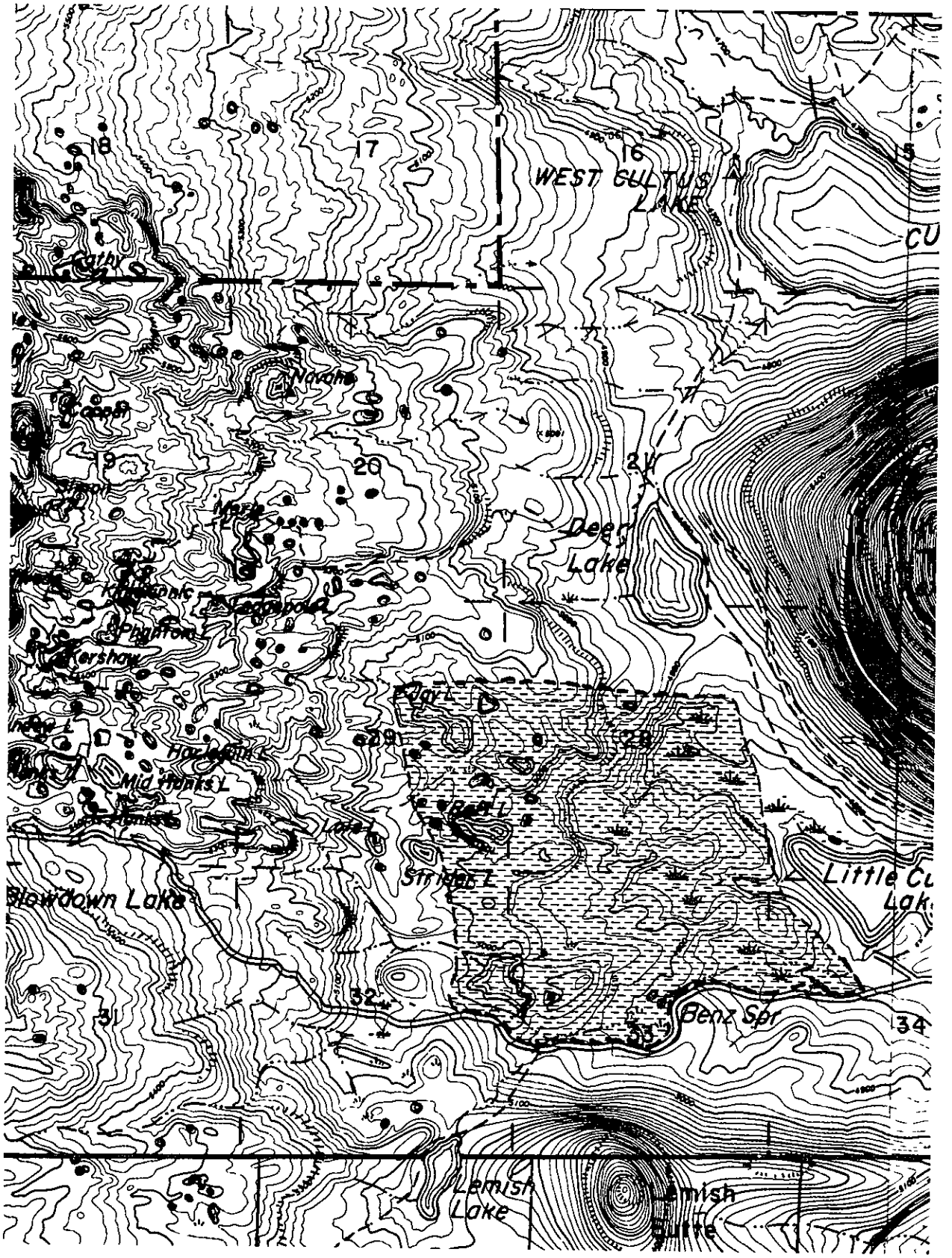

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Nearly all have some areas dominated by sedges, rushes, and shrubs Several ponds contain Indian pond lily (*Nuphar polysepalum*) The largest lake is located in the extreme southwest corner of the RNA. This unnamed lake is about 17 acres (7 ha) in size at 5000 feet (1525 m) in elevation. It contains the most dense aquatic vegetation of all the lakes and ponds, dominated by Baltic rush (*Juncus balticus*), beaked sedge (*Carex rostrata*) and Indian pond lily. Englemann spruce is common in the forests surrounding the lakes and ponds

One of the outstanding features of Many Lakes RNA is the sequence of plant succession represented. The range of succession includes deep natural lake, shallow natural lake, wet meadows and bogs, and finally forested land. Adding to the biological diversity of the area is the variety of landforms from steep rock slopes and narrow draws, smooth complex slopes, nearly flat meadows and bogs, to open water. Many vertebrate species are associated with these diverse and complex series of terrestrial and aquatic communities Several species potentially present in the RNA are designated as rare, threatened, or endangered. The RNA would also provide substantial acreage of moderate to high elevation lodgepole, mountain hemlock and Englemann spruce plant communities.

Many Lakes RNA is surrounded by heavily used recreational land The Pacific Crest Trail is 3 miles (4.8 km) to the west A dirt road used by ATVs throughout the year bounds the RNA on the south Popular Little Cultus Lake is just east of the RNA, and Deer Lake is 1/4 mile (.4 km) north of the most northern bog. A primitive trail has been blazed into Raft Lake where fire pits, camp sites, and cut logs are in evidence.

The RNA provides an opportunity to study subalpine aquatics. Studies could also be done on a variety of bog and meadow communities. Very few descriptions exist of subalpine wet meadows and bogs in Oregon. Several unique plants and rare animals present other research possibilities Plant succession study opportunities are abundant The subalpine forest communities could serve as reference areas for management research outside the RNA.

Location

The proposed Many Lakes RNA occupies approximately 700 acres (284 ha) in the Deschutes National Forest, Bend Ranger District It is located at North Latitude 43° 49' and West Longitude 121° 53' The tract is in the Deschutes County 45 mile (56 km) southwest of Bend, Oregon The RNA occupies portions of Sections 28, 29, 32, 33, and 34, of Township 20 South, Range 7 East, Willamette Meridian.

To reach the RNA follow signs to Century Drive and Bachelor Butte out of Bend, Oregon Six miles (9.6 km) west of Bend, Century Drive becomes the Cascade Lakes Highway 3 5 miles (5 6 km) past the Deschutes Bridge junction, turn right onto Forest Road No 2022 This is a total of 37 5 miles (60 km) from the beginning of the Cascade Lakes Highway. In another 4 miles (6 4 km) turn right onto Forest Road No 2049 following signs to Little Cultus Lake. Little Cultus Lake Campground is reached in a little over 1 mile (1 6 km) The extreme southeast corner of the RNA is about 1 mile (1.6 km) west of the campground on a primitive dirt road. All access to the interior of the RNA is by foot One primitive trail to Raft Lake begins about 1/4 mile (4 km) from the southwest corner of the RNA No other trails are known

Community Types

Plant communities within the RNA change with topography, fire history, and distance from water. Variations are primarily the result of soil depth and moisture and occurrence of fire. Lodgepole pine is the most abundant tree species and occurs on all but the most moist sites Mountain hemlock is found throughout the RNA. Englemann spruce is most prevalent close to open water and other wet sites. White fir regeneration is widespread Western white pine of all ages is scattered within the RNA A few old-growth ponderosa pine (*Pinus ponderosa*) and whitebark pine (*Pinus albicaulis*) are present on rock slopes White fir and mountain hemlock are the climax species Lodgepole pine stands are maintained by fire or as a topoclimax species. Ecologically, the communities encountered in the Many Lake RNA best fit into the *Tsuga mertensiana* Zone[4] of the western slope and crest of the Cascades. This zone is characterized by

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old-growth mountain hemlock forests and seral lodgepole pine in drier portions. Understories are often depauperate and dominated by huckleberry species (*Vaccinium* species) Wet meadows and bogs are an important special feature of the zone.

Five plant communities have been identified in the Many Lakes RNA Four may be correlated to Volland's[5] plant communities as follows

Unit	Plant Community	Location	Acreage
1	Wet meadow MW	Near lakes and bogs	10 (4 ha)
2	Engelmann spruce bottomlands CW-C9-11	Surrounding streams, lakes, and bogs	7 (30 ha)
3	Mountain hemlock/grouse huckleberry CM-S1-11	Most of RNA not recently burned	200 (81 ha)
4	Lodgepole pine/grouse huckleberry CL-S4-12	Driest area of RNA, recent burns	300 (122 ha)

Two types of wet meadow plant communities are seen in Many Lakes RNA. The first is the isolated wet meadow surrounded by forest. The second is found on the edges of lakes and ponds. The isolated wet meadow is well represented south of the lake in the southwest corner of the RNA It is about 4 acres (1.6 ha) in size and shows a clear relationship of plant species to soil moisture The majority of the meadow is dominated by beaked sedge, black alpine sedge (*Carex nigricans*), and Baltic rush. Tufted hairgrass (*Deschampsia caespitosa*) is subordinate, occurring in drier areas than the sedges A small, wet depression at the west end of the meadow is nearly pure northern mannagrass (*Glyceria borealis*) Slimstem reedgrass (*Calamagrostis neglecta*) is common near the edges of the meadow Shrubs dominate the vegetation at the edge of the forest This shrub component is dominated by western bog blueberry Other common shrubs are Menzies' spirea and bearberry honeysuckle (*Lonicera involucrata*). Mosses are also common at the edge of the forest Surface soils are moist to wet year-round. The relationship of plant species to soil moisture along a gradient from wet to dry, appears to be. northern mannagrass-beaked sedge-black alpine sedge-rushes and reedgrass-tufted hairgrass-shrubs-forest This may also represent a successional sequence. The other type of wet meadow community occurs along the edge of lakes and ponds where the soils are wet to ponded all year. The plant community is simple in these locations, usually consisting of one to three species of sedges and rushes The most common species are beaked sedge, black alpine sedge and Baltic rush Approximately 5 acres (2 ha) of this type occur in the RNA

Englemann spruce bottomlands are found on moist sites near streams, lakes, bogs, and wet meadows. Variation of tree species within this community is great. In many areas, lodgepole pine dominates the overstory as old growth, but the understory will be Englemann spruce, mountain hemlock, and white fir In other areas mountain hemlock will dominate the overstory, or may be

[4]Jerry F Franklin and C T Dryness, *Natural Vegetation of Oregon and Washington*, U S Government Printing Office, Washington, D C , 1973, 417 pages, illustrated

[5]Leonard A Volland, *Plant Associations of the Central Oregon Pumice Zone*, USDA Forest Service Pacific Northwest Region, Portland, Oregon, September, 1982. R6-Ecol-104-1982, 122 pages