Appendix C
Threatened, Endangered, and Sensitive Species

		Federal	State	R-6	N.G.
Sensitive Birds					
Ferruginous Hawk	*Buteo regalis*	Cat. 2		OR	S
Swainson's Hawk	*Buteo swainsoni*	Cat. 2	S	OR	D
N. Bald Eagle	*Haliaeetus leucocephalus*	T	T	*/OR	D
Greater Sandhill Crane	*Grus canadensis tabida*		S	*/OR	D
Western Snowy Plover	*Charadrius alexandrinus nivosus*	Cat. 2	T	*/OR	S
Long-billed Curlew	*Numenius americanus*	Cat. 2		*/OR	D
Western Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*				
Sensitive Mammals					
Preble's Shrew	*Sorex preblei*	Cat. 2		OR	S
Sensitive Plants					
Bristle-flowered Collomia	*Collomia macrocalyx*	Cat. 2	S	OR	D
Henderson Ricegrass	*Oryzopsis hendersonii*		T	*/OR	D

Definitions

Federal: 1985 Federal Register Notice of Review

T = Threatened

Category 2 = Needs additional information before proposing a federal listing.

State: Oregon State Status Regional Forester's

E = Endangered

T = Threatened

S = Sensitive

R-6: Sensitive Species List

OR = Sensitive in Oregon

* = Potential candidate for Regional Forester's list.

N.G.: Crooked River National Grassland

D = Determined to be present

S = Suspected to be present

Appendix D

Travel Plan

Appendix E

Spill Incident Response Plan

Appendix D

Travel Plan

Process

Various laws, regulations, and Executive Orders recognize on-road and off-road uses as legitimate activities on national grasslands and forests.

The Transportation Planning Handbook, FSH7709.55 contains procedural direction on access and travel management. The objective in the handbook states, "... identify and document recreational opportunities by integrating off-road travel management with on-road management, under the common framework of access management."

The direction under FSM 2355, which sets objectives for recreation, states, ". . . provide off-road vehicle recreation opportunities that are in concert with the environmental setting, minimize off-road vehicle effects on the land and resources, promote public safety, and control conflicts with other uses of the National Forest System lands."

The regulation 36 CFR 219.21(d), requires that we consider the impacts of proposed recreation activities on other uses and values and the impacts of other uses and activities associated with them on recreation opportunities, activities, and quality of experience. Off-road vehicle use is specifically addressed by 36 CFR 219.21(g):

Off-road vehicle use shall be planned and implemented to protect land and other resources, promote public safety, and minimize conflicts with other uses of the National Forest System lands. Forest planning shall evaluate the potential effects of vehicle use off roads and, on the basis of the requirements of 36 CFR 295 of this chapter, classify areas and trails of National Forest System lands as to whether or not off-road vehicle use may be permitted.

Executive Order No. 11644, as amended by Executive Order 11989, directs that the designation of off-road vehicle areas shall be based upon minimizing damage to soils, watersheds, vegetation, and other resources, and minimizing conflicts with other uses. The travel map development, which consists of describing how users access the Ochoco National Forest and Crooked River National Grassland, is consistent with this direction. It includes all forms of travel, including on-road and off-road.

Traffic management (on-road) and off-road vehicle standard and guidelines for all management areas were determined through an integrated interdisciplinary team approach and are found in the prescriptions in Chapter 4 for the Forest and the Grassland Plans.

Implementation

The following is representive of the action items or activities which will be scheduled and completed through implementation of the Forest and Grassland Plans:

Enforcement

Orders will be issued by the Forest Supervisor in accordance with 36 CFR 261.50. A copy of the order imposing prohibitions will be placed in the offices of the Forest Supervisor and district rangers.

The closures and restrictions(controls) covered under Title 36 CFR 261, Subpart B are applicable and are supplemental to those in 36 CFR 261, Subpart A.

Traffic and Off-Road Management

Uniform travel management direction will be developed for road design standards, road maintenance plans, traffic control devices (to include signing), closure orders, and trail design standards.

Revise the Forest and the Grassland sign plans to

bring them in line with the Plans.

From the appropriate management area direction and standard and guidelines, apply appropriate entrance information that communicates to the Forest and Grassland visitor the current conditions and purpose intended by management.

Establish priorities by management areas to insure consistent and timely application of the travel access management decisions.

Establish travel management needs during each phase of the program development and budget (PD&B) process, identifying those needs and direction specific to the situation.

Explore the potential for using the Forest and Grassland development road system to provide off-road travel opportunities. Roads temporarily closed to vehicular traffic could be used to supplement off-road vehicle opportunities.

Education and Involvement

Endorse organization of various motorcycle clubs and off-road enthusiasts to help implement this plan. This coalition could help develop, monitor, and maintain existing and new trail systems, which could minimize Forest Service cost through the use of volunteer work and partnership projects.

Initiate a program to educate employees in the technical linkage between the Plans, transportation planning, resource objectives, and travel management.

Implement the monitoring program to keep management appraised of changing needs so that methods, techniques, facilities, and settings can be managed appropriately.

Revisions

The Forest and Grassland will move towards controlling off-road vehicle use in order to minimize impacts to resources and other user groups while not necessarily restricting off-road users. The use of closed road systems, and the designation of trails and destinations, will be encouraged for those management areas without existing off-road restrictions, such as General Forest and General Forage.

Additional off-road vehicle recreation opportunity proposals will be in accordance with management area direction and standards and guidelines. All projects and activities are subject to analysis under the National Environmental Policy Act (NEPA) process before they can be implemented.

The travel map will be updated annually or as necessary to reflect these changes as well other changing conditions or new information, such as changes to the traffic management of open on-road use under the Green Dot program. If these or other situations are identified as being outside the limits of acceptable variability, appropriate amendments or other changes may be made. The amendment process, as well as monitoring and evaluation, can be found in Chapter 5 of the Forest and Grassland Plans.

The successful implementation of new off-road vehicle trails, or other changes, will be dependent upon a policy that insures that these opportunities are met through an integrated, interdisciplinary, and public approach, and that they adhere to the requirements of the Forest and Grassland Plans.

Appendix E

Spill Incident Response Plan

The Forest Spill Incident Plan establishes reporting and response procedures to be followed in the event of an accidental spill of toxic, hazardous or otherwise dangerous materials, including petroleum products.

Because of the serious health and water pollution potential of many of the materials used with our varied land management activities and transported across our land, spills will be given the same emergency priority as a forest fire.

The Plan relies on the expertise of the local, state and federal agencies, and private contractors for spill containment and cleanup. The Forest Service's role in a spill incident is communication and coordination. The key Forest players in a spill response are Dispatch and the Forest spill coordinator. They may request others to assist them, depending on the nature of the spill.

Spill Response

Health and Safety

Of paramount importance is the health and safety of personnel at the spill site, and of downstream water users if supplies are contaminated.

When approaching any spill site, the following precautions must be taken.

Approach from the up wind direction if possible;

Keep all unauthorized people away from the spill site;

Avoid inhaling fumes, smoke, vapors and dust even if no hazardous materials are involved; and

Do not assume that gases or vapors are harmless because of lack of smell.

Identify the spilled material from a distance as soon as possible. Until the material is identified, avoid all contact including breathing fumes.

Remember that the Spill Plan is written for professionals trained and equipped for emergency responses. The people at the spill site are probably not such professionals, and should not be encouraged to exceed their abilities.

Priority should be given to notifying downstream water users, especially those with domestic, fish hatchery, and irrigation supplies.

Responsibility

The party responsible for the spill should be identified as soon as possible. This party is responsible for containment and cleanup of the spill and is liable for any damages that might occur. The party is also responsible for reporting spill incidents involving toxic, hazardous or otherwise dangerous materials to the appropriate state and federal agencies. The Forest Service will also notify local, state and federal agencies of such spills to ensure that the proper agencies are promptly notified.

Spill Containment

Upon evaluating a spill incident (identification of the material, health and safety problems, and quantity), action will be taken as soon as possible to contain the material at the immediate spill site. This

is especially important if there is a potential for contaminating nearby streams, lakes, or wetlands and downstream water supplies.

Exceptions to taking any immediate containment action would be when the spill material is extremely hazardous and is beyond the ability of the agency and local contractors to handle or it cannot be adequately identified.

Spill Cleanup

All spills involving toxic or hazardous materials or other substances which could contaminate nearby streams, lakes, wetlands or downstream water supplies will be cleaned up as soon as possible.

Spills involving toxic or hazardous materials should be evaluated for having the cleanup and disposal work performed by companies that specialize in this type of work.

Responsibilities of Forest Personnel

Reporting Person

Avoid contact with spilled material.

Call Dispatch for help.

Identify yourself, tell how you can be contacted, location of spill, identity & quantity of spilled material.

Isolate the spill area.

Wait for additional instructions.

Dispatch

Obtain information from Reporter to fill out Spill Incident Report (See Figure E-1).

Notify Forest Spill Coordinator or the Forest Alternate Spill Coordinator.

If no one can be reached in 1 & 2 above, call OARS and follow their instructions (see Notification List).

Forest Spill Coordinator

Notify and coordinate with the appropriate local, state and federal agencies for spill scene security, containment, and cleanup.

Assure the health and safety of Forest personnel and the Public.

Inform the Forest Supervisor, District Ranger and appropriate Forest staff of spill incident status.

Notify downstream water users of spills if there is a potential for contamination of domestic, or irrigation water supplies.

Prepare initial and final spill response reports for each incident.

Notify the Regional Office of spill.

Provide Forest leadership in Spill Response planning.

Table E-1

Spill Incident Notification List

Agency	Telephone No.	Remarks
Forest Hazardous Substances Coordinator		
Work	447-9513	Call immediately.
Home	447-1882	
Oregon Accident Response System (OARS)	1-800-452-0311	Call immediately.
National Response Center	1-800-424-8802	Call immediately.
Sheriffs - Emergency Management Coordinators		Call Immediately.
Crook	911, 447-4168	
Deschutes	911, 388-0107	
Gilliam	384-2851	
Grant	575-1131	
Harney	911, 573-6156	
Hood River	386-2098	
Jefferson	475-2201	
Klamath	883-7111	
Lake	947-3308	
Sherman	565-3622	
Wasco	(509) 575-4080	
Wheeler	763-4101	
Oregon State Police	911, 1-800-452-6824	
Oregon Dept. of Environmental Quality	388-6146	
Environmental Protection Agency	(206) 442-1263	Notify for spills of inland waters.
Oregon Department of Fish & Wildlife	(206) 696-6211	Notify for spills which could contaminate surface waters.
FS RO Hazardous Spill Coordinator (B.Pinto)	(503) 221-2931 (FTS) 423-2931	
BLM OSO Hazmat Coordinator	(503) 231-6977,2253	

Figure E-1
Hazardous Spill Report Form

Hazardous Substances
Initial Field Report

1. Type/Description of Incident: _____

   _____

2. Date of Sighting: _____

   Time: _____

3. Location(Describe - road #, name etc): _____

   Township: _____

   Range: _____

   Section: _____

   Subsection: _____

4. Hazardous Material or Substance: _____

   Label(placard): _____

   Unknown: _____

   Name: _____

   Waste No. or I.D. No.: _____

   Manufacturer: _____

   Transporter: _____

5. Name and Address of Responsible Party: _____

   _____

6. Site Secured: [Yes] [No] Describe: _____

   _____

7. Environmental Conditions: _____

   Terrain: _____

   Weather: _____

   Water Resources: _____

   Soil: _____

   Vegetation: _____

Appendix F

Water Quality

Appendix G

History

Appendix F

Water Quality

Memorandum of Understanding between the U.S. Department of Agriculture, Forest Service and the Oregon Department of Environmental Quality

December 1, 1978

This document can be found at the Ochoco National Forest Supervisor's Office, in Forest Service Manual 1561.5 - Water Department (Irrigation and Flood Control). Exhibit 1.

The Memorandum of Understanding between the Oregon Department of Environmental Quality (DEQ) and the U.S. Department of Agriculture, Forest Service (USFS), delineates the responsibilities and activities to be performed by each agency pursuant to the implementation of the Oregon Statewide Water Quality Management Plan on lands administered by the USFS.

The Statewide Water Quality Management Plan has been developed to meet the requirements of state law, federal law, the Federal Water Pollution Control Act, and the Clean Water Act.

The DEQ's overriding purpose is to control pollution. The Forest Service's job is to manage public national forest lands. Under the memorandum of understanding, USFS and DEQ mutually agree to specified provisions in order to prevent duplication of effort and provide the coordination necessary to meet the implementation requirements of the Clean Water Act.

Specified provisions cover a range of areas, including: agency roles; implementation, coordination, and administration of the memorandum; and designations of control.

Appendix G

Section 1

Chronological History

Crooked River National Grassland

1869	Surveyors begin to plot Townships in Central Oregon (the Grassland locale).
1880 to 1913	Homesteading active.
1929 and 1930	Stockmarket crash and drought.
1931	Congress authorizes Federal Farm Board to investigate possibility of reducing the amount of submarginal land in cultivation.
1931	A national conference on land utilization held.
1932	National Land Use Planning Committee made up of Federal bureaus and land-grant colleges is created.
1932	Bureau of Chemistry and Soils undertakes a nationwide classification of land according to its physical adaptability for various uses. Its report shows 454,000 farms in problem areas on land too poor to provide a living, involving some 75 million acres.
1933	The National Resource Board prepares a comprehensive report on the land and water resources of the United States. The report suggests that national policies should promote land ownership and land use patterns that are clearly in the interest of the general public rather than individuals or groups. The Board recommends that the Federal Government acquire some 75 million acres of land to "supplement the assistance to private forestry and erosion control work." The Board suggests acquiring selected areas of submarginal land and demonstrating how it could be used to serve the public. The necessity of relocating occupants of the land and providing a greater economic base in the submarginal farmland areas was recognized.

1935 Resettlement Administration is formed in the Department of Agriculture. Repurchase of abandoned farms begins.

Responsibility for the Land Utilization Program transferred to the Resettlement Administration from the Federal Emergency Relief Administration (FERA).

1937 Congress passes the Bankhead-Jones Farm Tenant Act (see Appendix G2). Title III of the Act directs the Secretary of Agriculture "to develop a program of land conservation and land utilization, including the retirement of lands that are submarginal or not primarily suitable for cultivation in order thereby to correct maladjustments in land use."

Resettlement Administration is moved into the Department of Agriculture and renamed the Farm Security Administration. The Land Utilization Program is transferred to the Bureau of Agricultural Economics.

1938 Land Utilization Program is transferred to the Soil Conservation Service.

1946 Acreage acquired under the Land Utilization Program totals 11,299,000 acres. Total cost was $47.5 million, or an average of about $4.40 per acre for the land purchased.

1954 A total of 8,847,000 acres in Land Utilization Projects are assigned by the Secretary of Agriculture to the Forest Service. This included 6,958,000 acres assigned on this date from the Soil Conservation Service, 1,062,000 acres earlier assigned, and 827,000 acres under Forest Service custodianship that were being managed by State agencies under long-term leases or sales contracts.

Eighteen Land Utilization Projects, containing 2,464,000 acres, were transferred to the Bureau of Land Management. Eighty of the Land Utilization Projects, totaling 1.3 million acres, were transferred to the State and local agencies.

1960 The Secretary of Agriculture designates 19 of the Land Use Projects acquired by the Forest Service as National Grasslands. The name "Central Oregon Land Utilization Project" is officially replaced by Crooked River National Grassland.

1970 Forest Service Manual amended making it Forest Service policy to manage National Grasslands under the principles of multiple use.

Section 2

Bankhead-Jones Farm Tenant Act

*Act of July 22, 1937 (Ch. 517, 50 Stat. 522, as amended; 7 U.S.C. 1010-1012; 16 U.S.C. 551)

Title III

Sec. 31. "The Secretary is authorized and directed to develop a program of land conservation and land utilization, in order thereby to correct maladjustments in land use, and thus assist in controlling soil erosion, reforestation, preserving natural resources, protecting fish and wildlife, developing and protecting recreational facilities, mitigating floods, preventing impairment of dams and reservoirs, developing energy resources, conserving surface and subsurface moisture, protecting the watersheds of navigable streams, and protecting the public lands, health, safety, and welfare, but not to build industrial parks or establish private industrial or commercial enterprises." (7 U.S.C. 1010)

Sec. 32. In order to put the above program into practice, the Secretary of Agriculture is authorized to do the following:

Protect, improve, develop, and administer any property acquired, and to construct structures that may be necessary in adapting land to its most beneficial use.

Sell, exchange, lease, or otherwise dispose of any property acquired. Any sale, exchange, or grant shall be made only to public authorities and agencies, and only on the condition that the property is used for public purposes. An exception to this provision may be made, allowing exchanges with private owners or agencies of State governments, if the Secretary decides that it would not conflict with the purposes of the land conservation and utilization program.

Make dedications or grants for any public purpose, and to grant licenses and easements under reasonable terms. However, this does NOT include granting easements for rights-of-way (Federal Land Policy and Management Act of 1976).

Cooperate with Federal, State, territorial, other public agencies, and local nonprofit organizations in developing land conservation and utilization programs involving conservation, development, and utilization of water for the benefit of aquatic animals or plants, or for recreational development. This involves assisting in carrying out such plans by:

> Making loans (normally of not more than $500,000),
>
> Conducting surveys and investigations relating to conditions and factors affecting the overall program and methods of accomplishing the aquaculture program,
>
> Bearing the costs of installing any works of improvement applicable to the goals of the overall program,
>
> Providing technical and other assistance, and
>
> Paying for any storage of water included in reservoir structures involved in the aquaculture program, and needed for rural community water supply.

Make rules and regulations as necessary to prevent trespasses, and regulate use and occupancy of these lands. Violations shall be punished by a fine of not more than $500 or imprisonment, or both.

Sec. 33. At the end of each calendar year, the Secretary will pay 25 percent of the net revenues received from the use of the land (not from the sale of land) to the county in which the land is held. If the land is

situated in more than one county, the amount to be paid will be divided equitably among the respective counties.

These payments will be made on the condition that they be used for school or road purposes, or both.

Section 3

Administration of Lands Under Title III of the Bankhead-Jones Farm Tenant Act by the Forest Service

Authority: 50 Stat. 525, as amended, 7 U.S.C. 1010-1012.

213.1 Designation, administration and development of national grasslands.

Land utilization projects administered by the Department of Agriculture are named and referred to as "national grasslands."

They are part of the National Forest system and are permanently held by the Department of Agriculture for administration under the provisions and purposes of Title III of the Bankhead-Jones Farm Tenant Act.

They shall be administered under sound and progressive principles of land conservation and multiple use, and to promote development of grassland agriculture and sustained-yield management of the forage, fish and wildlife, timber, water, and recreational resources in the areas of which the national grasslands are a part.

Resources shall be managed to maintain and improve soil and vegetative cover, and to demonstrate sound and practical principles of land use for the areas in which they are located. The Chief of the Forest Service shall provide policies for management of Federally-owned lands that exert a favorable influence for securing sound land conservation practices on associated private lands.

There are 20 national grasslands in 11 states throughout the midwest, southwest, and west. The Crooked River National Grassland is the only one located in Oregon.

213.2 Authority for Chief, Forest Service, to group, define, and name national grasslands.

The Chief of the Forest Service is authorized to group national grasslands into administrative units; to define, change or modify their boundaries; and to provide specific designations as necessary and desirable for effective and economical administration.

213.3 Protection, occupancy, use, administration, and exercise of reservations.

In general, the rules and regulations applicable to national forests as designated in Title 36, Code of Federal Regulations are used to govern the national grasslands. Provided, however, that Forest Service officers, under delegated authority, may acquire lands, make exchanges, grant leases, and enter into leases, permits, agreements, contracts and memoranda of understanding involving lands as authorized by Title III of the Bankhead-Jones Farm Tenant Act.

213.4 Prior rules and regulations superseded.

The rules and regulations issued before September 18, 1962, for land utilization projects, are superseded. However, existing valid rights, reservations, easements, leases, permits, agreements, contracts, and memoranda of understanding, which affect these lands, shall continue as long as they remain in accordance with their designated terms.

Appendix H

Range Allotments

Appendix I

Mineral Report

APPENDIX H

RANGE ALLOTMENTS

RANGE ALLOTMENT	SUITABLE ACRES	GROSS ACRES	OBLIGATED AUM'S	ESTIMATED CARRYING CAPACITY AUM'S
Blanchard	7903	7903	2355	2355
Boyce	5589	5589	2373	2373
Canadian Bench	2408	2408	---	160
Clevenger	685	685	40	40
Cyrus	7054	9142	1418	1408
Fox	7364	7364	2357	2357
Goldmine-Falls	783	783	53	53
Gorge	1153	1153	236	236
Grizzly	8998	9087	2354	2540
Holmes-Squaw Creek	3684	3684	509	509
Juniper Butte	8151	8151	2120	2120
Lone Pine	8992	8992	1884	2180
Lower Desert	11275	11787	---	695
North	10247	10247	3248	3234
Peninsula	2111	2111	---	488
Round Butte	3180	3180	143	143
Rush	7526	7526	1686	1914
Steer	2350	2350	286	630
Williams	1340	1340	222	222
Kennedy	720	720	---	100
TOTAL	101513	104202	21284	23757

Appendix I

Section 1

Mineral Potential[1]

[1] A complete copy of the Mineral Potential Report for the Crooked River National Grassland is available at the Supervisor's Office

Lands Involved

The Crooked River National Grassland lies within Jefferson County, in T10S through T13S, and R11E through R15E, W.M. The Grassland encompasses 173,629 acres; 111,379 acres are under Forest Service administration, and 62,250 acres are either privately owned or owned by other government agencies.

In the eastern part of the Grassland, rolling hills and mountains dominate the landscape. The western part is a plateau dissected by steep-sided canyons. Temperatures are moderate and rainfall averages 10.5 inches per year. The land is used for cattle grazing, recreation and wildlife habitat. It is easily accessed by State Roads 26 and 97, and a well-developed system of Forest Service roads.

Status Record Data

The land administered by the Forest Service in the Grassland consists of 100,379 acres of acquired land and 10,806 acres of public domain land. The mineral rights are vested in a number of different owners:

Public domain lands where the mineral rights are owned by the United States.

Acquired lands where mineral rights are owned either privately or by the United States.

Private lands where mineral rights are owned either privately or by the United States.

Minerals are classified as locatable, leasable or saleable. Locatable minerals are deposits that are subject to disposal under the 1872 Mining Law. This law allows individuals to locate, develop and patent mining claims on public domain lands. Gold, silver, mercury and diatomite are locatable minerals if the deposits occur on public domain lands.

Leasable minerals are exempted from the 1872 Mining Law. Instead, these minerals are disposed of through a leasing system. On public domain lands, energy and fertilizer minerals are leasable. On acquired lands, all minerals (except saleable minerals) are leasable.

Saleable, or common variety, minerals include sand, gravel, cinders and stone. They are disposed of through a permit system under the Materials Act of 1947 as amended. On acquired lands, common variety minerals may only be sold to public agencies and for public purposes.

At present, there are 7,160 acres of land in the southeastern part of the Grassland under lease for oil and gas. A total of 29,408 acres have been leased in the past. One well was drilled in the 1960's but was abandoned when it proved dry. No further drilling has been attempted.

Three hardrock exploration permits have been issued in T13S R13E W.M. No leases have been issued in this area.

There are no mining claims located on the Grassland.

Regional Geology

Three physiographic provinces occur in the Grassland: the southwest part of the Blue Mountains province, the High Lava Plains province and the Deschutes-Umatilla Plateau province.

The oldest rocks in the Grassland belong to the late Eocene Clarno Formation and are about 40 million years old. The Clarno Formation consists of a series of rhyolite, andesite and basalt flows, pyroclastic rocks (tuffs and breccias) and some waterlaid sedimentary rocks.

The late Oligocene and early Miocene John Day Formation is approximately 30 million years old. It is made up of rhyolitic flows, bedded tuff and varicolored fluvatile and lacustrine tuffaceous sedimentary rocks.

The Columbia River Basalt Group, a series of thick, dark-gray basalt flows, is middle to late Miocene in age (10 to 15 million years old). These rocks occur in isolated outcrops in the Grassland.

The Pliocene Dalles Formation (approximately 3 million years old) consists of water-laid, pumice-rich pyroclastic rocks interbedded with basalt and andesite flows. The Dalles Formation is capped with younger basalt flows.

Recent basalt flows can be found in the canyons of the Deschutes and Crooked Rivers. The canyons were cut by the rivers, and then filled by the lava flows. The rivers have since partially eroded the flows, resulting in steep-sided, narrow canyons.

Mercury, Gold and Silver

Local Geology and Mineral Deposits

Anomalous values for mercury and gold have been detected in the Gray Butte area in the southeastern part of the Grassland. This area is underlain by the John Day Formation and faulted by northeast-trending faults. Small outcrops of Columbia River Basalt overlie the John Day Formation in the faulted area.

Cinnabar (HgS) is the principal mercury ore mineral. Cinnabar deposits are most often found in regions of Tertiary and Quaternary orogeny and volcanism. The cinnabar is deposited from mineralized hot waters related to magmatic activity, and the deposits usually contain calcite and chalcedony. The hot, mineralized solutions rise along faults, cooling as they near the surface. As they cool, cinnabar is deposited in fractures and voids. The host rocks are often altered in both composition and appearance by the mineralized solutions. The principal products of this alteration are clay, silica and carbonate materials (Brooks, 1971).

Gold also occurs in hydrothermal deposits. The gold is deposited by mineralized solutions traveling through fractured zones. These deposits can also contain quartz, calcite, silver, sulfides, and cinnabar (Brooks, 1968; Jenson, 1981).

The Gray Butte mercury prospect is located in SE1/4 Section 13, T13S, R13E W.M, approximately 1-1/2 miles north of Gray Butte. Brooks (1963) reported cinnabar along an east-trending fault zone approximately 1,000 feet long. He also reported a 2- to 6-foot wide rib of silicified tuff bordered on the north by a 2-foot wide zone of silicified gouge and brecciated tuffs, with cinnabar occurring as fracture coatings along the north side of the rib.

During a field visit to the Gray Butte Prospect, the Ochoco National Forest Geologist examined the fault zone but did not find any cinnabar.

Two miles southwest of Gray Butte, in SE1/4 SE1/4 Section 22, T13S, R13E, W.M, a hydrothermally-derived calcite vein, a pebble dike and a garnet-bearing breccia outcrop in the John Day Formation (Gray, 1986).

Mineral Exploration and Development

The Gray Butte Prospect was discovered by Staley in June 1942 (Brooks, 1942) Rodman and Chamness located the Tom and Jerry claims here in 1955. A trench about 25 feet wide has been dug along the fault zone for a distance of approximately 400 feet, and numerous small exploration pits have been dug in the area.

In 1963, H.G. Plog, a Forest Service geologist, conducted a mineral examination of the claim group and declared the claims invalid due to lack of discovery. The claims are abandoned.

Jerry Gray and Gary Baxter of the Oregon Department of Geology and Mineral Industries sampled the pebble dike outcrop for assaying and petrographic analysis. Six samples were assayed. All six samples showed detectable amounts of gold. Two samples contained anomalous silver values, and one sample contained anomalous mercury values (Gray, 1986).

The Bureau of Land Management sponsored the geochemical analysis of 74 stream sediment samples, 55 rock chip samples and 22 drill core samples in the Gray Butte area. The samples were collected in:

T12S R13E Sections 29, 31, 32 and 36;

T13S R13E Sections 5, 8, 9, 10, 12, 13, 14, 22, 23, 24, 25, 26, 27, and 36;

T13S R14E Sections 8, 9, 10, 19, 20, 21, 22, 27, 28, 29, 31, 32, and 33.

The analysis of these samples showed some anomolous gold and mercury values (Rimal, 1987).

Mineral Production and Marketing

Mercury is listed as a Strategic and Critical Mineral in the Strategic and Critical Materials Stockpiling Revision Act of 1979.

Mercury is used for industrial, chemical and military purposes. The world sources of mercury are concentrated in a few areas, and imbalances in supply and demand are common. Because of rapid price fluctuations, the U.S. mercury industry is highly unstable. Oregon's mercury mines have operated almost exclusively during periods of war (Brooks, 1971).

According to Brooks, the Gray Butte prospect has produced less than 1 flask (76 pounds) of mercury (Brooks, 1971).

Mineral Potential

Based upon existing information, the geologist of the Ochoco National Forest classified the Gray Butte area as having moderate potential for mercury, gold and silver, with a Level of Certainty C (BLM Manual 3031, see Appendix A). Refer to the Mineral Potential map in the map packet for the location of this area.

Moderate potential is defined as: "The geologic environment, the inferred geologic processes and the reported mineral occurrences or valid geochemical/geophysical anomaly indicate moderate potential for accumulation of mineral resources" (BLM Manual 3031).

Level of Certainty C is defined as: "The available data provide direct evidence but are quantitatively minimal to support or refute the possible existence of mineral resources" (BLM Manual 3031).

Existing information indicates that this area warrants further exploration work to discern its true mineral potential.

Diatomite

Local Geology and Mineral Deposits

An active diatomite mine on the Deschutes River is located 1/2 mile south of the Grassland's southern boundary, approximately 6 miles west of Terrebonne. Diatomite is a lightweight sedimentary rock composed of the siliceous shells of microscopic aquatic plants called diatoms. Diatomite has a wide variety of industrial uses, including use as a filter aid, a filler in paints, paper and plastics, and as an insulating material.

The diatomite occurs in a roughly circular deposit in the late Tertiary Deschutes Formation. Sand and volcanic detritus underlie the deposit, and sand and gravel deposited by the Deschutes River cover the diatomite. The deposits formed in the bed of a lake dammed by lava flows. Because the deposit is very clean, it is likely that the lake was fed by springs instead of streams (Bates, 1969).

Mineral Exploration

Geologic conditions favorable for similar diatomite deposits occur in the Grassland, especially along the Deschutes and Crooked Rivers. Winters (1983), in his mineral investigation for the Deschutes River Rare II area, did not discover any diatomite deposits. In addition, neither Williams (1957), Walker (1977), nor Peck (1983) indicate any diatomite deposits on their map. However, a diatomite deposit could easily be overlooked if it were covered with overburden, as is the case with the Terrebonne deposit.

Mineral Potential

Based upon existing information, the geologist of the Ochoco National Forest classified the Crooked River/Deschutes River area as having a moderate potential for diatomite, with a Level of Certainty A (BLM Manual 3031, see Appendix A). Refer tothe Mineral Potential Map in the map packet for the location of this area.

Moderate potential is defined as: "The geologic environment, the inferred geologic processes and the reported mineral occurrences or valid geochemical/ geophysical anomaly indicate moderate potential for accumulation of mineral resources" (BLM Manual 3031).

Level of Certainty A is defined as: "The available data are insufficient and/or cannot be considered as direct of indirect existence of mineral resources within the respective area" (BLM Manual 3031).

It is possible that further exploration could result in the discovery of a diatomite deposit in the area indicated on the map.

Oil and Gas

The oil and gas potential of the Grassland is not well-defined. Although areas of the Grassland have been leased for oil and gas development, only one hole has been drilled. This hole was abandoned after proving dry.

Central Oregon is believed to be underlain by Mesozoic marine sediments that could produce petroleum. However, the thick covering of volcanic rocks has deterred exploration (Newton, 1965).

Smith (1976) classified the eastern portion of the Grassland as prospectively valuable for oil and gas (see the Oil and Gas Potential Map, Figure I-3, p. I-9). This classification is based on the assumption of 1,000 feet of sedimentary rocks occurring within 10,000 feet of depth.

The oil and gas potential of the western part of the Grassland is low to zero. Here, the presence of volcanic activity in the Cascades may have metamorphosed any organic matter to a thermal state which would destroy hydrocarbons (Fouch, 1983).

Geothermal Energy

There are no Known Geothermal Resource Areas (KGRA) or Potential Geothermal Resource Areas (PGRA) listed within the Grassland by USGS (Justus, 1979).

The Oregon Department of Geology and Mineral Industries has classified the entire Grassland as favorable for the discovery of geothermal resources. This classification is based on various geothermal, volcanic and tectonic phenomena including thermal wells, youthful volcanism, mineralization, and anomalous concentrations of faults and lineaments (Oregon Department of Geology and Mineral Resources, 1982).

Two thermal wells are located near the Grassland boundary southeast of Madras. One, located in NE1/4 NE1/4 Section 24, T11S R13E W.M, intercepts water measuring 25 C (77 F). The other, with water at 21 C (70 F) is located in SE1/4 NE1/4 Section 24, T11S R13E W.M. (Oregon Department of Geology and Mineral Industries, 1982).

Rockhounding Areas

Rockhounding is a popular activity on the Ochoco National Forest, and minerals of interest to rockhounds occur in several locations on the Crooked River National Grassland.

Shirley (1965 and 1967) located the following deposits on the Grassland.

Agate: T13S R13E Section 26

Amethyst and agate: T13S R13E Sections 17,18,19,20

Jasper and agate: T13S R13E Section 28

Moss agate: T11S R14E Section 15

Moss agate: T10S R14E Sections 10, 11

Angel wing agate: T10S R15E Section 12, T10S R15E Section 6

Petrified wood: T13S R14E Section 30.

Common Variety Minerals

There are 13 developed materials sources on the Grassland. Refer to Table I1-1 for material types and land status of these sources.

Only three of these sources, Round Butte, Schmoker and Cyrus, have development plans.

Round Butte has an estimated reserve of 400,000 cubic yards (cy) of cinders, an estimated demand of 10,000 to 20,000 cy per year, and therefore, a lifespan of 20 to 40 years. Oregon State Highway Department removes approximately 70,000 cy each decade. The Forest Service, Jefferson County, and the City of Culver also use cinders from this source. The cinders are used for aggregate for road construction and to improve traction on icy roads.

Schmoker has an estimated reserve of 40,000 cy of basalt of variable quality. This quarry is used primarily by Jefferson County for road construction.

Cyrus contains fine-grained, weathered basalt which is easily rippable. No reserve estimates are available.

McPheeters contains an estimated 84,000 cy of basalt. This quarry is used primarily by the Oregon Department of Transportation.

There appears to be a sufficient supply of rock to meet the local demand in the next decade. The development of a rock resource management plan that addresses long-term supply and demand, as well as area management strategies, would assure a continuing supply of these materials.

Table I-1

Material Sources

Name	Location	Land Status	Material Type
Round Butte	SW1/4 SE1/4 Sec 13, T11S R12E	Acquired	Cinders
Big Canyon	NW1/4 SW1/4 Sec 31, T11S R12E	Acquired	Clay/gravel
Metolius	NW1/4 NE1/4 Sec 36, T11S R13E	Acquired	Sand/gravel
Schmoker	NW1/4 NW1/4 Sec 3, T11S R14E	Acquired	Basalt
Grandview	NW1/4 NE1/4 Sec 16, T12S R12E	Acquired	Sand/gravel
Juniper Butte	SE1/4 SW1/4 Sec 32, T12S R13E	Acquired	Sand/gravel
Geneva	SE1/4 NE1/4 Sec 4, T13S R12E	Acquired	Basalt
Canal	SE1/4 SW1/4 Sec 22, T13S R13E	Acquired	Gravel
McPheeters	SW1/4 SW1/4 Sec 27, T13S R13E	Public Domain	Basalt
Haystack	NE1/4 SW1/4 Sec 36, T13S R13E	Acquired	?
Cyrus	NE1/4 SE1/4 Sec 18, T13S R14E	Acquired	Basalt
Gray Butte	SW1/4 NE1/4 Sec 30, T13S R14E	Public Domain	?
Jap Creek	SE1/4 SE1/4 Sec 35, T13S R14E	Acquired	?

Figure I-1

MERCURY, GOLD AND SILVER POTENTIAL

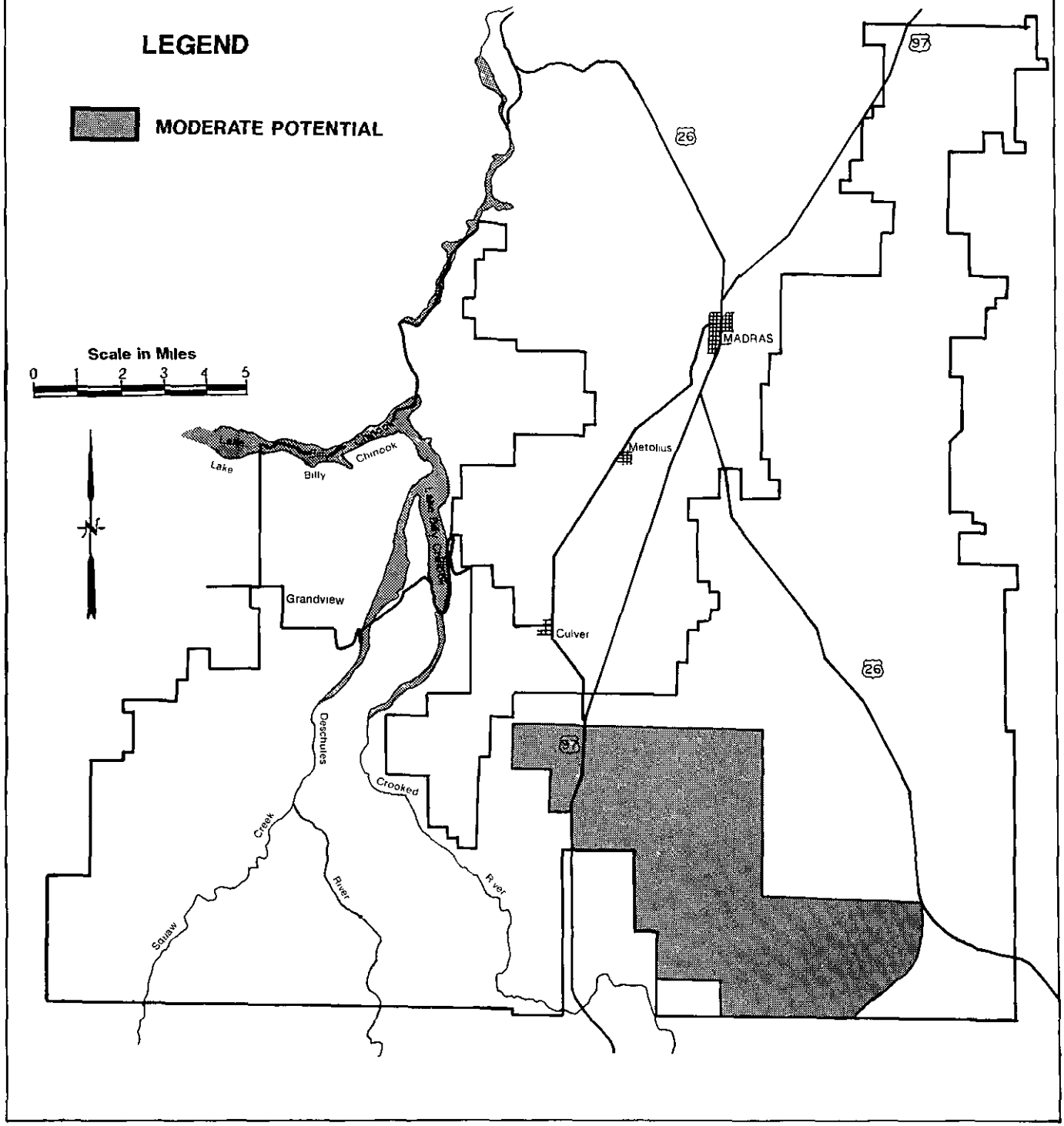


Figure I-2

DIATOMITE POTENTIAL

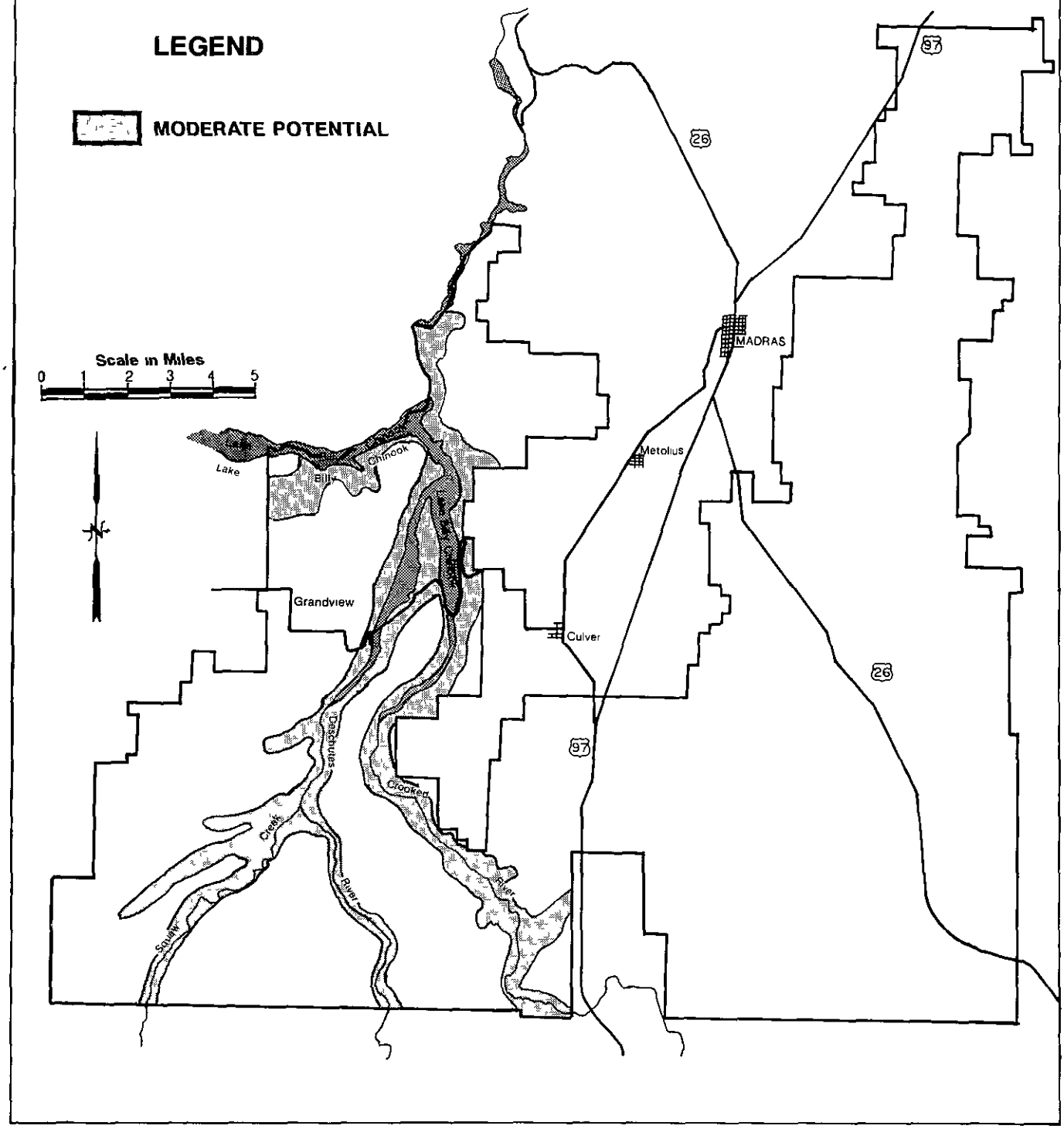
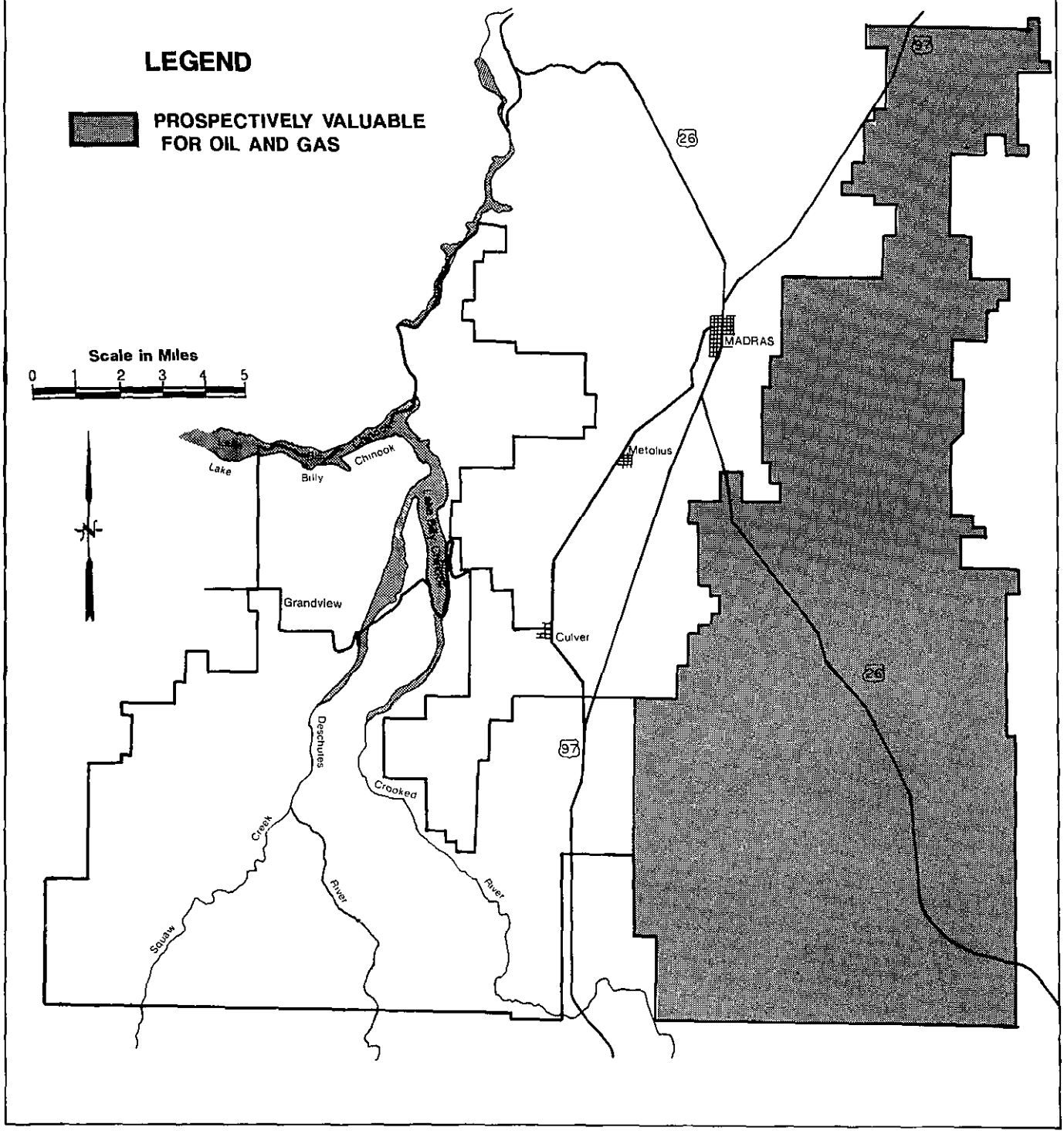


Figure I-3

OIL & GAS POTENTIAL



Section 2

Oil and Gas Lease Stipulations

Stipulations will be included in leases to protect surface resources. A stipulation may be modified or waived if the Forest Service determines that factors have changed so that the protection provided by the stipulation is no longer justified, or that the proposed operation would not cause unacceptable impacts.

The following stipulations will be included in all leases:

Allow no occupancy or other surface disturbance on slopes in excess of 30 percent.

Allow no occupancy or surface disturbance in the vicinity of eagle, hawk, or owl nesting sites as specified in Wildlife and Fish Standards and Guidelines.

To maintain esthetic values, require all semipermanent and permanent facilities to be painted or camoflaged to blend with the natural surroundings.

Additional stipulations will be required in the following Management Areas.

Antelope Winter Range

Allow exploration, drilling, and other developmental activities only between April 1 and November 15 to reduce harassment to antelope on the winter range. This limitation does not apply to maintenance and operation of producing wells.

Cove Palisades State Park

Allow no occupancy or other surface disturbance within park boundary.

Haystack Reservoir

Allow no occupancy or other surface disturbance.

Juniper Old Growth

Allow no occupancy or other surface disturbance.

Metolius Deer Winter Range

Allow exploration, drilling, and other developmental activities only between April 1 and November 15 to reduce harassment to deer on the winter range This limitation does not apply to maintenance and operation of producing wells.

Research Natural Areas

Allow no occupancy or other surface disturbance.

Rimrock Springs Wildlife Area

Allow no occupancy or other surface disturbance.

Riparian Areas

Allow no occupancy or other surface disturbance within riparian zones.

Squaw Creek

Allow no occupancy or other surface disturbance within Squaw Creek canyon.

Elsewhere, allow exploration, drilling, and other developmental activities only between April 1 and November 15 to reduce harassment to deer on the winter range. This limitation does not apply to maintenance and operation of producing wells.

Utility Corridors

Allow no drilling or storage facilities within 2,000 feet of utility lines.

Section 3

Land and Mineral Estates on the Crooked River National Grassland

There are eight administrative land categories involved within the Crooked River National Grassland. The laws and regulations governing the administration and disposal of minerals vary according to land categories.

For administrative purposes, Federal minerals are divided into the three categories that follow.

(1) Locatable minerals:

Uncommon varieties of sand, stone, gravel, cinders, pumice, pumicite or cinders;

All "valuable mineral deposits" (General Mining Law, 1872) except those specifically excluded as leasable or salable.

(2) Leasable minerals:

All minerals except salable minerals on acquired lands;

Coal, phosphate, oil, gas, chlorides, sulfates, carbonates, borates, silicates or nitrates of potassium or sodium, native asphalt, solid and semisolid bitumen and bituminous rock including oil-impregnated rock or sand from which oil is recoverable only by special treatment after the deposit is mined;

Geothermal resources and associated by-products.

(3) Salable minerals:

Common varieties of sand, stone, gravel, cinders, pumice, pumicite and clay.

The eight administrative land categories involved within the Crooked River National Grassland are:

(1) Land acquired under Title III of the Bankhead-Jones Farm Tenant Act that are administered by the Crooked River National Grassland. Mineral ownership is vested in the United States.

Under this category, minerals that would normally be locatable are instead classified as leasable. Thus, all minerals, except salable minerals, are disposed of through a leasing system. Salable minerals may be disposed of only to public authorities and agencies, and only on the condition that the minerals are used for public purposes (FRF 228.41(4)).

(2) Lands reserved from the public domain that are included as part of the Crooked River National Grassland. Mineral ownership is vested in the United States.

Under this category, locatable minerals are available for location under the 1872 Mining Law, unless the land is specifically withdrawn from the operation of the mining laws. In other words, any citizen of the United States, or person declaring his/her intent to become a citizen, may locate a mining claim for the purpose of developing a mine. Leasable minerals are disposed of through a leasing system. Salable minerals may be disposed of by sale, free use permit or contract (CFR 228.57).

(3) Lands acquired under Title III of the Bankhead-Jones Farm Tenant Act and administered by the CRNG, but all or part of the mineral rights are in private ownership.

The mineral rights vested in the United States will be administered as in (1) above. The development of the minerals rights in private ownership is, of course, controlled by the owner. However, because the United

States owns the surface rights, surface use would be administered by the United States in cooperation with the owner of the mineral estate.

(4) Lands acquired under Title III of the Bankhead-Jones Farm Tenant Act and administered by the CRNG, but all or part of the mineral rights are vested in the State of Oregon.

This situation is the same as (3) above, except that the State of Oregon replaces the private owner.

(5) Lands reserved from the public domain that are administered by the Deschutes Area of BLM's Prineville District. Mineral ownership is vested in the United States.

BLM administers minerals on these lands.

(6) Private lands with all or part of the mineral ownership vested in the United States.

Minerals are administered as in (2) above. State law protects and regulates the surface owner's rights.

(7) Private ownership with partial mineral ownership vested in the United States.

Minerals owned by the United States are administered as in (6) above. When the land and minerals are both privately owned, they are privately administered.

(8) Lands and minerals are privately owned.

These land and mineral estates are privately administered.

Section 4

Materials Source Management Plan

This appendix contains information from the Crroked River National Grassland Materials Source Management Plan. The entire Plan can be found in the Forest Supervisor's Office in Prineville, Oregon.

Summary and Conclusions

Thirteen materials sources were identified on the Grassland. Mineral rights at each materials source are owned by the United States. The property lines and extent of federal mineral ownership at McPheeters M.S. are pending the outcome of a survey that will be completed by April 1989.

Two of the materials sources have up-to date development plans. Three have development plans in progress pending completion of airphoto-derived topographic maps in 1989 or 1990. Four materials sources are in occasional use and need development plans completed or updated. Three materials sources will receive no forseeable use and need rehabilitation plans. One material source should be rehabilitated for recreational use by off-road vehicles.

A total of approximately 9,000-15,000 cubic yards of material are removed from the Grassland each year, and an additional 30,000 cubic yards are removed for special projects about every 5 years.

At the present rate of use, rock supplies are adequate for the next 20 years. It is unclear whether or not there will be adequate supplies further into the future due to the difficulty of projecting a future rate of use.

Recommendations

Long-term use permits issued in the 1950's and early 1960's should be discussed with the five agencies currently in their possession and, if possible, terminated or replaced with short-term use permits.

Canal M.S. should be closed to use as a borrow and waste storage site and rehabilitated for use by off-road vehicles.

Waste storage at Boyce M.S. should be discontinued. Use of this materials source should be limited to removal of the two existing stockpiles, and the area should then be rehabilitated and closed to future use.

Grandview M.S., which is located inside Cove Palisades State Park, should be rehabilitated and closed to future use.

Haystack M.S. and Big Canyon M.S. have no anticipated use, and should be rehabilitated and closed to future use.

Unauthorized removal of material occasionally occurs at sites outside of recognized materials sources. Rehabilitation should be accomplished at these unauthorized sites to discourage future removal of material.

The feasibility of a land exchange agreement should be examined as a means of giving the Forest Service's portion of Round Butte M.S. and McPheeters M.S. to the state.

Table I-1

Land Status and Mineral Ownership of Materials Sources

Name	Land Status	Mineral Rights	Long-term Use Permits
1. Round Butte	Acquired	United States	1958 Jefferson County 1961 City of Culver
2. Big Canyon	Acquired	United States	none
3. Metolius	Acquired	United States	1955 Jefferson County
4. Schmoker	Acquired	United States	none
5. Fence	Acquired	United States	none
6. Grandview	Acquired	United States	1958 Jefferson County
7. Boyce	Acquired	United States	1955 Jefferson Co. Court
8. Haystack	Acquired	United States	1959 Jefferson County 1960 City of Madras 1962 City of Culver
9. Geneva	Acquired	United States	1959 Deschutes Valley Water District 1960 Jefferson County
10. Canal	Acquired	United States	none
11. McPheeters	Public Domain	United States	none
12. Cyrus	Acquired	United States	none
13. Japanese Creek	Acquired	United States	none

A new pit run or grid roll material source on the west side of the Deschutes River would be valuable for Forest Service road maintenance in that area. Examination of the area for a new material source should be concentrated in the area where the Clarno Formation is exposed.

On some of the material sources, long-term use permits have been issued. Long-term use permits have no expiration date and no stated rate or quantity of removal. One of the requirements listed on the permit is that development plans must be submitted by the permittee and approved in advance by the Forest Supervisor. The long-term permits on the Grassland predate the National Forest Management Act of 1976, which sets a 10-year limit on permits issued to government agencies (36 CFR 228.62(b)). As a result, these long-term permits are grandfathered in.

Recommendation is hereby made that the long-term permits be discussed with the five agencies involved and be terminated or replaced, if possible, with short-term use permits. Conversion to short-term use permits would allow more up-to-date use records and improved management of the materials sources by the Forest Service.

Short-term use permits, generally for a period of less than one year, are called mineral material use permits (form FS-2800-9). They may be obtained from the Crooked River National Grassland District Office.

Development and Rehabilitation

Provisions must be made in contracts and permits to ensure the efficient removal and conservation of the material (36 CFR 228.47(c)). Requirements for reclamation of the areas disturbed by removal must also be included (36 CFR 228.47(f)). The Forest Service must prepare the development and reclamation plans if the material is in a community site or common-use area (36 CFR 228 64).

For removal of more than 5,000 cubic yards of material or disturbance of more than one acre during a 12-month period, non-Forest Service entities must obtain development and land reclamation permits from the Oregon Department of Geology and Mineral Industries and must have a long- or short-term use permit from the Crooked River National Grassland. For removal of less than 5,000 cubic yards, non-Forest Service entities are required to have a long- or short-term use permit from the Grassland. The Grassland District notifies the Engineering Section of the Ochoco National Forest Supervisor's Office so that use records in the individual materials source files can be kept up-to-date. The Forest Service may use its own materials sources without need for a permit, but is responsible for having a development plan and accomplishing final rehabilitation.

Development plans take into account the need for visual screening, drainage, road access, crusher and stockpile locations, variation in material quality, and the method of excavation of the material. The Forest Service follows the regulations of the Federal Mine Safety and Health Administration in regard to height and slope of working slopes and benches.

Two of the materials sources on the Grassland have up-to-date development and reclamation plans: Round Butte M.S. and Cyrus M.S. Three materials sources will have airphoto-derived topographic maps: McPheeters M.S. will have its topographic map completed by April 1989, while Metolius M S. and Japanese Creek M.S. will be completed in spring 1990. When each detailed topographic map for these three quarries is made available, a development and reclamation plan should be completed. The following five materials sources are in occasional use, and need to be surveyed with a compass and clinometer and have development and reclamation plans completed or updated: Geneva M.S., Boyce M.S., Fence M S., and Schmoker M.S. There are three materials sources that will receive no forseeable use and are in need of reclamation plans: Grandview M S., Haystack M.S., and Big Canyon M.S. One material source, Canal M.S., should be rehabilitated for recreational use and is in need of a reclamation plan.

Rehabilitation plans take into account the need for proper sloping of pit or quarry walls, spreading stockpiled overburden over excavated areas, mulching, and reseeding. The Ochoco National Forest follows regulations of the Oregon Department of Geology and Mineral Industries Mined Land Reclamation Program in regard to specification of final slopes and other reclamation practices.

Specifications of Rock Quality and Quantity

Gravel Roads

Forest Service gravel roads in the Grassland are maintained as low-traffic-volume roads, in which base material is used but not surfacing material. Road maintenance includes blading, primarily to provide adequate drainage on the roads, and secondarily to improve driveability. Water bars may be bladed into the roads Most of the Forest Service roads in the Grassland that are gravel roads are intended for vehicles with high clearance.

Table I-2 summarizes the Forest Service and Oregon State Highway Division (OSHD) requirements for crushed aggregate to be used on gravel roads. Lower-grade material such as pit run or borrow material is not expected to meet these specifications because they are used on low-traffic-volume roads.

Rock from Schmoker M.S. was crushed for use in surface rock and base rock on county roads, and was expected to meet the specifications.

The state has no gravel roads in the Grassland under its jurisdiction, but Jefferson County has jurisdiction over several gravel roads in the Grassland and follows state requirements for rock quality. The Forest Service has jurisdiction over many gravel roads in the Grassland and follows Forest Service requirements for rock quality.

Paved Roads

There are no paved roads in the Grassland under the jurisdiction of the Forest Service, except for two short lengths of pavement--one on the south side of Haystack Reservoir and one on the east side of the reservoir leading into a campground. The Federal Highway Administration will be adding to the pavement on the south side of the reservoir in 1991 or 1992, and this addition will be under the jurisdiction of the Forest Service. The state maintains two paved roads--Highway 97 and Highway 26. Jefferson County has jurisdiction over all other paved roads in the Grassland, and is in the process of paving many of their gravel roads using rock obtained from a privately-owned rock quarry north of Grizzly Mountain. The Oregon Parks and Recreation Division has jurisdiction over roads within Cove Palisades State Park.

Table I-3 summarizes the Forest Service and Oregon State Highway Division requirements for paved roads. Jefferson County follows the state requirements for rock quality, and the Federal Highway Administration follows their own third set of requirements. The table gives the requirements for "flexible pavement" rather than for roads with a "chip seal" surface.

Determination of Excavated Volume from In-Place Volume

The quality of the material is taken into consideration in determining excavated rock volume from in-place volume. Material used from gravel roads ideally contains a percentage of silt and clay sufficient to act as a binder. This rock will generally swell approximately 20% upon excavation. Cinders are porous and readlily break down, generally decreasing in volume by 70% leaving 30% of original in-place volume. Material used in paving, "oil rock," ideally contains no silt or clay. If any silt or clay is present a "scalper," which is a screen, may be used to remove them, or they may be removed by washing. For oil rock, excavated volume should equal in-place volume.

Table I-2

Specifications for Crushed Aggregate on Gravel Roads in the Grassland (Base Rock)

Description	USFS Test (AASHTO)	USFS Requirement	State Test (OSHD)	State Requirement
Percent Wear; Abrasion, LAR	T96	40 max	TM211	45 max.
Durability Index	T210	35 min.	TM208	35 max.
Fine Aggregate Degradation				
Liquid Limit	T89	25 max.	TM102	nonplastic or 35 max.
Plasticity Index	T90	6 max.	TM103	nonplastic or 6 max.
Sand Equivalent	T176	35 min.	TM101	25 min.

The first test listed in Table I-2 is the percent wear or abrasion test. Test 96 of the American Association of State Highway and Transportation Officials (AASHTO) is also known as the Los Angeles Rattler (LAR) test. This test indicates the relative resistance of material to breakdown into sand-sized or smaller particles as a result of tumbling in a cylinder with a prescribed number of 2-inch metal spheres. A high number indicates that the material readily wears into sand-sized or smaller particles.

The second test in Table I-2 is the durability index or fine aggregate degradation test. It indicates the relative resistance of material to break down into claylike small particles as a result of agitation in a container with water, calcium chloride, glycerine, and formaldehyde. The USFS test has a minimum requirement because the post-test weight of the material that doesn't pass through a sieve is reported as a percentage of the pre-test weight of the total sample The state test has a maximum requirement because they report the percentage of the material that does pass through the sieve.

The liquid limit is that water content of at which the material passes from a plastic to a liquid state.

The plasticity index is the range of water content within which the material is in a plastic state.

The sand equivalent test is intended to show the percentage of sand-sized particles in a sample. The sample is agitated in a cylinder containing water, calcium chloride, glycerine, and formaldehyde. After agitation, the material in the cylinder is allowed to settle for 20 minutes and then the amount of material that has accumulated at the bottom of the cylinder is measured.

Description of Individual Materials Sources

The individual materials sources on the Grassland have been classified according to the Unified Rock Classification developed by Doug Williamson of the Forest Service. This classification scheme provides a brief description of the engineering characteristics of rocks based on observations in the field. When used with other geotechnical information such as water table location, it permits an estimate of rock performance in such areas as excavation, slope stability, material use, blasting character, and water transmittal. It is not used to classify unconsolidated sand and gravel deposits. The Unified Rock Classification is listed in Table I-4.

Table I-5 lists the individual materials sources and summarizes information on the rock type, Unified Rock Classification (URC), primary use of the materials source, and secondary use.

The following paragraphs describe the individual materials sources in order by their primary use.

Pit Run

Pit run material consists of native materials that are of a size and grading that can be taken directly from the source and placed on the road without crushing.

There are three materials sources on the Grassland that contain pit run material. Two of them, Geneva M.S. and Round Butte M.S., are composed of cinder, while Cyrus is composed of fractured basalt of the Clarno Formation.

Cyrus M.S.

Cyrus Material Source is located on the northeastern slope of Gray Butte, approximately one mile north of the top of Gray Butte. It was discovered about 15 years ago by the Forest Service road crew. Visibility of the pit from Highway 26 became a problem as the pit enlarged, and was mitigated by construction of berms on the northwest and northeast sides of the excavation area. The berms have been seeded so they will blend in with the hillside and shield view of the excavation from Highway 26. Any southwestward expansion of the pit further into the hillside beyond the limits of the current 1988 pit plan will require close cooperation between the Engineering Section and the Grassland District to ensure that visual constraints are met; excavation further into the hillside may require higher berms.

The 1988 pit plan shows that the current excavation may be extended 100 feet to the northwest and not at all in the other directions. Drill hole data indicate that the highly fractured basalt at the surface extends downward 12 to 17 feet. Less-weathered, and therefore less-broken rock, is encountered below 12 to 17 feet. This material would probably be grid-rollable in contrast to the pit-run material at the surface, and may even require crushing. The rock extends to more than 108 feet, which is the depth of the deepest of four drill holes at the site.

Based on the current development plan, which shows excavation to about 15 feet in depth, there are about 150,000 cubic yards of material remaining. The material contains a sufficient amount of silt and clay to set up almost like concrete when used on gravel roads, and this, in combination with its average size of 2 inches in diameter, makes it ideal pit run material for use on the low volume gravel roads on the Grassland. This rock has been used by the Forest Service at Haystack Reservoir's boatramp and parking lot and on many of the gravel roads in the area. If used by other agencies it would be rapidly depleted, so it is reserved for exclusive long-term use by the Forest Service. Access to the materials source is restricted by a locked gate near the entrance to the pit.

Table I-3
Crushed Aggregate Specifications for Paved Roads in the Grassland (Flexible Pavement)

Description	USFS Test (AASHTO)	USFS Requirement	State Test (OSHD)	State Requirement
Percent Wear; Abrasion, LAR	T96	40 max.	TM211	30 max.
Durability Index, Fine Aggregate Degradation	T210	35 min.	TM208	30 max.
Sand Equivalent	T176	45 min.	not listed	not listed

For a brief description of each test, see Table I-2

Note that in sampling material for rock quality testing, a representative sample must be obtained from the area to be mined Sampling technique is important so that the test results reflect the rock quality that will be obtained from the quarry and not just the best rock in the quarry

Table I-4
Unified Rock Classification System by Doug Williamson

In using the Unified Rock Classification System, one observation that best describes the rock is chosen from each of four sets of descriptive terms, and the corresponding letter symbols are assigned to the rock.

Letter Symbol	Observation--Interpretation
Degree of Weathering Terms	
A	Magnifying-lens fresh state--high quality rock for foundations and excavations
B	Visual fresh state--standard quality rock for foundations and excavations
C	Stained state
D	Partly decomposed state
E	Completely decomposed state--Unified Soil Classification tests should be run
Specimen Strength Terms	
A	Rebound reaction with hammer blow--free-draining,fragments may form sharp and angular "arrowheads," high energy transfer in response to blasting

B	Pits with hammer blow--free-draining, high energy transfer in response to blasting
C	Dents with hammer blow--usually not suitable for road fill or surfacing and is not free-draining, low energy transfer in response to blasting
D	Craters with hammer blow--responds to freeze-thaw stresses by cracking, produces poorly drained embankments, not suitable for road fill or surfac ing, very low energy transfer when blasting
E	Moldable with finger pressure--must be evaluated as a soil for design pur poses

Planar and Linear Terms

A	Solid with random breakage--rare; the strength of any individual piece is indicative of the strength othe entire mass
B	Solid with preferred breakage--may produce an undesirable size or shape for rock aggregate
C	Latent planes of separation--in most cases, blasting energy will be reflected by the plane and produce a separation and breakage at right angles to the plane
D	Two dimensional, open separations--important to consider the attitude of the planes in design considerations; water transmission can be determined by water tests
E	Three dimensional, open separations--the attitude of the planes with respect to the slope or excavation is a chief design consideration; water transmission can by determined by water tests

Unit Weight Terms

A	Greater than 160 pounds per cubic foot--suitable more than 50% of the time for use as road aggregate, concrete aggregate, or riprap without lab t testing
B	From 150 to 160 pounds per cubic foot--requires laboratory testing
C	From 140 to 150 pounds per cubic foot--typically not suitable for use as road aggregate, concrete aggregate, or riprap, does not produce free-draining fill, and will probably degrade
D	From 130 to 140 pounds per cubic foot--typically not suitable for use as road aggregate, concrete aggregate, or riprap, does not produce free-draining fill, and will probably degrade
E	Less than 130 pounds per cubic foot--likely to degrade during excavation under abrasion of excavating equipment

Table I-5

Rock Description Summary and Use of Materials Sources

Materials Source	Rock Type	URC	Primary Use	Secondary Use
1. Round Butte	cinders	CDAE	pit run	riprap
2. Big Canyon	sand/gravel	--	borrow	waste area
3. Metolius	sand/gravel	--	borrow	waste area
4. Schmoker	basalt	BBEA	crusher	riprap
5. Fence	rhyolite	BBEE	grid roll	--
6. Grandview	sand/gravel	--	borrow	waste area
7. Boyce	rhyolite	CBBD	riprap	crusher
8. Haystack	rhyolite	CBED	grid roll	riprap
9. Geneva	cinders	CDAE	pit run	riprap
10. Canal	sand/gravel	--	borrow	recreational (ORV's)
11. McPheeters	basalt	BBEA	crusher	grid roll
12. Cyrus	basalt	BBEA	pit run	grid roll
13. Japanese Creek	basalt	BBEA	crusher	riprap

Round Butte M.S.

Round Butte material Source is a cinder pit complex located on the north slope of Round Butte, approximately two miles east of Round Bute Dam and the Deschutes River. Round Butte is included in the pit run category because this material would be used by the Forest Service as pit run material although the Forest Service has not used any cinder from this pit to date. The primary user of this pit crushes the cinder for use in sanding icy paved roads.

The state is the primary user of the pit, although the City of Culver has a long-term use permit and has removed small quantities of cinder. The state owns the mineral rights in the SW 1/4 Section 13, which is in the western half of the cinder pit complex, and has a long-term use permit from the Forest Service in the rest of the material source. Even though the state has a long-term use permit, it nevertheless obtains short-term use permits, this serves as a way of keeping the Forest Service informed on its rate of use.

Cinder was removed from the middle level of the pit complex many years ago, probably during the 1940's and 1950's. Hazardous vertical walls and narrow haul roads at the middle level are the legacy from this era of excavation. The state is now removing material from the top of the pit complex downward and will gradually obliterate the hazardous area, leaving an overall 2:1 slope. The cinder pit is not visible from the paved road and viewpoint at the top of Round Butte, which is part of Cove Palisades State Park.

Every 4 or 5 years the state crushes approximately 20,000 cubic yards of material to store in a stockpile and use over several years. As a result, the state obtains a reclamation permit from the Oregon Department of Geology and Mineral Industries about every 5 years and the pit is listed as inactive during the other years. In 1987 the state crushed 25,000 cubic yards of which 4,500 cubic yards were obtained

from Forest Service property. This cinder was removed under a 1987 permit from the Forest Service for removal of 70,000 cubic yards of material over 10 years At the current rate of use, this 1987 permit will allow two more entries before the permit needs to be renewed.

Because a more durable material is available in this area for road construction, this cinder is best suited for its present use in road sanding. The state had seven rock quality tests run in 1963, on cinders sampled from various locations in the pit complex. The tests revealed an LAR of 45-50, liquid limit of 34-41, and no plasticity. No drilling has been done to determine the extent of the cinder deposit, but based on the current rate of use and a brief visual inspection of surface material, there is sufficient material for the next 20 years.

Because the state is the primary user of this materials source and owns the mineral rights in the western part of the pit complex, it is recommended that the Forest Service look into the feasibility of giving their portion of Round Butte M.S. to the state as part of a land exchange agreement.

Geneva M.S.

Geneva M.S. is located about 3 miles west of Juniper Butte, overlooking the Crooked River Gorge Long-term use permits by Deschutes Valley Water District and Jefferson County indicate development and use of this cinder pit by those agencies. The Forest Service has not obtained material from this pit.

Cinder from the pit has been excavated using a backhoe, screened, and used on roads in the immediate vicinity. There is currently a screen and a stockpile of 8-inch-minus material near the center of the pit. Oversized cinder and basalt boulders from the 5-foot-thick overlying basalt flow are stored on the western side of the pit near the cliff edge. The pit is now about 200 feet by 200 feet in size. The cinder extends down about 30 feet below the present depth of excavation based on exposures in the canyon wall. This indicates that there are about 30,000 cubic yards of cinder remaining. Thirty percent of 30,000 cubic yards of in-place volume calculates to about 9,000 cubic yards of excavated volume remaining.

The pit may be expanded to the north, east, and south, but it is unknown how far the cinder extends horizontally beneath the capping basalt flow. No drilling has been done to determine the extent of the cinder deposit. This pit is well-suited for its current low-volume, local use.

Grid Roll

Grid-roll material consists of native materials of a quality that can be taken directly from the source, without crushing, and broken down on the road by a grid roller. This material generally is platy or partially decomposed rock that is too large in size to be pit run material.

There are two materials sources that primarily contain grid roll material. Both are in the John Day Formation.

Fence M.S.

This material source is located along Road 53, approximately 7 miles southeast of Madras. The material is platy welded ash, and a portion of the materials source has already been removed. Approximately 600 cubic yards of material is available for future excavation, and may be removed up to a fenceline without adverse visual impact. The area for future excavation is approximately 20 feet wide, 150 feet long, and 5 feet deep.

Haystack M.S.

Haystack Materials Source is located on a butte approximately one mile south of Haystack Reservoir. This material has been used on county roads in the area. Long-term use permits are held by Jefferson County and the City of Culver.

The pit is currently at its limits of expansion due to visual constraints. It is unknown how much deeper the excavation may be extended, but probably not more than 20 feet based on a brief visual inspection. No drilling has been done in the pit. The material abruptly becomes clayey on the western side of the pit, and this white, clayey material should be avoided. Based on an excavation 50 feet wide, 400 feet long, and 20 feet deep, there are approximately 15,000 cubic yards of material remaining. Approximately 500 cubic yards of riprap have been stored near the center and on the western side of the excavation. This riprap may not be durable as indicated by the ready decomposition of the smaller-sized rock from this pit where it has been used on the road into the campground at Haystack Reservoir.

This materials source has received little use in the past 10 years. Access is restricted by a locked gate at the beginning of the access road.

Because the rock decomposes readily and there is no anticipated demand for the rock, it is recommennded that this materials source be rehabilitated and closed to future use.

Crusher

Material for crushing must meet the requirements listed in Table I-3 on specifications of rock quality for paved roads. In general descriptive terms, material suitable for crushing is clean (lacking in silt and clay), hard, and durable. Two of the materials sources in this category are in the Columbia River Basalt Group, and one is in the Clarno Formation.

Schmoker M.S.

Schmoker Materials Source is located on a butte approximately 4 miles east of Madras. This quarry was developed by the state during paving of Highway 97, and it contains clean, durable rock suitable for use in paved roads. In 1986, Jefferson County crushed 20,000 cubic yards of rock, stockpiled 25% of it for Forest Service use, and removed the balance for use as base rock and leveling rock on two gravel county roads in the area. The Forest Service has already used half of the stockpiled crushed rock leaving 2,500 cubic yards for future use.

The 1986 development plan is now in need of updating due to removal of material from Phase 1 and Phase 2 by Jefferson County in 1986. No drilling has been done in this quarry to aid in determination of the extent of the resources. Based on a brief visual inspection, the floor of the quarry could be lowered to remove approximately 15,000 cubic yards and bring it to the depth shown on the 1986 development plan. An additional 15,000 cubic yards may be removed to let down the quarry floor to the depth of the underlying ash bed. The floor may be lowered on the west side of the quarry only, because the westward-dipping ash bed, which is unusable, already has been encountered on the east side. West side lowering of the quarry floor must not disturb the outslope, which provides a visual barrier.

The Forest Service uses approximately 2,000 to 3,000 cubic yards per year for road maintenance. At this rate, the materials source will be exhausted in about 10 years. Because there is a limited amount of rock left in this pit, future use should be reserved for the Forest Service exclusively.

McPheeters M.S.

McPheeters Materials Source is located approximately 1.5 miles east of Highway 97 and 3 miles northwest of Smith Rock State Park. It contains clean, durable rock suitable for use in paved roads although the north side of the pit contains clayey material. Due to questions concerning land ownership in the area, property lines will be posted on the ground by April 1989, by a surveyor under contract to the Forest Service.

The Oregon State Highway Division developed the quarry originally, and over the course of many years removed approximately 50,000 cubic yards of rock. Jefferson County removed 30,000 cubic yards in 1986 for use as base rock and as leveling rock on about 15 gravel county roads.

A 1985 development plan is in need of updating using new land ownership determinations and detailed topographic data that will be available by April 1989. Rock from Phases 1, 2, and 3 of the 1985 plan were removed by Jefferson County in 1986, leaving approximately 70,000 cubic yards available

for future use in Phases 6 through 8. No drilling has been done in this quarry to delineate the extent of the resource. The quarry is at its limit of expansion on the north side due to visual constraints and due to the presence of a clay block that extends to an unknown depth and over which the basalt lava apparently flowed and abruptly decreased in thickness. Development of the quarry may continue indefinitely back into the hillside to the east and may extend to neighboring knobs to the south depending on the outcome of the property ownership determination.

Two rock quality tests were run in 1987 by the state, one of which was from 1-inch-minus rock that Jefferson County had crushed. The crushed rock had test results as follows: abrasion of 16, fine aggregate degradation of 30, and sand equivalent of 35; fines with a liquid limit of 45 and plasticity index of 16 were present in the sample. This sample does not meet requirements for oil rock, but may be used on gravel roads. A second rock sample from the quarry had test results as follows: abrasion of 17, fine aggregate degradation of 17, and sand equivalent of 41; no fine-grained sand, silt, or clay were present. This sample meets specifications for oil rock.

The Federal Highway Administration would like to obtain 20,000-30,000 cubic yards for construction work on the road south of Haystack Reservoir in about 2 or 3 years. The state would like to remove about 40,000 cubic yards for overlay work on the Madras Highway in about 4 or 5 years. The Forest Service uses approximately 300-400 cubic yards per year for road maintenance.

The state is the primary user of this pit and apparently owns the mineral rights in the area where the materials source will be developed in the future. Because of this and because this pit is outside the Grassland boundary, it is recommended that the Forest Service examine the possibility of giving their portion of McPheeters M.S. to the state as part of a land exchange agreement.

Japanese Creek M.S.

Japanese Creek Materials Source is located approximately 1.5 miles south of Highway 26 and 4 miles southwest of Grizzly Mountain. It was developed by the state, and the material consists of clean, durable rock suitable for crushing. The Forest Service has used this rock for gabions at the Haystack Reservoir boatramp and uses 800-1,000 cubic yards per year for road maintenance.

No drilling has been done in this quarry, but the rock may extend to approximately 50 feet in depth based on the visually estimated thickness of this geologic unit exposed in outcrops one mile to the north as viewed looking south from Gray Butte. Opalized flow breccia from the top of the basaltic lava flow is present on the north side of the quarry. The rock unit dips 5 degrees to the southeast. Assuming that the quarry may be extended to the south approximately 1,000 feet, in an east-west direction 200 feet, and to a depth of 50 feet, the total resources of the quarry are roughly estimated as 370,000 cubic yards. Due to the remoteness and seclusion of the location, there are no visual constraints to development. The southern boundary of the Grassland occurs less than 1/2 mile south of the quarry.

Riprap

Riprap is large, durable pieces of rock that are placed to prevent erosion and thereby preserve the underlying surface or structure. There is only one material source on the Grassland with its primary use as supply of riprap, although several other materials sources may supply riprap as a secondary function.

Boyce M.S.

Boyce Material Source is located approximately 2 miles west of Highway 26 and about 3 miles northeast of Haystack Reservoir. The quarry is a roadcut along the east side of Road 89, and was probably developed by the state.

Rock that may be removed without adverse visual impact consists of 5-feet-minus boulders that are in two stockpiles of about 500 cubic yards each at the

north and south end of the quarry. Removal of these stockpiles would visually improve this quarry, but removal of additional rock would have an adverse visual impact. Fill piles have been placed near the center of the quarry, and these need to be leveled and seeded. Additional waste storage should be discouraged at this site due to its adverse visual impact.

This quarry recieves occasional use as a source of riprap. It is not needed for crushed rock due to visual constraints and the availability of rock from Japanese Creek M.S.

Borrow

Borrow is earth material such as sand and gravel that is removed to be used for fill at another location. All four of the materials sources in this category are in the Deschutes Formation.

Metolius M.S.

Metolius Materials Source is located on a ridge approximately three miles south of Madras, less than 1/4 mile east of Highway 26. This material consists of silty sand and gravel in horizontal beds. It has been used continually by Jefferson County at a rate of 4000 to 5,000 cubic yards per year as base rock and leveling rock on gravel county roads. A privately-owned gravel pit occurs to the north of this materials source.

The material is currently being removed by advancing an upper bench and two lower benches. Advancement of the upper bench removes the top of the ridge, and approximately 75 feet of the original ridgetop remains in the northern end of the pit. The two lower benches are at the same horizontal level but are advancing in opposite directions. No drilling has been done in this pit to determine material type with depth. Assuming that no unusable material is encountered, 500,000 cubic yards of this material may be remaining At the present rate of removal, the resource will last for well over 50 years. Development of the pit should take into account visual constraints, which will become important as excavation proceeds and the ridge becomes lower.

Grandview M.S.

Grandview Materials Source overlooks Lake Billy Chinook on the west side of the Deschutes River canyon, about 5 miles southwest of Round Butte Dam. Silty sand, gravel, and cobbles occur in this material source. Cobbles in this material are generally too numerous and too large for use on gravel roads. Use of this materials source, in the past, by the Forest Service road crew, required waste storage of large amounts of the excavated material.

Because this materials source is located inside Cove Palisades State Park and there is no anticipated demand for the rock, it is recommended that this materials source be rehabilitated and closed to future use.

Canal M.S.

Canal Material Source is located two miles east of Highway 97 and 1 mile north of McPheeters M.S. This site was developed as an artillery target range during World War II and has since been used as a borrow source and for waste storage. In one outcrop the material consists of approximately 30% silty sand and 70% gravel that is generally 1 to 3 inches in diameter. The site is currently within an off-road vehicle (ORV) management area and is being used by motorcycles and all-terrain vehicles. Because this material is not in demand and is low in quality, it is hereby recommended that this materials source be closed and rehabilitated for use by recreational vehicles.

Big Canyon M.S.

Big Canyon Material Source is located south of the Metolius River, approximately 4 miles southwest of Round Butte Dam. This materials source is not in current use and was not visited for review in this report. Leroy Burke, of the Forest Service road crew, reports that the rock consists of clayey gravel and is not suitable for use on the gravel roads in the area.

Because there is no anticipated demand for the rock, this materials source should be rehabilitated and closed to future use.

Projections of Future Use

Materials supplies are adequate for the next 10 years, but it is unclear whether or not there will be adequate supplies further into the future. Visual constraints, noise constraints, and other limits on development of materials sources will make development of new sites more difficult as population in the area increases. In addition, increasing numbers of houses in the Madras-Redmond-Prineville area will occupy areas that could otherwise be good sources of material, bringing added pressure on Forest Service land to supply rock to the county and state.

Projections of the amount of material that will be needed by the State, Jefferson County, Federal Highway Administration, and Forest Service were obtained by contacting each agency. The use of the materials determines the type of material needed, and supplies of materials are needed as close to the area of use as possible to reduce haul distances and thereby reduce costs. As a result, the use for the material is noted and the amount of material is attributed to specific materials sources that contain rock of appropriate quality and that are located close to the area of use.

Oregon State Highway Division

In a telephone conversation with Rolland Van Cleave on 10-7-88, future needs of the Oregon State Highway Division were estimated as:

Round Butte M.S.--approximately 4,000 to 5,000 cubic yards per year for road sanding on state highways in the Madras area.

McPheeters M.S.--approximately 40,000 cubic yards will be needed in about 1991, for an overlay on the Highway 97 high bridge over the Crooked River (T. 13 S., R 13 E., Sec. 32).

Japanese Creek M S.--If rock is not available from McPheeters due to ownership problems, the rock may be obtained from Japanese Creek M.S.

The State does not anticipate expanding Highway 97, between Redmond and Madras, to a 4-lane highway in the forseeable future.

Jefferson County

In a telephone conversation with Don Wood on 10-7-88, future needs of Jefferson County were estimated as:

Metolius M.S.--approximately 2,000 to 4,000 cubic yards per year for road maintenance in the Madras area.

The County has approximately 700 miles of road, of which about 200 miles are paved. The County is paving some of their gravel roads each year, and expect this paving program to continue for about 20 years. Most of the material needed for their paving is obtained in a private quarry about 2 miles northwest of the townsite of Grizzley, from which they extract approximately 50,000 to 60,000 cubic yards per year. The County expects this quarry to be able to continue to supply large quantities of rock for the next 20 years

Federal Highway Administration

In the same telephone conversation with Don Wood on 10-7-88, future needs of the Federal Highway Administration were estimated as:

McPheeters M.S.--approximately 20,000 to 30,000 cubic yards to move the road on the south side of Haystack Reservoir from its current route through a farmer's yard to a nearby route on land donated by the farmer. The road work would be done in about 1991 or 1992, by the Federal Highway Administration in cooperation with Jefferson County and Ochoco National Forest.

The Federal Highway Administration paves public access roads into national forest land using money directly from Congress. The Federal Highway

Administration can pave only state or county roads, not Forest Service Roads--Forest Service roads are paved by private contractors using Forest Service money budgeted to the Federal Road Program. The Oregon State Highway Division, representing itself and the counties, meets with the Forest Service and the Federal Highway Administration yearly to decide which state and county roads the Federal Highway Administration should pave for Forest land access.

Forest Service

In a conversation with Jim Zimmerlee of the Ochoco National Forest Engineering Office on 10-14-88, the issue of Forest Service jurisdiction versus Jefferson County jurisdiction on roads leading into the Grassland was discussed. Some county roads provide access to Grassland land only and the Forest Service would like to obtain jurisdiction over them and maintain them at the level at which they receive use. Some roads currently maintained by the Forest Service primarily serve residents of the area, and the Forest Service would like to give its jurisdiction of these roads to the County. Overall, there are more roads for which the Forest Service wants to give jurisdiction to the County than the Forest Service wants to obtain from the County. If the jurisdiction exchange occurs, the County would have additional roads that would eventually be paved by them using rock mostly from the private quarry north of Grizzly Butte.

In a conversation with Leroy Burk on 10-7-88, future needs of the Forest Service on the Grassland were estimated as:

Cyrus M.S.--approximately 3,000 to 4,000 cubic yards per year for road maintenance and small projects.

Schmoker M S --approximately 2,000 to 3,000 cubic yards per year for road maintenance.

McPheeters M.S.--approximately 300 to 400 cubic yards per year for road maintenance in the immediate vicinity.

Japanese Creek M S.--approximately 1,000 cubic yards per year for road maintenance and for the new boat ramp and parking area at Haystack Reservoir.

Boyce M.S.--approximately 400 pieces of 2-feet to 4-feet diameter riprap for use at Haystack campground.

A new pit run or grid roll rock source on the west side of the Deschutes River would be valuable for Forest Service road maintenance in that area. Approximately 2,000 cubic yards would be used per year on Road 6350 and Road 6360 if a suitable rock source could be found. Grandview M.S. and Big Canyon M.S. are in the area but are not suitable for pit run or grid roll use. Examination of the area for a potential material source should concentrate on the area where the Clarno Formation is exposed.

Table I-6 summarizes the availability and demand for rock from each materials source. The estimated amount of rock available from each materials source is based only on brief visual inspection except at Cyrus M.S., where drilling has been done. As a result, these estimated amounts are subject to revision, pending drilling.

A total of approximately 9,000 to 15,000 cubic yards of material are removed from the Grassland yearly for maintenance of gravel roads and sanding icy paved roads. An additional 30,000 cubic yards are removed approximately every 5 years for paving projects by the Oregon State Highway Division, Jefferson County, and the Federal Highway Administration. Material is obtained mostly by three agencies from four materials sources: the Oregon State Highway Division (4,000-5,000 cubic yards per year from Round Butte M.S., of which approximately 1,000 cubic yards per year is from the Forest Service portion of Round Butte M.S.), Jefferson County (4,000-5,000 cubic yards per year from Metolius M.S.), and the Forest Service (7,000-9,000 cubic yards per year dominantly from Cyrus M.S. and Schmoker M.S.).

At the present rate of use, rock supplies are adequate for the next 20 years. It is important to note that this assumes that the estimated resource figures are accurate. After 20 years, Round Butte M.S, Schmoker M.S., and Boyce M S. will be exhausted. *It is unclear whether or not there will be adequate* supplies further into the future due to the difficulty of projecting a future rate of use.

TABLE I-6
AVAILABILITY AND DEMAND FOR MATERIALS
(Quantities Listed are in Cubic Yards)

		FUTURE USE				
Materials Source	Estimated Resource	State	Jefferson Co	Federal Highway Admin	USDA Forest Service	Years Remaining
Round Butte *	100,000	4,000-5,000/Yr				20
Big Canyon	Unknown	**	**	**	**	Unknown
Metolius	500,000		4,000-5,000/Yr			100
Schmoker	30,000				2,000-3,000/Yr	10
Fence	600					Unknown
Grandview	Unknown	**	**	**	**	Unknown
Boyce	1,000				500 in 1989	5
Haystack	15,000					Unknown
Geneva	9,000		Minor Use			Unknown
Canal	1/	1/	1/	1/	1/	
McPheeters 2/	Pending a 4/89 survey	40,000-1991		20,000-30,000 in 1991 or 1992	300-400/Yr	Pending
Cyrus	150,000				3,000-4,000/Yr	37-50
Japanese Cr	370,000	40,000 in 1991 3/			1,000/Yr	50

* Approximately 1,000 cubic yards per year of this 4,000 to 5,000 per year total is obtained from the Forest Service portion of Round Butte M S , the majority of the rock is from the state-owned portion of the materials source The estimated resource amount includes both the state-owned and Forest Service-owned portions

** Not currently in demand.

1/ *Recommended for closure*

2/ Initial entry and development is in the Forest Service-owned portion of the materials source Continued development will enter onto the state-owned portion, most of the resource is state-owned

3/ If not obtained from McPheeters

Figure I-4

MATERIALS SOURCES

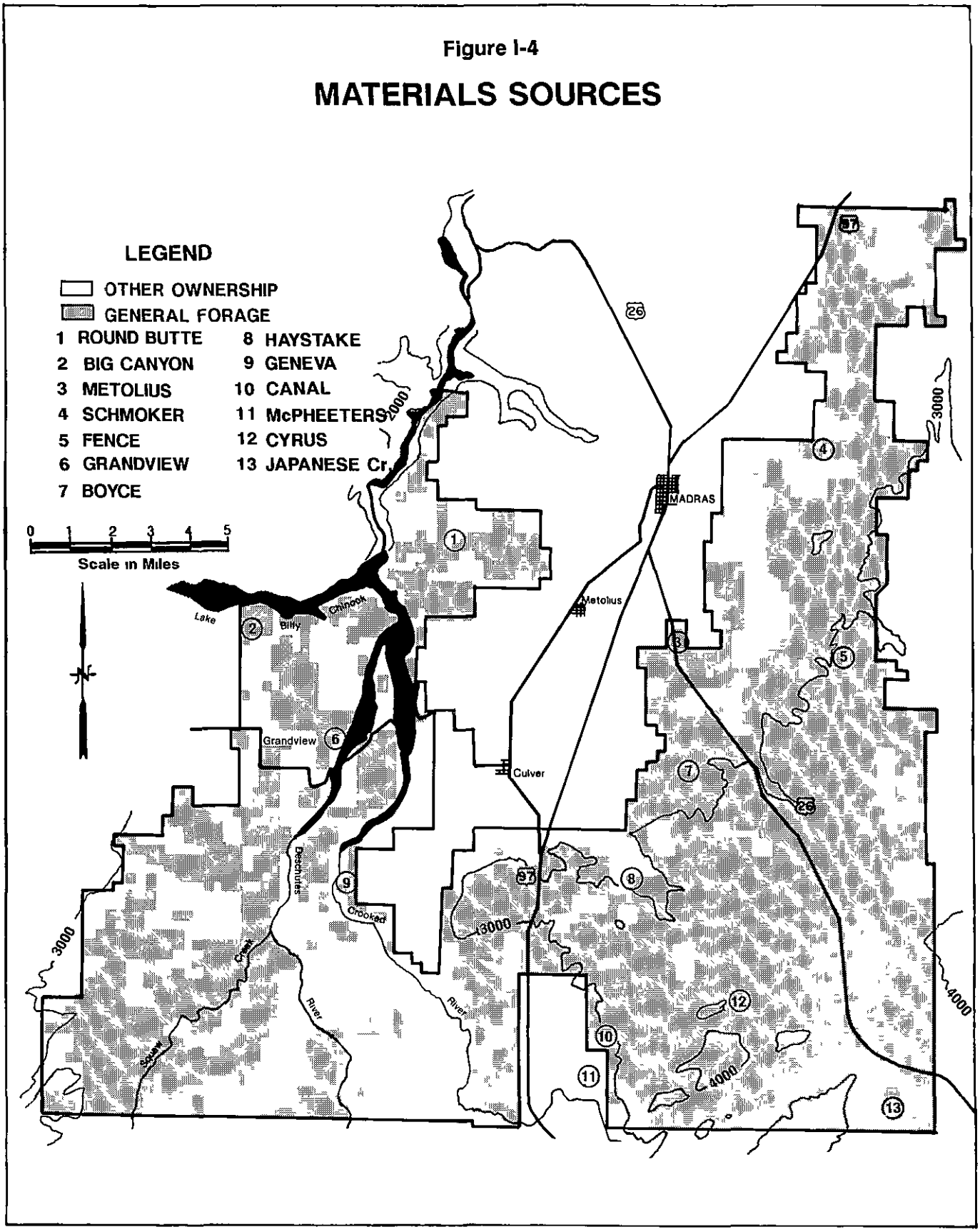
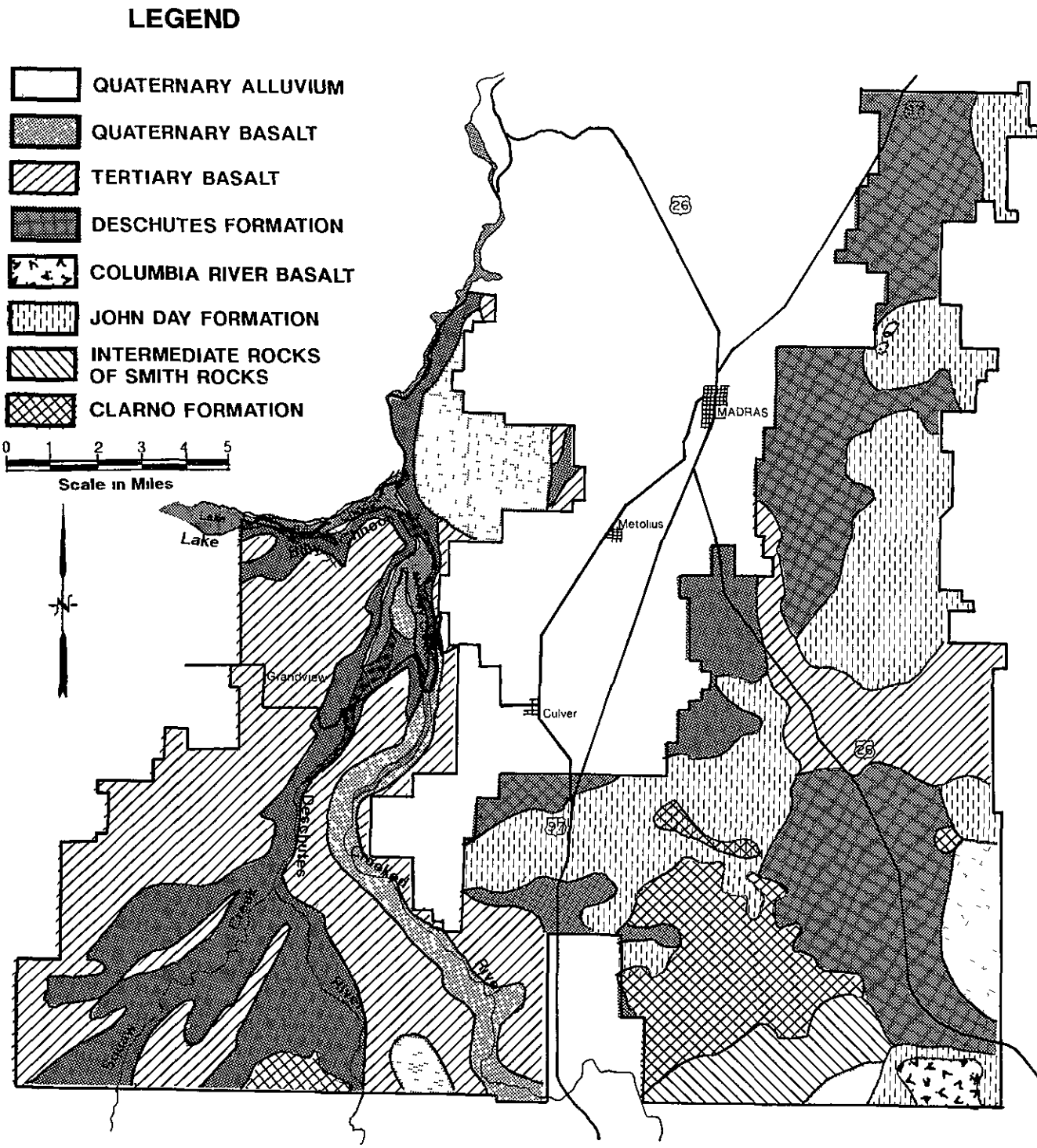


Figure I-5

GEOLOGIC MAP



Appendix J

Rimrock Springs Wildlife Management Area

Appendix K

Cove Palisades State Park

Appendix J

Rimrock Springs Wildlife Management Area

Management Plan and Memorandum of Understanding

The Rimrock Springs Wildlife Management Area is located in the center of the Crooked River National Grassland, adjacent to State Highway 26, midway between Prineville and Madras.

The presence of ponds and springs in a semiarid grassland ecosystem provides a wide variety of plant communities and unique wildlife habitat in a relatively small area. The presence of rimrock, old homesteads with farm fields, and a variety of plant communities on various soil types adds to the diversity.

In the past, activities have focused on administrative grazing and hunting uses. More recently, demand for environmental study, wildlife viewing, photography, and nature study by numerous individuals and groups has increased.

Because of these demands, the 450-acre area has been developed cooperatively with the state and private groups. Two official documents dealing with the area, both signed in 1981, are on file and can be viewed at the Ochoco National Forest Supervisor's Office.

Rimrock Springs Wildlife Management Area Management Plan - this document was developed by the Forest Service. While the Grassland Plan provides a description of the area, emphasis and desired future condition (Chapter 4, Section 2), as well as management practices, standards and guidelines, this management plan contains more detailed descriptions of habitat and wildlife, and actions to be taken in order to meet objectives for the area.

Memorandum of Understanding between the USDA Forest Service and the Oregon Department of Fish and Wildlife for Administration of Rimrock Springs Area - this document was drawn up in cooperation with the two mentioned parties, and outlines the administration of the area, the responsibilities and coordination of agencies involved, and contains the legal description of the area.

Appendix K

Cooperative Agreement With the State of Oregon for Cove Palisades State Park

Background

Cove Palisades State Park is a developed recreation complex - campgrounds, boat ramps, swimming beaches, and picnic grounds - located on the Deschutes and Crooked River arms of Billy Chinook within the boundaries of the Crooked River National Grassland.

Land ownership within the park is a mix of State and Federal lands totalling 7,000 acres, as follows:[1]

State Land	1,434 acres
Leasedfrom Forest Service (National Grassland)	2,695
Leased from BLM	1,170
Lake Billy Chinook	1,700

Except for the proposed Island Research Natural Area and fire protection, the park is managed by the State Division of Parks and Recreation with little input or interference from the Forest Service.

The park was originally located along the Crooked and Deschutes Rivers, but was relocated to higher ground along the shores of Lake Billy Chinook and expanded when the Round Butte Dam was constructed.

A file (2740) located at the Ochoco National Forest Supervisor's Office includes the cooperative agreement between the State of Oregon and Department of Agriculture, signed April 9, 1940, and extensive correspondence between the State and Forest Service regarding the park. Over the years, three main issues have surfaced.

Park Boundary

The files indicate that modification of the park boundary has been discussed by the Forest Service and State, but never fully resolved. In their 1981 master plan, the State proposed changing the park boundary to eliminate 1,080 acres of National Grassland land, located on the outer edges of the park on the plateaus above the canyon rim, that were not considered essential to the managing of the park.

Transfer of Ownership

The files indicate that the idea of transferring most of the National Grassland lands within the park boundary to the State has also been discussed repeatedly. The concept has been supported by both parties, but a transfer has not yet taken place.

The most recent attempt at a land transfer was tabled when the Forest Service/BLM interchange was proposed several years ago. Apparently, the feeling was that the Federal agencies should resolve the land ownership problems between themselves before attempting to deal with the State.

One parcel within the park boundary that the Forest Service has expressed its intent to retain is the Island Research Natural Area, located on a peninsula between the Crooked and Deschutes River arms of Lake Billy Chinook. Most of the Island is under BLM administration, and both agencies agree to manage it as a research natural area.

If Forest Service lands within the park boundary were transferred to the State, the lease agreement would no longer be needed.

[1] from The Cove Palisades State Park Master Plan, State of Oregon Department of Transportation, 1981

Minerals

Proposed policies for managing minerals on National Grassland lands within the park boundary have generated the greatest amount of discussion between the State and the Forest Service.

In 1982, the Forest Service prepared an environmental assessment responding to seven applications for oil and gas leases on National Grassland lands within the park. The Forest Service's preferred alternative proposed leasing 900 acres with standard stipulations, 1,000 acres with special stipulations, and 800 acres with no surface occupancy.

In responding to the proposal, the state park administrator stated:

> "We strongly recommend that the...Park...not be leased for mineral exploration or only non-surface leasing be considered..."

The National Park Service expressed the opinion that because the park had been developed in part with funds from the Land and Water Conservation Fund, use other than for outdoor recreation could only be permitted if permission was granted from the Secretary of Interior.

The debate never came to a head because the environmental assessment was never signed, and the leases were not developed. However, it is likely there will be interest in leasing again at some time in the future, which suggests that the underlying issues need to be resolved.

Appendix L

Haystack Reservoir

Appendix L

Haystack Reservoir Recreation Management Plan

Haystack Lake, a 233-acre reservoir, was constructed in 1958. It was constructed to provide interim storage of irrigation water for the Madras-Culver area. North Unit Irrigation District oversees the flow of water and manages the dam and related facilities. The dam was constructed by the Bureau of Reclamation. Reservoir capacity is 5,635 acre feet and is usually held at 80 percent capacity. Water comes to the reservoir from Wickiup Reservoir, via the Deschutes River from Wickiup to Bend, and by canal from Bend.

The reservoir is administered by several federal, state, and county agencies. These include the U.S. Forest Service - Crooked River National Grassland, the Bureau of Reclamation, Oregon Department of Fish and Wildlife, Oregon State Marine Board, North Unit Irrigation District, and Jefferson County. Since each agency has different management objectives, a plan was necessary in order to guide the overall management of the area in a manner agreed upon by all. Consequently, the Haystack Reservoir Recreation Management Plan was developed in 1986.

The plan elaborates on a number of factors involving the reservoir, including:

The Physical Setting - vegetation, wildlife, fisheries and unique habitats; topography and climate; man-made facilities and other recreation sites.

The Social Setting - types of recreational experiences available and the amount and type of contact between people.

The Managerial Setting - management policies and objectives of the agencies involved; public comments and concerns which were well documented through on-site interviews, public meetings and the involvement of local representatives serving on the Haystack Area Planning Committee.

Summary of Past Land Management - land transfer proposals, management agreements, leases, and permits.

Future Management - special zones, area specific developments, a development schedule, and monitoring methods.

The Haystack Reservoir Recreation Management Plan is on file in the Ochoco National Forest Supervisor's Office.

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Abbreviations and Acronyms

ABBREVIATIONS AND ACRONYMS

* *Term is defined in the Glossary*

Acronym	Definition
"8A"	Contracts set aside for Minority Contractors
A	Alternative A
A.	Acres
ACF	Acre Foot *
ACHP	Advisory Council on Historic Preservation *
ADRV	Air Quality Related Values
AFDC	Aid for Dependent Children
AIRFA	American Indian Religious Freedom Act
AMP	Allotment Management Plan
AMS	Analysis of the Management Situation *
ASQ	Allowable Sale Quantity *
ATV	All-Terrain Vehicle *
AU	Animal Unit *
AUM	Animal Unit Month *
B-MOD	B-Modified Alternative
BD	Brush Disposal
BG	Big Game Habitat (Area Management Objective) *
BLM	Bureau of Land Management
BMP	Best Management Practices *
BOR	Bureau of Reclamation
B.t.	*Bacillus thuringiensis* *
BTU	British Thermal Units
C-MOD	C-Modified Alternative
CCC	Civilian Conservation Corps
CEQ	Council on Environmental Quality
CFL	*Commercial Forest Land* *
CFR	Code of Federal Regulations
CMAI	Culmination of Mean Annual Increment *
CRITFC	*Columbia River Inter-Tribal Fish Commission*
CRNG	Crooked River National Grassland
DBH	Diameter Breast Height *
DC/SF	Deschutes Canyon/Steelhead Falls
DEIS	Draft Environmental Impact Statement *
DEP	Departure *
DEQ	Oregon Department of Environmental Quality
DF	Douglas Fir
DIB	Diameter Inside Bark
DOGAMI	Oregon Department of Geology and Mineral Industries
E-DEP	E-Departure Alternative
EA	Environmental Assessment *
EA	Euro-American (Cultural Resources)
ECA	Equivalent Clearcut Area *
EEO	Equal Employment Opportunity
EFSA	Escaped Fire Situation Analysis
EHA	Equivalent Harvest Area *
EHE	Earned Harvest Effect *
EIS	Environmental Impact Statement
EO	Executive Order
EPA	*Environmental Protection Agency*
FDR	Forest Development Road *
FEIS	Final Environmental Impact Statement *

FIA	Forest Influence Area
FMEI	Fire Management Effectiveness Index *
FORPLAN	Forest Planning Model
FPFO	Forestry Program for Oregon *
FRES	Forest and Range Environment Study
FS	Forest Service
FS	Forest Supervisor
FSH	Forest Service Handbook
FSM	Forest Service Manual
FUD	Fishing User Days
FWS	U.S. Fish and Wildlife Service
FY	Fiscal Year *
HE	Habitat Effectiveness *
HEI	Habitat Effectiveness Index
HCI	Habitat Capability Index *
I	Alternative I
ICO	Issues, Concerns, and Opportunities
ID	Interdisciplinary
IDT	Interdisciplinary Team (ID Team) *
IMPLAN	Forest Service Input-Output Economic Model *
IPM	Integrated Pest Management *
K-V	Knutson - Vandenberg Act of 1924 *
KV	Kilovolt
LIDES	Local Interactive Digitizing and Editing System
LMP	Land Management Planning
LP	Lodgepole Pine
LP	Linear Programming
LRMP	Land and Resource Management Plan
LTSYC	Long Term Sustained Yield Capacity *
M	Roman Numeral for 1000 *
MA	Management Area *
MA-D1-14	Management Area-Draft Plan, Areas 1-14
MA-F1-28	Management Area-Forest Plan, Areas 1-28
MA-G1-16	Management Area-Grassland Plan, Areas 1-16
MAI	Mean Annual Increment *
MAR	Management Attainment Report
MAX	Maximum Viable Population
MBF	Thousand Board Feet *
MC	Mixed Conifer *
MCF	Thousand Cubic Feet
MIS	Management Indicator Species *
MM	Million *
MMBF	Million Board Feet
MMCF	Million Cubic Feet
MO	Management Objective
MOA	Memorandum of Agreement *
MOU	Memorandum of Understanding
MR	Management Requirement *
MRVD	Thousand Recreation Visitor Days
MVP	Minimum Viable Population *
NA	Native American
NC	No Change Alternative
NEPA	National Environmental Policy Act *
NFCR	North Fork Crooked River
NFDRS	National Fire Danger Rating System
NFF	National Forest Fund *
NFMA	National Forest Management Act *
NFS	National Forest System Land *

NIRP	National Information Requirements Project
NWPS	National Wilderness Preservation System
ODFW	Oregon Department of Fish and Wildlife
OHV	Off-Highway Vehicle *
ONF	Ochoco National Forest
ORV	Off-Road Vehicle *
OSWC	Oregon State Wildlife Commission (Now ODFW)
PAMARS	Program Accounting Management Attainment Reporting System
PAOT	Persons at One Time *
PL	Public Law (also P.L.)
PMOA	Programmatic Memorandum of Agreement
PNV	Present Net Value *
PNW	Pacific Northwest
PP	Ponderosa Pine
PSD	Prevention of Significant Deterioration
R	Rural (ROS Classification) *
R-6	Forest Service, Northwest Region
RAMIS	Range and Management Information System
RARE II	Roadless Area Review and Evaluation *
RIM	Recreation Information Management *
RMO	Road Management Objective
RN	Roaded Natural (ROS Classification) *
RNA	Research Natural Area *
RO	Regional Office
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum *
RPA	Forest and Rangeland Renewable Resources Planning Act of 1974
RVD	Recreation Visitor Days *
RWS	Recreation Wilderness Spectrum *
SCORP	State-wide Comprehensive Outdoor Recreation Plan
SEV	Soil Expectation Value
SHPO	State Historic Preservation Officer (or Office) *
SIP	State Implementation Plan (for Air Quality)
SMU	Streamside Management Units
SPM	Semiprimitive motorized (ROS Classification) *
SPNM	Semiprimitive Nonmotorized (ROS Classification) *
SRI	Soil Resource Inventory *
STARS	Sale Tracking and Reporting System.
S&G	Standards and Guidelines
T&E	Threatened and Endangered Species
T/R	Area to be developed for Timber/Forage Production
TIS	Transportation Inventory System
TRP	Timber Resource Plan
TSI	Timber Stand Improvement *
TSP	Total Suspended Particulates
TSPIRS	Timber Sale Program Information Reporting System
USDA	United States Department of Agriculture
USFS	United States Forest Service
VAC	Visual Absorption Capability
VIS	Visitor Information Service
VMS	National Forest Visual Management System
VQO	Visual Quality Objective
WFUD	Wildlife/Fish User Day *
WRS	Wilderness Resource Spectrum *
WS	Wild and Scenic Designation
WSA	Wilderness Study Area
WUD	Wildlife User Day

Glossary

GLOSSARY

These definitions apply to Forest Service land management and planning. Meanings may differ when used in another context. Some definitions were shortened, paraphrased or adapted to fit local conditions Definitions of other terms used in resource management but not included in this glossary may be found in the following publications·

* American Geological Institute; *Dictionary of Geological Terms*. Doubleday & Company Inc., New York, 1962.

* Kothman M.M., *A Glossary of Terms Used in Range Management*. Society for Range Management, 1974

* Mifflin, Ronald W. and Hiton H Lysons. *Glossary of Forest Engineering Terms*. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station; 1979

* Schwarz, Charles F ; Thor, Edward C., Elsner, Gary H. *Wildland Planning Glossary* USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, General Technical Report PSW-13, 1976.

A

ACCEPTABLE RIPARIAN CONDITION - A shady, brushy riparian condition with frequent amounts of tall overstory conifer trees and shorter hardwoods of alder, willow and aspen; the site has the potential to produce conifers and/or hardwood species. Moderately gentle bank slopes containing moderate to high plant densities, thick root masses, embedded angular boulders and old logs characterize these areas Frequent channel scouring and deposition will largely be replaced by mossy aquatic growth on assorted sizes of tightly packed rocks.

ACRE EQUIVALENT - Used to adjust actual acres of habitat improvement or improvement structures to reflect overall habitat benefits derived. It reflects the zone of influence of the habitat improvement for the target species For example, a single water development for upland game birds has an acre equivalent of 160, whereas a single water structure for big game has a value of 640 because it has a larger zone of influence for the more mobile big-game animals

ACRE FOOT (ACF) - A unit for measuring a volume of water. Quantity of water required to cover 1 acre (43,560 square feet) to a depth of 1 foot

ACRES OF DEGRADED WATERSHED CONDITION - represents existing soil/watershed areas which are degraded and contributing to loss in site productivity and/or creating water quality deterioration when hazardous events occur. The Soil/Water Restoration Inventory (1979) for the Ochoco National Forest (located at the Ranger District Offices) delineates these areas.

ACTIVITY - Actions, measures, or treatments that are undertaken that directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental quality objectives. Forest Service activity definitions, codes, and units of measure are contained in the Management Information Handbook (FSM 1309 11.).

ADVISORY COUNCIL ON HISTORIC PRESERVATION (ACHP) - An independent advisory body established by the National Historic Preservation Act of 1966. The mission of the Council is to advise the President and Congress on national historic preservation policies, to encourage private and public interest in historic preservation, and to review and comment on Federal undertakings that might have an effect on properties listed on or eligible for the National Register of Historic Places

ALL-TERRAIN VEHICLE (ATV) - An abbreviation whose initials stand for All-Terrain Vehicle, which is any motorized off-highway vehicle 50 inches or less in width ATV's usually have a dry weight of 600 pounds or less, traveling on three or more low pressure tires and having a seat designed to be straddled by the operator

AIRSHED - A geographical area that, because of topography, meteorology, and climate, shares the same air.

ALLOTMENT - see Range Allotment

ALLOWABLE SALE QUANTITY (ASQ) - (Comparable to programmed allowable harvest used in previous plans). The quantity of timber that may be sold from the area of suitable land covered by the forest plan for a time period specified by the plan This allowable sale quantity (ASQ) is usually expressed on an annual basis as the "average annual allowable sale quantity." (FSM 1900).

ALL-TERRAIN VEHICLE (ATV) - Any motorized, off-highway vehicle 50 inches or less in width, having a dry weight of 600 pounds or less that travels on three or more low pressure tires with a seat designed to be straddled by the operator Low-pressure tires are 6 inches or more in width and designed for use on wheel rim diameters of 12 inches or less, utilizing an operating pressure of 10 pounds per square inch (psi) or less as recommended by the vehicle manufacturer.

ALTERNATIVE - One of several policies, plans, or projects proposed for decision making.

AMENITY - An object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity value is typically used in land-use planning to describe those resource properties for which market values (or noncash values) are not or cannot be established, such as hiking or scenic viewing.

ANADROMOUS FISH - Those species of fish that mature in the sea and migrate into streams to spawn Salmon, steelhead, and searun cutthroat trout are examples

ANALYSIS AREA - An area of land (not necessarily contiguous) which for FORPLAN analysis purposes has homogeneous timber management costs and vegetative responses to timber management activities.

ANALYSIS OF THE MANAGEMENT SITUATION (AMS) - A step required under the National Forest Management Act in which the Forest determines its ability to supply goods and services to meet society's demand for them.

ANIMAL UNIT (AU) - An animal unit is a 1,000 pound mature cow, or its equivalent based on an average daily forage consumption of 26 pounds dry matter per day.

ANIMAL UNIT MONTH (AUM) - The amount of forage required by an animal unit for one month.

ANNUAL PROGRAMMED HARVEST - That part of the potential timber yield that is scheduled for harvest in a specific year.

APPROPRIATE SUPPRESSION RESPONSE - The kind, amount, and timing of suppression action on a wildfire which most efficiently meets fire management direction under current and expected burning conditions. The action may be from prompt control to confinement. (See definitions for confine, contain, and control.)

AQUEOUS - Of, relating to, or resembling water

ARCHAEOLOGY - The scientific study of the physical characteristics of cultural resources in order to describe and explain former ways of life

ARTERIAL ROAD - Roads comprising the basic access network for National Forest System administrative and management activities. These roads serve all resource elements to a substantial extent, and maintenance is not normally determined by the activities of any one element. They provide service to large land areas and usually connect with public highways or other Forest arterial roads to form an integrated network of primary

travel routes. The location and standards are often determined by a demand for maximum mobility and travel efficiency rather than by a specific resource management service. Usually they are developed and operated for long-term land and resource management purposes and constant service.

B

***Bacillus thuringiensis* (*B.t.*)** - A biological agent used to initiate insecticidal treatments of the western spruce budworm populations.

BACKGROUND - The visible terrain beyond the foreground and middleground where individual trees are not visible, but are blended into the total fabric of the stand. (See "Foreground" and "Middleground.")

BASALT - A dark gray to black, fine-grained igneous rock.

BENCHMARK - An analysis of the supply potential of a particular resource, or of a set of resources subject to specific management objectives or constraints.

BENEFIT COST RATIO - An economic indicator of efficiency, computed by dividing total priced benefits by priced costs Usually both benefits and costs are discounted so that the ratio reflects efficiency in terms of the present value of future benefits and costs.

BEST MANAGEMENT PRACTICES (BMP) - A specific activity, measure, course of action, or treatment.

BIG GAME (BG) - Those species of large mammals normally managed for sport hunting, generally elk, deer, and antelope.

BIOLOGICAL DIVERSITY - The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan

BIOLOGICAL POTENTIAL - The maximum possible output of a given resource limited only by its inherent physical and biological characteristics.

BOARD FOOT - A unit of timber measurement equaling the amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide.

*Board foot volume measurement varies with size of trees and is designed for certain product specifications and current technology Young stands that have been regenerated cannot be measured in board foot or equivalent units of measurement, attempting to do so would underestimate the biological potential of timber producing lands and make future growth estimates impossible See cubic foot

BRECCIA - A rock made up of highly angular coarse fragments

BROADCAST BURN - Allowing a prescribed fire to burn over a designated area within well-defined boundaries for reduction of fuel hazard or as silvicultural treatment, or both.

C

CANOPY CLOSURE - The progressive reduction of space between crowns as they spread laterally, increasing the canopy density.

CAPABILITY - The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology, as well as on the application of management practices, such as silviculture or protection from fire, insects, and disease

CAPITAL INVESTMENT COST - Costs generally associated with construction such as trails, roads, and physical structures for range, recreation, and fish and wildlife. Other major functions include reforestation, timber stand improvement and prescribed burning.

CAVITY - The hollow excavated in trees by birds or other natural phenomena, used for roosting and reproduction by many birds and mammals.

CINNABAR - A mineral (HgS) which is the principal ore of mercury

CLEARCUTTING - The harvesting in one cut of all trees on an area for the purpose of creating a new, even-aged stand. The area harvested may be a patch, strip, or stand large enough to be mapped or recorded as a separate class in planning for sustained yield

COLLECTOR ROAD - Roads that serve smaller land areas than a Forest arterial road, and usually connected to a Forest arterial or public highway. Collect traffic from Forest local roads and/or terminal facilities. The location and standard are influenced by both long-term multiresource service needs, as well as travel efficiency. May be operated for either constant or intermittent service, depending on land use and resource management objectives for the area served by the facility

COMMERCIAL FOREST LAND (CFL) - Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; and (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvesting.

COMMERCIAL THINNING - A cut in a stand under rotation age designed to remove excess merchantable trees The objective is to place the growth capability of the site on the remaining leave trees

COMMODITY - A transportable resource product with commercial value, all resource products that are articles of commerce

COMMON VARIETY MINERAL - Saleable minerals.

COMMUNITY COHESION - The degree of unity and cooperation evident in a community as it defines problems and attempts to resolve them.

COMMUNITY STABILITY - A community's capacity to handle change without major hardships or disruptions to component groups or institutions. Measurement of community stability requires identification of the type and rate of proposed change and an assessment of the community's capacity to accommodate that level of change

COMPACTION, SOIL - The packing together of soil particles by forces exerted at the soil surface, resulting in increased soil density

CONCERN - A point, matter, or question raised by management that must be addressed in the planning process.

CONFINE - To limit fire spread within a predetermined area principally by use of natural or preconstructed barriers or environmental conditions. Suppression action may be minimal and limited to surveillance under appropriate conditions

CONSTANT SERVICE - A road developed and operated for continuous or annual recurrent service.

CONTAIN - To surround a fire, and any spot fires therefrom, with control line as needed, which can reasonably be expected to check the fire's spread under prevailing and predicted conditions

CONTROL - To complete the control line around a fire, any spot fires therfrom, and any interior islands to be saved, burn out any unburned area adjacent to the fire side of the control line, and cool down all hot spots that are immediate threats to the contol line, until the line can reasonably be expected to hold under foreseeable conditions

CONVERSION PERIOD - A transition period during which an unregulated forest structure is converted to a regulated one. When regulated, the forest will have a distribution of stand age and size classes, providing approximately equal periodic harvests.

CORD - A unit of volume measurement containing 128 cubic feet of solid wood Generally a stack of round or split wood measuring 4 feet wide by 4 feet high by 8 feet long.

CORRIDOR - A linear strip of land identified for the present or future location of transportation or utility rights-of-way within its boundaries.

COST EFFICIENCY - *The usefulness of specified inputs (costs) to produce specified outputs (benefits).* In measuring cost efficiency, some outputs, including environmental, economic, or social impacts, are not assigned monetary values, but are achieved at specified levels in the least cost manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates-of-return may be appropriate.

COVER/FORAGE RATIO - The ratio, in percent, of the amount of area in cover condition to that area in non-cover or forage condition; the criteria by which potential deer and elk use of an area is judged

COVER - Vegetation used by wildlife for protection from predators, to ameliorate conditions of weather, or in which to reproduce.

CUBIC FOOT - In timber management a volume measured as a 1 foot cube of solid wood.

*Growth and inventory of forest stands is measured in units of cubic foot volume because it is independent of numerous product requirements occurring within a locale, region, or the nation as a whole

CULMINATION OF MEAN ANNUAL INCREMENT (CMAI) - The age at which a stand of trees no longer increases in average annual growth

CULTURAL RESOURCES - The remains of sites, structures, or objects used by humans in the past--historical or archaeological.

CULTURAL RESOURCES - Physical remains of districts, sites, structures, buildings, networks, or objects used by humans in the past. They may be historic, prehistoric, archaeological, or architectural in nature Cultural resources are land based and are nonrenewable

CUMULATIVE EFFECTS - The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

CURRENT DIRECTION - The direction contained within the following plans that has guided the recent management of the Forest and Grassland.

1. Ochoco-Crooked River Planning Unit Land Management Plan, 1979
2. Silvies-Malheur Planning Unit Land Management Plan, 1978
3. Crooked River National Grassland Land Management Plan, 1980

4. South Fork Planning Unit Land Management Plan, 1978
5. Timber Resource Plan Ochoco National Forest, 1979

D

DATA - Any recorded measurements, facts, evidence, or observations reduced to written, graphical, tabular, or computer forms.

DATA RECOVERY - Collection of information through any of a variety of techniques (e.g., photography, mapping, archaeological excavation) conducted for purposes of No Adverse Effect or mitigating Adverse Effect. Data collection is designed to recover representative data from a cultural resource prior to its disturbance or destruction.

DBH - *D*iameter at *b*reast *h*eight. Diameter of a tree 4 feet 6 inches above the ground.

DECISION CRITERIA - Essentially the rules or standards used to evaluate alternatives. They are measurements or indicators that are designed to assist a decisionmaker in identifying a preferred choice from an array of possible alternatives.

DECISION VARIABLE - A component of an alternative in which input costs, outputs and benefits are identified and used for analysis and decision making.

DEMAND - The amount of goods or services that will be consumed if offered over a given range of prices at a particular point in time.

DEMOGRAPHIC - Pertaining to the study of the characteristics of human populations, such as size, growth, density, distribution, and vital statistics.

DEPARTURE (DEP) - Timber harvest schedule which deviates from the principle of nondeclining even flow by exhibiting a planned decrease in the timber sale and harvest schedule in the future. A departure is characterized as a temporary increase over the base sale schedule without impairing the Forest's long-term sustained-yield.

DETERMINATION OF ELIGIBILITY - Formal determination by the Keeper of the National Register, Department of Interior, as to whether or not a cultural resource is eligible for listing on the National Register of Historic Places.

DETERMINATION OF EFFECT - Determination of the effect (No Effect, No Adverse Effect, Adverse Effect) a proposed undertaking will have on cultural resources listed on or eligible for the National Register of Historic Places. Requires consultation with the State Historic Preservation Officer and may require review by or consultation with the Advisory Council on Historic Preservation.

DEVELOPED RECREATION - Recreation that requires facilities that, in turn, result in concentrated use of an area. Examples of recreation areas are campgrounds and ski areas; facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings.

DISCOUNT RATE - The interest rate used in plan formulation and evaluation for discounting future benefits and computing costs, or otherwise converting benefits to a common time basis.

DISPERSED RECREATION - A general term referring to recreation use outside a developed recreation site; this includes activities such as scenic driving, hunting, backpacking, and recreation in primitive environments.

DISPERSION - To disperse the effects of timber harvest by distributing harvest units more or less uniformly throughout a drainage so that increased runoff and sediment from disturbed sites will be buffered by lower levels of runoff and sediment production from surrounding undisturbed lands.

DISTRICT - See Ranger District.

DIVERSITY - The distribution and abundance of different plant and animal communities and species within the area.

DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) - The version of the statement of environmental effects required for major Federal actions under Section 102 of the National Environmental Policy Act (NEPA) and released to the public and other agencies for review and comment. It is a formal document which must follow the requirements of NEPA, the Council on Environmental Quality (CEQ) Guidelines, and directives of the agency responsible for the project proposal.

E

EARNED HARVEST EFFECT (EHE) - An increase in the present harvest based on the expectation of increased yields in the future resulting from management practices such as planting genetically-improved stock and thinning.

ECONOMIC EFFICIENCY - See cost efficiency.

ECOSYSTEM - The interacting system of a biological community and its nonliving environment.

EDGE - The place where plant communities meet or where successional stages or vegetative conditions within plant communities come together. It often contains organisms from both communities as well as those restricted to the interface area. The number of species present is often greater than the surrounding communities.

EFFECTS - Environmental consequences as a result of a proposed action. Included are direct effects, which are caused by the action and occur at the same time and place, and indirect effects, which are caused by the action and are later in time or further removed in distance, but which are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. Effects and impacts as used in the FEIS are synonymous. Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic quality, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effects will be beneficial (40 CFR 1508.8).

ELIGIBLE - Cultural properties that meet the criteria for listing on the National Register of Historic Places.

EMPIRICAL YIELD TABLE - A table reflecting the existing standing timber volumes today and how they would grow in the future, under various timber management regimes.

ENDANGERED SPECIES - Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act.

ENDEMIC - A taxonomic category (e.g., genus, species, variety) whose natural occurrence is confined to a certain region and whose distribution is relatively limited.

ENDEMIC ORGANISM - A taxonomic category (e.g., genus, species, variety) whose natural occurrence is confined to a certain region and whose distribution is relatively limited.

ENHANCE - To improve, reinforce, enrich or strengthen the existing condition, value, or beauty of a resource.

ENHANCEMENT - Interpret cultural resources for the public benefit. Cooperate with museums, universities, and other recognized institutions, agencies, and knowledgeable persons in planning and constructing cultural resource exhibits involving National Forest System cultural resources. Coordinate these efforts with

interpretive Services people (FSM 2390). Enhancement efforts may include the full range of interpretive techniques Because enhancement may affect the resource, comply with regulations set forth in FSM 2366. In all cases consider a determination of beneficial effect (FSM 2366 26).

ENVIRONMENT - The sum of all external conditions and influence affecting the life, development, and survival of an organism.

ENVIRONMENTAL ANALYSIS - An analysis of alternative actions and their predictable short- and long-term environmental effects, incorporating the physical, biological, economic, social, and environmental design arts and their interactions

ENVIRONMENTAL ASSESSMENT (EA) - A concise public document required by the regulations implementing the *National Environmental Policy Act*.

EPIDEMIC - An outbreak of sudden rapid spread, growth, or development.

EPITHERMAL MINERAL DEPOSIT - A deposit formed in rocks of shallow depth from low-temperature hydrothermal solutions.

EQUIVALENT CLEARCUT AREA (ECA) - That area which when harvested under any of the various silvicultural regimes produces hydrological effects similar to one acre of clearcut.

EQUIVALENT HARVEST AREA (EHA) - The same as Equivalent Clearcut Area (ECA)

EROSION - The processes whereby earthy or rocky material is worn away, loosened, dissolved and removed from any part of the earth's surface.

EVAPOTRANSPIRATION - Process by which water moves from the soil to the atmosphere by evaporation from the soil or transpiration through plants

EVEN-AGED MANAGEMENT - The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together Managed even-aged forests are characterized by a distribution of stands of varying ages (and, therefore, tree sizes) throughout the forest area. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harvested. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

EXCELLENT RIPARIAN CONDITIONS - An extremely shady and brushy riparian condition with an abundance of tall overstory conifer trees and shorter hardwoods of alder, willow and aspen will be present; the site has the potential to produce conifer and/or hardwood species. Gentle bank slopes, high plant densities, thick root masses, embedded angular boulders and old logs characterize these areas Channel scouring will be minimized with deposition replaced by mossy aquatic growth on assorted sizes of tightly packed rocks.

F

FAULT A fracture or fracture zone along which there has been displacement of the sides relative to one another parallel to the fracture.

FAWNING AREAS - areas used regularly by female deer for fawning (and maintaining fawns for their first few days or weeks); optimum fawning habitat includes low shrubs or small trees under a tree overstory of about 50-percent closure, usually located on slopes of less than 15 percent where vegetation is succulent and plentiful in June and potable water is available within 183 meters (600 feet)

FINAL ENVIRONMENTAL IMPACT STATEMENT (FEIS) - The final version of the statement of environmental effects required for major Federal actions under Section 102 of the National Environmental Policy Act (NEPA). It is a revision of the Draft Environmental Impact Statement to include public and agency responses to the

draft. It is a formal document which must meet legal requirements and is the document used as a basis for judicial decisions concerning compliance with NEPA.

FIRE HAZARD REDUCTION - The treatment of fuels and residues, which reduces the potential fire's rate of spread or intensity.

FIRE MANAGEMENT EFFECTIVENESS INDEX (FMEI) - A number derived by totaling the cost of a fire protection organization and fire suppression cost with the net value change and dividing that figure by 1000 acres.

FIREWOOD - Wood, either round, split or sawn, and burned primarily for heating purposes

FISCAL YEAR (FY) - October 1st to September 30th

FLOODPLAIN - The lowland and relatively flat areas adjoining inland and coastal waters (including debris cones and floodprone areas of offshore islands) including, at a minimum, those areas subject to a one-percent or greater chance of flooding in any given year (100-year recurrence)

FORAGE (LIVESTOCK) - All grass and grass-like plants

FORAGE (WILDLIFE) - All browse and herbacious food that is available to wildlife for grazing.

FORBS

1. Any herbaceous plant other than those in the Gramineae (true grasses), Cyperaceae (sedges) and Juncaceae (rushes) families - i.e , any nongrass-like plant having little or no woody material on it.

2 A palatable, broad-leaved, flowering herb whose stem (above ground) does not become woody and persistent.

FOREGROUND - A term used in scenic management to describe the stand of trees immediately adjacent to a high-value scenic area, recreation facility, or forest highway (See "Background" or "Middleground.")

FOREST AND RANGELAND RENEWABLE RESOURCES PLANNING ACT OF 1974 (RPA) - An Act requiring the preparation of a program for the management of the National Forests' renewable resources and of Land and Resource Management Plans for units of the National Forest System. It also requires a continuing inventory of all forest, rangelands, and renewable resources nation-wide

FOREST DEVELOPMENT ROADS (FDR) - Roads that are part of the Forest transportation system,which includes all existing and planned roads, as well as other special and terminal facilities designed as Forest development transportation facilities.

FOREST HEALTH - A condition where biotic and abiotic influences on the Forest (i e. insects, diseases, atmospheric deposition, silvicultural treatments, harvesting practices) do not threaten management objectives either now or in the future

FOREST INVENTORY PLAN - A plan, based on known cultural and environmental information, that delineates areas of varying degrees of suspected cultural resource potential.

FOREST PLAN - The National Forest Land and Resource Management Plan (Forest Plan) guides all natural resource management activities and establishes management standards and guidelines for the Forest. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management It is prepared under the implementing regulations and requirements of NFMA

FORESTRY PROGRAM FOR OREGON (FPFO) - A comprehensive forest management program developed by the State of Oregon for all forest lands in the state regardless of ownership.

FOREST STANDARD - A performance criterion indicating acceptable norms or specifications that actions must meet to maintain the minimum conditions for a particular resource This type of standard applies to all areas of the Forest regardless of the other management area direction applied.

FOREST SUPERVISOR - The official responsible for administering the National Forest System lands in a Forest Service administrative unit. He or she reports to the Regional Forester.

FORPLAN - The forest planning model. A linear programming software package used to analyze planning decisions regarding land use patterns, capital investment, and timber harvest scheduling

FUEL BREAK - A strategically located strip of land, usually 100 to 500 feet wide, that has been altered by removal of flammable vegetation so that fires burning into it can be more readily extinguished.

FUELS - Anything within the Forest that will burn. Usually live and dead woody vegetation (e.g., grass, shrubs, trees).

FUEL TREATMENT - The rearrangement or disposal of fuels to reduce the fire hazard

G

GEOMORPHIC - Of, or pertaining to, the form of the earth, or its solid surface features.

GEOTHERMAL - Of, or pertaining to, the heat of the earth's interior.

GOAL - A concise statement that describes a desired condition to be achieved sometime in the future. It is normally expressed in broad, general terms and is timeless in that it has no specific date by which it is to be completed. Goal statements form the principal basis from which objectives are developed

GOODS AND SERVICES - The various outputs, including on-site uses, produced from forest and rangeland resources.

GRAZING - Consumption of range or pasture forage by animals.

GRAZING SEASON - 1. A period of grazing to obtain optimum use of the forage resource. 2. On public lands an established period for which grazing permits are issued.

GREEN DOT SYSTEM - A seasonal vehicular management program which visually indicates travel routes open to public use; roads not identified by the green dot, and cross-country travel, are closed to public use during the designated time period.

GROUND WATER - *Water in a saturated zone of a geologic stratum*

GROUP SELECTION - A modification of the selection system in which trees are removed in small groups at a time.

GUIDELINE - An indication or outline of policy or conduct that is not a mandatory requirement (as opposed to a standard, which is mandatory).

H

HABITAT - The sum total of environmental conditions of a specific place occupied by a wildlife or plant species or a population of such species

HABITAT CAPABILITY INDEX (HCI) - A process used to determine habitat capability for big game by evaluating thermal cover and road density

HABITAT DIVERSITY INDEX - A number that indicates the relative degree of diversity in habitat forest wide.

HABITAT EFFECTIVENESS (HE) - A combination of both quantity and quality of habitat, including both natural and introduced factors, which produces a specific habitat condition that either limits or generates habitat use by a wildlife species.

HARVEST CUTTING METHOD - The combination of management practices used to manipulate forest vegetation resulting in forests of distinctive form and character. Harvest cutting methods are classified as even-aged and uneven-aged.

HEAP LEACH - A mineral extraction process in which a solution (commonly cyanide solution) percolates through a pile (heap) of ore, dissolving the metal being extracted. The solution is collected after it percolates through the heap, and the metal is recovered from the solution. This is a common extraction process for low-grade deposits of gold, copper and silver.

HERBACEOUS - Having little or no woody tissue and persisting usually for a single growing season.

HIGH CLEARANCE VEHICLES - Motorized vehicles that can drive over minor obstacles because of their elevated frame.

HISTORIC - Refers to the period of time for which there are written records (after European contact). In Region 6, the historic era begins at roughly 1800 A.D , with the first explorers who kept journals

HYDROLOGIC - Pertaining to the quantity, quality, and timing of water yield from forested lands.

HYDROPHOBIC - Lacking affinity for water.

HYDROTHERMAL - An adjective applied to heated or hot aqueous-rich solutions, to the process in which they are concerned, and to the rocks, ore deposits, and alteration products produced by them.

I

IGNEOUS ROCK - Rock formed by the crystallization of once molten material called lava or magma.

IMPLAN - A Forest Service input-output model that is an economic model which predicts the behavior of an economy as certain portions of the economy are altered

IMPROVED ROAD - A constructed or maintained vehicle way for the use of highway-type vehicles having more than two wheels

INDICATOR SPECIES - A plant or animal species so highly adapted to a particular kind of environment that its mere presence is sufficient indication that specific conditions are also present. (W-W DEIS).

INTEGRATED PEST MANAGEMENT (IMP) - A process for selecting strategies to regulate forest pests in which all aspects of a pest-host system are studied and weighed. The information considered in selecting appropriate strategies includes the impact of the unregulated pest population on various resource values, alternative regulatory tactics and strategies, and benefit/cost estimates for these alternative strategies. Regulatory strategies are based on sound silvicultural practices and ecology of the pest-host system and consist of a combination of tactics such as timber stand improvement plus selective use of pesticides A basic principle in the choice of strategy is that it be ecologically compatible or acceptable.

INTENSIVE FOREST MANAGEMENT - A high investment level of timber management that envisions initial harvest, regeneration with genetically improved stock, control of competing vegetation, fill-in planting, pre-commercial thinning as needed for stocking control, one or more commercial thinnings, and final harvest.

INTERDISCIPLINARY TEAM - A group of individuals with different training assembled to solve a problem or perform a task.

INTERMINGLED OWNERSHIPS - Lands within the National Forest boundaries or surrounded by National Forest lands that are owned by private interests or other government agencies Because of early land grants, these lands frequently are in checkerboard ownership patterns.

INTERMITTENT SERVICE - A road developed and operated for periodic service and closed between periods of use

INTERPRETATION - Educational activity which aims to reveal meaning and relationships of the natural and cultural environment through first-hand experience

IRRETRIEVABLE - Applies to losses of production, harvest, or use of renewable natural resources For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sports site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

IRREVERSIBLE - Applies primarily to the use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity, that are renewable only over long periods. Irreversible also includes loss of future options.

ISSUE - A point, matter, or question of public discussion or interest to be addressed or decided through the planning process

J

JASPEROID - Agate, jasper, or thundereggs

K

KNUTSON - VANDENBERG ACT OF 1924 (K-V) - An act that allows for the use of receipts for National Forest timber to reforest, to conduct stand improvement work or to perform improvement projects for other resources on the area where timber was harvested.

L

LAND ALLOCATION - The decision to use land for various resource management objectives in order to best satisfy the planning process issues, concerns, and opportunities, and meet assigned forest output targets

LAND EXCHANGE - The conveyance of non-Federal land or interest in the land to the United States in exchange for National Forest System land or interest in the land.

LANDLINE LOCATION - Location of Forest property boundaries.

LIFESTYLE - A characteristic way of living which may be an individual variant within the cultural mainstream or may be an individual expression of a subculture.

LEASABLE MINERALS - Generally include minerals such as oil, gas, oil shale, coal, potassium, sodium, phosphates, sulphur, and geothermal.

LOCAL ROADS - Local roads are usually one-lane roads constructed to serve a dominant use or resource. Local roads do not access large land areas since they are more site specific than arterial and collector roads.

LOCATABLE MINERALS - These resources include gold, silver, lead, copper, and mercury, which are mined and processed for metals, and some uncommon nonmetallics

LOGGING SYSTEMS -

Tractor Logging - A system of log transportation in which logs are pulled from the woods to a landing by means of a crawler tractor, skidder, or similar ground-based equipment.

High-Lead Logging - A system of cable logging in which the working lines are elevated at the landing area by a rigged wooden tree or portable steel spar.

Skyline Logging - A system of cable logging in which all or part of the weight of the logs is supported during yarding by a suspended cable

Balloon Logging - A system of cable logging in which the weight of the logs is counteracted by the lift provided by a lighter-than-air balloon

Helicopter Logging - A system of transporting logs from the woods to a landing as an external load on a helicopter.

LONG-TERM EFFECTS - Those effects which will be significant beyond the RPA planning horizon of 50 years.

LONG-TERM SUSTAINED-YIELD TIMBER CAPACITY (LTSYC) - The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity consistent with multiple-use objectives.

M

M - The Roman numeral for 1000.

MBF - One thousand board feet. Lumber or timber measurement.

MM - Million

MANAGED STAND - A stand of trees in which stocking level control is applied to achieve maximum growth.

MANAGED YIELD TABLE - A table showing, for a given species (or species mix) on a given site, the progressive development of a managed stand at periodic intervals covering the greater part of its useful life. It usually includes average diameter, basal area, number of trees, standing volume, and harvest volumes for a specific timber management regime

MANAGEMENT AREA (MA) - A unit of land allocated to emphasize a particular resource, based on the capability of the area.

MANAGEMENT CONCERN - An issue, problem or a condition which constrains the range of management practices identified by the Forest Service in the planning process.

MANAGEMENT DIRECTION - A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them.

MANAGEMENT INDICATOR SPECIES (MIS) - A wildlife species whose presence in a certain location or situation at a given population level indicates a particular environmental condition Population changes are believed to indicate effects of management activities on a number of other wildlife species

MANAGEMENT INTENSITY - A management practice or combination of management practices and associated costs designed to obtain different levels of goods and services.

MANAGEMENT PRESCRIPTION - Management practices selected and scheduled for application on a specific area to attain multiple-use and other goals and objectives

MANAGEMENT REQUIREMENT (MR) - Standards for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, soil and water and diversity, to be met in accomplishing National Forest System goals and objectives. (See 36 CFR 219.27)

MARGINAL COMPONENT - The portion of the commercial forest land on which it is presently not feasible (economically or technologically) to manage for timber crops but on which it may be possible in the future.

MASS-WASTING - A general term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another. (Dictionary of Geological Terms) Also mass movement.

MAXIMUM MODIFICATION - See "Scenic quality Objectives."

MEAN ANNUAL INCREMENT (MAI) - The total increment up to a given age divided by that age.

MEMORANDUM OF AGREEMENT (MOA) - A three-party agreement (responsible Forest Service Official, State Historic Preservation Officer, Executive Director of the Advisory Council on Historic Preservation) which documents an agreed-upon plan to mitigate a proposed project's adverse effect upon cultural resources listed on or eligible for the National Register of Historic Places

METAMORPHIC ROCK - Rocks changed by heat and pressure causing recrystallization and loss of original characteristics.

MIDDLEGROUND - The visible terrain beyond the foreground where individual trees are still visible, but do not stand out distinctly from the stand (See "Foreground" and "Background ")

MINERAL DEVELOPMENT - The activities and facilities associated with extracting a proven mineral deposit

MINERAL ENTRY - Filing a mining claim on public land to obtain the right to any minerals it may contain.

MINERAL EXPLORATION - The search for valuable minerals on lands open to mineral entry.

MINERAL RESERVE - That portion of a mineral resource from which a mineral commodity can be economically and legally extracted

MINERAL RESOURCE - A concentration of naturally occurring solid, liquid, or gaseous materials in or on the Earth's crust in such a form that economic extraction of a mineral resource is currently or potentially feasible (BLM Manual 3031).

MINIMUM VIABLE POPULATION (MVP) - The low end of the viable population range

MITIGATION - To moderate the force or intensity of environmental effects. To lessen or minimize an Adverse Effect upon a cultural resource listed on or eligible for the National Register of Historic Places The two categories of mitigation most often used are project modification and data recovery.

MIXED CONIFER (MC) - A stand of coniferous trees with a mixture of species. Ponderosa pine will usually make up 25 percent to 75 percent of the species composition

MODIFICATION - See "Scenic Quality Objectives."

MONITORING - A process of collecting significant data from defined sources to identify departures or deviations from expected plan outputs.

MOUNTAIN PINE BEETLE - *A small insect (1/8 - 5/8 inch) that bores into the tree's cambium and deposits* its eggs. Larvae emerge from the eggs and feed upon the cambiel layer and thus disrupt the tree's translocation of food. Frequent attacks on the host tree result in the tree's mortality.

MORTALITY - The volume of sound wood dying from natural causes during a specified period

MULTIPLE-AGED STANDS - An intermediate form of stand structure between even-/ and uneven-aged stands. These stands generally have two or three distinct tree canopy levels occurring within a single stand

MULTIPLE USE - The management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some lands will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

N

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA) - An act declaring a National policy to encourage productive harmony between man and his environment, to promote efforts which will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of man, to enrich the understanding of the ecological systems and natural resources important to the Nation and to establish a Council on Environmental Quality.

NATIONAL FOREST FUND (NFF) - An account that includes all receipts (to the U.S Treasury) from proclaimed National Forests for timber, grazing, land use, power, minerals, and user fees

NATIONAL FOREST MANAGEMENT ACT (NFMA) - A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act and requires the preparation of Forest plans.

NATIONAL FOREST SYSTEM (NFS) LAND - Federal lands that have been designated by Executive order or statute as National Forests, National Grasslands, or Purchase Units, and other lands under the administration of the Forest Service, including Experimental Areas and Bankhead-Jones Title III lands.

NATIONAL RECREATION TRAILS - Trails designated by the Secretary of the Interior or the Secretary of Agriculture as part of the national system of trails authorized by the National Trails System Act. National Recreation Trails provide a variety of outdoor recreation uses in or reasonably accessible to urban areas.

NATIONAL REGISTER OF HISTORIC PLACES - A register of cultural resources of national, state, or local significance, maintained by the Department of the Interior

NATIONAL WILD AND SCENIC RIVER SYSTEM - Rivers with outstanding scenic, recreational, geological, fish and wildlife, historic, cultural, or other similar values designed by Congress under the Wild and Scenic Rivers Act for preservation of their free-flowing condition.

NET PUBLIC BENEFIT - An expression used to signify the overall long-term value to the Nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index

NO ACTION ALTERNATIVE (Alternative A) - The most likely condition expected to exist in the future if current management direction were to continue unchanged

NONCOMMERCIAL SPECIES - Species that have no economic values at this time nor anticipated timber value within the near future.

NONDECLINING EVEN FLOW - A policy governing the volume of timber removed from a National Forest, which states that the volume planned for removal in each succeeding decade will equal or exceed that volume planned for removal in the previous decade

NONFOREST LAND - Land that has never supported forests and lands formerly forested but now developed for such nonforest uses as crops, improved pasture, etc

NONMARKET - (Noncash economic benefits). Products derived from National Forest resources that do not have a well-established market value, for example, wilderness, wildlife

NONPRICED OUTPUTS - Outputs for which there is no available market transaction evidence and no reasonable basis for estimating a dollar value commensurate with the market values associated with the priced outputs.

NONSTRUCTURAL RANGE IMPROVEMENT - Practices and treatments undertaken to improve range not involving construction of improvements (e.g , seeding, fertilizing, or prescribed burning).

O

OBJECTIVE - A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals.

OBLITERATE - The action needed to close an unneeded road and return the land to production.

OFF-HIGHWAY TRAVEL MANAGEMENT OBJECTIVES - These objectives relate to the recreation opportunities for off-highway use on areas and trails on National Forest lands The objectives, which include off-highway travel criteria, are developed from management area direction and access management objectives.

OFF-ROAD or OFF-HIGHWAY VEHICLES (ORV's or OHV's) - Any vehicle, including ATV's, which is restricted by law from operating on public roads reserved for general motor vehicle traffic.

OLD GROWTH STAND - An old-growth stand is defined as any stand of trees 10 acres or greater generally containing the following characteristics: 1) stands contain mature and overmature trees in the overstory and are well into the mature growth stage; 2) stands will usually contain a multilayered canopy and trees of several age classes; 3) standing dead trees and down material are present; and 4) evidence of man's activities may be present, but does not significantly alter the other characteristics and would be a subordinate factor in a description of such a stand.

OPERATION AND MAINTENANCE COSTS - Costs associated with operating and maintaining facilities, program management, and support costs associated with management of other resources.

ORE - A mineral deposit which can be extracted at a profit

ORV CLOSURE - An administration order closing a land area to specified types of off-road vehicle travel yearlong

ORV RESTRICTION - An administrative order restricting a land area to specified types of off-road vehicle travel during specific seasons or conditions

OUTPUT - The goods, end products, or services that are purchased, consumed, or used directly by people. Goods, services, products, and concerns produced by activities that are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives A broad term for describing any result, product, or service that a process or activity actually produces.

OVERMATURE - The stage at which a tree declines in vigor and soundness, for example, height growth has usually stopped and probability of mortality is high

OVERSTORY - The portion of trees in a forest which forms the upper most layer of foliage.

OVERSTORY REMOVAL - A type of harvest which is designed to remove all of the trees in the overstory The objective is to release the acceptably stocked understory

OVERVIEW - A report, based primarily on archival research, that organizes and summarizes cultural resource information from a particular National Forest or geographic area.

P

PACIFIC NORTHWEST REGION - A Forest Service organizational unit consisting of all the National Forests in Oregon and Washington.

PARTIAL CUT - Any cutting other than a clearcut. This may include thinning, selection shelterwood or an overstory removal.

PARTIAL RETENTION - See "Scenic Quality Objectives."

PERMITTED GRAZING - Use of a National Forest range allotment under the terms of a grazing permit.

PERSONS-AT-ONE-TIME (PAOT) - The number of people in an area or using a facility at the same time. Generally used as "maximum PAOT" to indicate the capacity of an area or facility to support peak usage within established user density standards and without degradation to biophysical resources.

PHYSIOGRAPHIC - Pertaining to physical geography.

PHYSIOGRAPHIC PROVINCE - Region of similar structure and climate that has had a unified geomorphic cycle

PLANNING HORIZON - The overall time period considered in the planning process that spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decisions.

PLANNING PERIOD - Generally one decade. The time interval within the planning horizon that is used to show incremental changes to yields, costs, effects, and benefits.

PLANNING RECORDS - A system that records decisions and activities that result from the process of developing a forest plan, revision, or significant amendment

PLANT ASSOCIATION - Climax plant community type.

PLANT COMMUNITIES - A homogeneous unit in respect to the number and relationship of plants in the tree, shrub, and ground cover strata

POTENTIAL YIELD - The maximum, perpetual, sustained-yield harvest attainable through intensive forestry on regulated areas considering the productivity of the land, conventional logging technology, standard cultural treatments, and interrelationships with other resource uses and the environment.

PRECOMMERCIAL THINNING - The practice of removing some of the trees less than merchantable size from a stand so that the remaining trees will grow faster.

PREHISTORIC - Relating to the period of time before written records (prior to European contact). In Region 6, before 1800 A D., or before the advent of written records.

PRESCRIBED BURNING - Use of fire in forest management for hazard reduction and vegetative manipulation.

PRESCRIBED FIRE - A wildland fire burning under specified conditions which will accomplish certain planned objectives The fire may result from either planned or unplanned ignitions. Plans for use of unplanned ignitions for this purpose must be approved by the Regional Forester

PRESENT NET VALUE (PNV) - The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area

PRESERVATION - See "Scenic Quality Objectives "

PRIMARY CAVITY EXCAVATOR - An animal that excavates a cavity in wood for nesting or roosting.

PRIME FARMLAND - All land which qualifies for rating as Class I or as Class II in the U.S. Soil Conservation Service land use capability classification.

PRIMITIVE ROADS - Roads constructed with no regard for grade control or designed drainage, sometimes by merely repeated driving over an area. These roads are single lane, usually with native surfacing and sometimes passable with 4-wheel drive vehicles only, especially in wet weather

PROGRAMMED ALLOWABLE HARVEST - That part of the potential yield scheduled for harvest in a specific year. It is based on demand, funding, management needs and multiple use considerations and, as a consequence, may vary over time.

PUMICE - A volcanic glass full of cavities and very light in weight.

PYROCLASTIC ROCK - A rock consisting of unreworked solid material explosively or aerially ejected from a volcanic vent.

PUBLIC ISSUE - A subject or question of widespread public interest relating to management of National Forest System.

PUBLIC PARTICIPATION - Meetings, conferences, seminars, workshops, tours, written comments, responses to survey questionnaires, and similar activities designed and held to obtain comments from the public about Forest Service planning.

PURCHASER CREDIT - Credit earned by the purchaser of a National Forest timber sale by construction of contract-specified roads Earned purchaser credit may be used by the purchaser as payment for National Forest timber removed.

R

RANGE ALLOTMENT - A designated area available for livestock grazing upon which a specified number, kind of livestock and season of use may be grazed under a term grazing permit. The basic land unit used to facilitate management of the range resource on National Forest System and associated lands administered by the Forest Service.

RANGE CONDITION - The state or health of the range vegetation and soil to produce a stable biotic community based on the composition, density, and vigor of the vegetation and the physical characteristics of the soil Condition is expressed as satisfactory or unsatisfactory

RANGE IMPROVEMENT - Any structure or nonstructural improvement to facilitate management of rangelands or livestock.

RANGELAND - Land where the vegetation is predominantly grasses, grass-like plants, forbs, or shrubs suitable for livestock grazing and browsing

RANGE MANAGEMENT - The art and science of planning and directing range use to obtain sustained maximum animal production, consistent with perpetuation of the natural resource

RANGER DISTRICT - Administrative subdivisions of the Forest supervised by a District Ranger who reports to the Forest Supervisor.

RARE II - See Roadless Area Review and Evaluation II.

REAL DOLLAR VALUE - A monetary value which compensates for the effects of inflation.

RECONSTRUCTION - Road or trail construction activities which take place on an existing road or trail and raise the standard of the road or trail. This can include relocation of the facility in a completely new location.

RECREATION CAPACITY - The number of people that can take advantage of the supply of a recreation opportunity during an established use period without substantially diminishing the quality of the recreation experience of the biophysical resources.

RECREATION INFORMATION MANAGEMENT (RIM) - A computer oriented system for the organization and management of information concerning recreation use, occupancy, and management of National Forest land.

RECREATION OPPORTUNITY SPECTRUM (ROS) - Land delineations that identify a variety of recreation experience opportunities categorized into six classes on a continuum from primitive to urban. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs, based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. The six classes are:

1. *Primitive* - Area is characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted

2. *Semiprimitive Nonmotorized* (SPNM) - Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other uses. The area is managed in such a way that minimum on-site controls and restrictions may be present, but would be subtle Motorized recreation use is not permitted, but local roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreational experience opportunities.

3. *Semiprimitive Motorized* (SPM) - Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but would be subtle. Motorized recreation use of local primitive or collector roads with predominantly natural surfaces and trails suitable for motor bikes is permitted.

4. *Roaded Natural* (RN) - Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.

5. *Rural* (R) - Area is characterized by a natural environment that has been substantially modified by development of structures, vegetative manipulation, or pastoral agricultural development Resource modification and utilization practices may be used to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily

evident, and the interaction between users is often moderate to high A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate user densities are present away from developed sites. Facilities for intensified motorized use and parking are available.

6. *Urban* - Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are often used to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans are predominant on site. Large numbers of users can be expected both on site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

RECREATION VISITOR DAY (RVD) - A measure of recreational use of an area. One recreation visitor day consists of 12 hours of recreation use of a site or area. Recreation visitor days are used as a recreation production or output capacity measure.

RECREATION WILDERNESS SPECTRUM (RWS) - This is associated with the recreation opportunity spectrum (ROS), a system used to classify or differentiate areas within wilderness to provide for a variety of management possibilities and wilderness opportunities. The objective of all classifications is to provide wilderness opportunities but to different degrees; from pristine to the semiprimitive transition.

REFORESTATION - The natural or artificial restocking of an area usually to produce timber and other wood products, but also to protect watersheds, prevent soil erosion, and improve wildlife, recreation and other natural resources. Natural reforestation includes site preparation to reduce competing vegetation and provide a mineral seed bed for seed provided by seed trees. Artificial reforestation is the planting of seedlings, cuttings or seeds by hand or mechanical means and may include site preparation.

REGENERATION CUT - The removal of trees intended for the purpose of assisting regeneration already present or to make regeneration of the stand possible.

REGION - The standard administrative unit of the Forest Service administered by a Regional Forester.

REGIONAL FORESTER - The official responsible for administering a single Region and preparing a Regional Guide.

REGIONAL GUIDE - The plan developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended, that guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands of a given region It also disaggregates the RPA objectives assigned to the Region and to the Forest within that region.

REGULATIONS - Generally refers to the Code of Federal Regulations, Title 36, Chapter II, which covers management of the Forest Service.

REHABILITATION - Actions taken to protect or enhance site productivity, water quality, or other values for a short period of time.

RESEARCH NATURAL AREAS (RNA's) - An area set aside by the Forest Service to preserve a representative sample of an ecological community; primarily for scientific and educational purposes. Commercial exploitation is not allowed and general public use is discouraged

RESOURCE - An aspect of human environment which renders possible or facilitates the satisfaction of human wants and the attainment of social objectives.

RESOURCE VALUES - The tangible and intangible worth of forest resources

RESPONSIBLE LINE OFFICER - The Forest Service employee who has the authority to select and/or carry out a specific planning action.

RESTORATION - The long-term placement of land back into its natural condition or state of productivity.

RETENTION - A scenic quality objective which means human activities are not evident to the casual forest visitor.

REVEGETATION - The re-establishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of man - reforestation or range reseeding.

RIGHT-OF-WAY - The right to pass through another person's land as obtained by condemnation or purchase.

RIM - See Recreation Information Management.

RIPARIAN AREAS - The riparian ecosystem (area) is that land, next to water, where plants that are dependent on a perpetual source of water occur. Riparian sites include fluvial surfaces such as streambanks, active channel shelves, active floodplains, and overflow channels.

RIPRAP - A structure built of broken rock or other material used for protecting exposed soil from erosion along stream channels or road ditches.

ROAD DENSITY - The number of road miles per square mile of land area.

ROADLESS AREA - An area of undeveloped Federal land within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.

ROADLESS AREA REVIEW AND EVALUATION (RARE II) - A comprehensive process directed by the Secretary of Agriculture to identify roadless and undeveloped land areas in the National Forest system and to determine their uses for either wilderness or other resource management and development and to determine areas that would require further planning to make such a decision.

ROADLESS ISLANDS - A roadless area that is surrounded by permanent waters, or that is markedly distinguished from surrounding lands by topographical or ecological factors such as precipices, canyons, thickets, or swamps.

ROAD MANAGEMENT OBJECTIVES - Road management objectives establish the intended purpose of an individual road based on management area direction and access management objectives. Road management objectives contain design criteria, operation criteria, and maintenance criteria

ROS - See Recreation Opportunity Spectrum.

ROTATION AGE - The age of a stand when regeneration harvest occurs.

RPA - Forest and Rangeland Renewable Resources Planning Act of 1974.

ROCKHOUND - An amateur rock and mineral collector

RVD - See Recreation Visitor Day.

S

SALEABLE MINERALS - Saleable minerals include common varieties of sand, stone, gravel, pumice, pumicite, cinders, and clay. In general, these minerals are of wide-spread occurrence and are of relatively low unit value. They are generally used for construction materials and for road building purposes. Saleable minerals, which have some property giving them distinct and special value, remain locatable. Before a deposit can be sold, a determination of "common variety" must be made by minerals staff and legal counsel.

SALVAGE HARVEST - Removal of dead or dying trees resulting from insect and disease epidemics or wildfire.

SANITATION HARVEST - Removal of dead or dying trees to prevent spread of insects or disease

SAWTIMBER - Trees that will yield logs suitable in size and quality for the production of dimension lumber.

SCENIC QUALITY OBJECTIVES - Categories of acceptable landscape alteration measured in degrees of deviation from the natural-appearing landscape.

1. *Preservation* - Ecological change only.

2. *Retention* - Human activities are not evident to the casual Forest visitor.

3. *Partial Retention* - Human activity may be evident, but must remain subordinate to the characteristic landscape

4. *Modification* - Human activity may dominate the characteristic landscape, but must, at the same time, follow naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.

5. *Maximum Modification* - Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

SCENIC RESOURCE - The composite of basic terrain, geologic features, water features, vegetative patterns, *and land-use effects that typify a land unit and influence the visual appeal the unit may have for visitors.*

SCOPING - Determination of the significant issues to be addressed in an EIS.

SEDIMENT - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

SEDIMENTARY ROCK - A rock made up of sediment.

SEED CUT - Removal of mature trees near rotation age in a shelterwood harvest to permanently open the stand and prepare the site for regeneration from the seed trees left for that purpose.

SEEDLING/SAPLING - A forest successional stage in which trees less than five inches in diameter are the predominant vegetation.

SELECTION CUTTING - The annual or periodic removal of trees (particularly the mature), individually or in small groups from an uneven-aged forest to achieve the balance among diameter classes needed for sustained yields, and in order to realize the yield, and establish a new crop of irregular constitution. NOTE: The improvement of the Forest is a primary consideration.

SELECTION SYSTEM - A silviculture system in which trees in an uneven-aged stand are removed individually, here and there, from a large area each year in order to achieve a balance among diameter classes needed for sustained yield by selection cutting - ideally over a whole forest or working circle, but from practical considerations almost always over the annual coupes of cutting series; regeneration mainly natural and crop ideally all-aged.

SENSITIVE SPECIES - Plant or animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Those species that are recognized by the Regional Forester as needing special manage*ment to prevent placement on Federal or State lists*

SERAL - A plant and animal community which is transitional in stage of succession, being either short- or long-term. If left alone, the seral stage will pass, and another plant and animal community will replace it

SHELTERWOOD HARVEST - Silvicultural system used to harvest mature trees at rotation age in a series of preparatory, seed and removal cuts designed to regenerate a new even-aged crop under the shelter of the old crop

SHORT-TERM EFFECTS - For timber management planning, those effects which will not be significant beyond the RPA planning horizon of 50 years, for DEQ water quality, short-term effects are defined as two days or less Generally, short-term effects are within the planning period.

SIGNIFICANT - Meeting the criteria for inclusion on the National Register of Historic Places (same as eligible).

SILVICULTURAL SYSTEM - A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop and provide for regeneration and according to the type of forest thereby produced

SILVICULTURE - The science and art of growing and tending crops of forest trees to attain the desired level of marketable and unmarketable products.

SITE INDEX - A measure of the relative productive capacity of an area for growing wood Measurement of site index is based on height of the dominant trees in a stand at a given age.

SITE PREPARATION - Removing unwanted vegetation and debris from a site and preparing the soil before reforestation.

SITE PRODUCTIVITY - Production capability of specific areas of land

SKYLINE LOGGING - A system of cable logging in which all or part of the weight of the logs is supported during yarding by a suspended cable.

SLASH - Debris left after logging, pruning, thinning, or brush cutting, and large accumulations of debris resulting from windstorms. It includes logs, bark, branches, and stumps

SMOLT HABITAT CAPABILITY INDEX (SHCI) - Smolt refers to the life history stage of anadromous salmonids in which physiological changes are taking place to adapt them for ocean survival and they are either migrating or will shortly migrate seaward. The three levels associated with this index are·

1. Existing SHC - The number of smolt being produced at the present time with existing escapement levels in existing freshwater habitat

2 Potential SHC - The number of smolt that are capable of being produced assuming there is sufficient adult escapement to fully seed existing freshwater habitat

3. Potential SHC with Full Enhancement - The number of smolt that are capable of being produced, assuming sufficient capital investments have been made to maximize the freshwater habitats and there is sufficient adult escapement to fully seed the existing and enhanced habitat

SNAG - A nonliving standing tree The interior of the snag may be sound or rotted.

SNAG LEVEL - The number of snags per unit of area by d b h. class selected as a management goal; the level is predicted on the theoretical number of snags per unit of area by diameter class needed to support nesting populations of woodpeckers at a selected density.

SOCIOECONOMIC - Pertaining to, or signifying the combination or interaction of, social and economic factors.

SOIL EROSION - The detachment and movement of soil from the land surface by wind, water, or gravity

SOIL COMPACTION - Increase in soil bulk density.

SOIL PRODUCTIVITY - The capacity of a soil, in its normal environment, to produce a specific plant or sequence of plants under a specific system of management.

SOIL RESOURCE INVENTORY (SRI) - An inventory of the soil resource based on landform, vegetative characteristics, soil characteristics, and management potentials.

SPECIAL COMPONENT - The portion of the commercial forest land that needs special treatment of the timber resource to achieve other resource objectives (e.g., old growth, streamside protection, or visual corridors).

SPECIAL USE PERMITS - Permits and granting of easements (excluding road permits and highway easements) authorizing the occupancy and use of land.

STAND - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition as to be distinguishable from the forest in adjoining areas.

STANDARD - Performance criteria indicating acceptable norms or specifications that actions must meet A principle requiring a specific level of attainment, a rule to measure against.

STANDARD COMPONENT - The portion of the commercial forest land on which crops of industrial wood can be grown and harvested with adequate protection of the forest resources under the usual provisions of the *timber sale contract.*

STATE HISTORIC PRESERVATION OFFICER (SHPO) - An official appointed by the Governor of each State to direct implementation of the National Historic Preservation Act of 1966 and subsequent regulations and Executive Order. Responsibilities include: State-wide cultural resource inventory, development of a State Historic Preservation Plan, review of National Register of Historic Places nominations, administration of Federal historic preservation grants, and review of Federal undertakings which might affect cultural resources listed on or eligible for the National Register of Historic Places.

STOCKING - The degree of occupancy of land by trees as measured by basal area or number of trees and as compared to a stocking standard; that is, the basal area or number of trees required to fully use the growth potential of the land.

STOCKING LEVEL CONTROL - The process of maintaining the desirable number of trees to achieve optimum growth and management.

STREAMFLOW - The discharge of water from a watershed that occurs in a natural stream channel.

STRUCTURAL RANGE IMPROVEMENT - Improvement requiring construction or installation to improve the range, facilitate management, or control distribution and movement of livestock.

SUITABILITY - The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices

SUITABLE TIMBER LAND - Forested lands that are available for timber management because they have not been withdrawn because of Law or Regulation, where irreversible damage would not occur, and where regeneration can be assured

SUMMER RANGE - A portion of the total range on which big game animals normally find food and cover during summer months

SUNK FUNDS - Monies already invested.

SUPPRESSION - The action of extinguishing or confining a fire.

SUSTAINED YIELD - The achievement and maintenance in perpetuity of a periodic output of the renewable resources without impairment of the productivity of the land.

T

TARGETS - Objectives assigned to the Forest by the Regional Plan.

TECTONIC - Of, pertaining to, or designating the rock structure and external forms resulting from the deformation of the earth's crust.

TEMPORARY ROADS - Temporary roads are low-level roads constructed for a single purpose and short-term use. Once use of the road has been completed, it is obliterated, and the land it occupied is returned to production.

THERMAL COVER - Cover used by animals to lessen the effects of weather; for elk the types of cover are:

Summer Range - A stand of coniferous trees at least 40 feet tall with an average crown closure of 40 percent or more

Winter Range - A stand of coniferous trees 10 feet or more tall with an average crown closure of 40 percent or more

THINNING - The practice of removing some of the trees in a stand so that the remaining trees will grow faster due to reduced competition for nutrients, water, and sunlight. Thinning may be done at two different stages.

1. *Commercial thinning* - Removing trees that have reached sufficient size to be manufactured into a product.

2. *Precommercial thinning* - Removing trees that are too small to make a merchantable product

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and which has been designated in the Federal Register by the Secretary of the Interior as a threatened species.

THRESHOLD - The point or level of activity beyond which an undesirable set of responses begins to take place within a given resource system.

TIERING - Refers to the coverage of general matters in broad environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basin wide program statements or ultimately site-specified statements), incorporating by reference the general discussions and concentrating solely on the issues specific to the statement in question.

TIMBER - A general term for the major woody growth of vegetation in a forest area.

TIMBER CLASSIFICATION - Forested land is classified under each of the land management alternatives according to how it relates to the management of the timber resource. The following are definitions of timber classifications used for this purpose.

1. *Nonforest* - Land that has never supported forests and land formerly forested where use for timber production is precluded by development or other uses.

2. *Forest* - Land at least 10-percent stocked (based on crown cover) by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use.

3 *Suitable* - Land to be managed for timber production on a regulated basis.

4 *Unsuitable* - Forest land withdrawn from timber utilization by statute or administrative regulation (for example, wilderness), or identified as not appropriate for timber production in the Forest planning process

5. *Commercial Forest* - Forest land tentatively suitable for the production of continuous crops of timber and that has not been withdrawn.

TIMBER PRODUCTION - The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use The term "timber production" does not include production of fuelwood.

TIMBER SALE PROGRAM QUANTITY - This includes all volume expected to be offered for sale. This includes "green" material, salvage, firewood and miscellaneous products. This is used to measure attainment of RPA budgeted target

TIMBER STAND IMPROVEMENT (TSI) - Management activities conducted in an immature stand to accelerate diameter growth and improve the form of the trees that remain.

TOLERANCE - The ability of a tree to grow satisfactorily in the shade of, and in competition with, other trees

TONS OF SUSPENDED PARTICULATES - A measure of the amount of solid material contributed to the airshed by smoke

TRAILHEAD - The parking, signing, and other facilities available at the terminus of a trail.

TRAIL VEHICLE - Vehicles designed for trail use that are 40 inches wide or less, such as bicycles, snowmobiles, trail bikes, trail scooters, and all-terrain vehicles

TRANSITORY RANGE - Land that is suitable for grazing use of a nonenduring or temporary nature over a period of time For example, on particular disturbed lands, grass may remain in the area for a period of time before being replaced by trees or shrubs not suitable for forage

TRANSPORTATION SYSTEM - All existing and planned roads and trails needed to access the Forest

TUFF - A rock formed of compacted volcanic fragments, generally smaller than 4mm in diameter

U

UNDERSTORY VEGETATION - Grass, small trees, shrubs, and other plants found beneath the overstory (the trees comprising the forest).

UNEVEN-AGED MANAGEMENT - The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection

UNIT PLANS - Land management plans prepared for multiple use management of land and resources on portions(units) of the National Forests, which do not necessarily fully incorporate NFMA requirements "Units" do not always follow National Forest boundaries and, in some cases, include parts of two or more National Forests

UNPLANNED IGNITION - A fire started at random by either natural or human causes, or a deliberate incendiary fire.

UNREGULATED - Timber land not managed on a sustained yield basis, such as administrative sites, campgrounds, and experimental forests.

UTILITY AND TRANSMISSION CORRIDOR - A strip of land designated for the transportation of energy, commodities, and communications by railroad, State highway, electrical power transmission (69 KV or above), oil and gas and coal slurry pipelines 10 inches in diameter and larger, and telecommunication cable and electronic sites for interstate use Transportation of minor amounts of power for short distances, such as short feeder lines from small power projects including geothermal or wind, or to serve customer subservice substations along the line, are not to be treated within the Forest Plan effort.

UTILIZATION STANDARDS - Standards guiding the use and removal of timber, which is measured in terms of diameter at breast height (d.b.h.), top diameter inside the bark (top d.i.b), and percent "soundness" of the wood

V

VIABLE POPULATION - The number of individuals of a species required to ensure the long-term existence of the species in natural, self-sustaining populations adequately distributed throughout their region.

VIEWSHED - The total landscape seen or potentially seen from all or a logical part of a travel route, use area, or water body.

W

WATERSHED - The area that contributes water to a drainage or stream

WETLANDS - Areas that are inundated by surface water or groundwater with a frequency sufficient to support, and under normal circumstances does or would support, a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction (Executive Order 11990).

WILD AND SCENIC RIVERS - Those rivers or sections of rivers designated as such by congressional actions under the 1968 Wild and Scenic Rivers Act, as wild, scenic, or recreational by an act of the Legislature of the State or States through which they flow. Wild and scenic rivers may be classified and administered under one or more of the following categories:

1 *Wild River Areas* - Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America

2 *Scenic River Areas* - Those rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

3. *Recreational River Areas* - Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past

WILDERNESS - Areas designated by congressional action under the 1964 Wilderness Act. Wilderness is defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature, with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or for a primitive and confined type of recreation, include at least 5,000 acres or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition, and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest

WILDERNESS ACT - Establishes a National Wilderness Preservation System to be composed of Federally-owned areas designated by Congress, administered for use and enjoyment as Wilderness, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as Wilderness.

WILDERNESS RESOURCE SPECTRUM (WRS) - Classification used to further divide a wilderness into zones based on degrees of primitiveness. Areas of the Ochoco Wilderness will be managed under two classes of the WRS system:

1. *Primitive* - characterized by an essentially unmodified environment. Concentration of users is low and evidence of human use is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls.

2. *Semiprimitive* - characterized by a predominately unmodified natural environment of moderate size. The concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimuM on-site controls and restrictions may be present, but are subtle.

WILDFIRE - Any wildland fire that is not a prescribed fire All wildfires require suppression.

WILDLIFE - All nondomesticated mammals, birds, reptiles, and amphibians living in a natural environment, including both game species and nongame species. Animals or their progeny, which once were domesticated but escaped captivity and are running wild (i.e., feral animals), such as horses, burros, and hogs, are not considered wildlife.

WILDLIFE AND FISH USER DAY (WFUD) - One WFUD consists of 12 hours of recreation that is the result of fish or wildlife.

WILDLIFE HABITAT DIVERSITY - The distribution and abundance of different plant and animal communities and species within a specific area.

WINTER RANGE - A range, usually at lower elevation, used by big game during the winter months; usually smaller and better-defined than summer ranges.

WITHDRAWAL - The withholding of an area of Federal land from settlement, sale, location, or entry, under some or all of the general land laws for the purpose of limiting activities under those laws in order to maintain other public values in the area.

WORKING GROUP - Comprises those parts of a forest that have generally the same growth potential and management opportunities.

Y

YARDING - The moving of logs from the stump where cut to a central concentration area or landing.

Z

ZONE OF INFLUENCE - The geographic area where most, but not all, of the direct social and economic effects of the Forest and Grassland's management occur

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