

APPENDIX D

STANDARDS AND GUIDELINES FOR ALL ALTERNATIVES

INTRODUCTION

The purpose of this Appendix (D) is to list those standards and guidelines (S&Gs) for alternatives which are different from those found in the Forest Plan, Chapter IV. S&Gs state the bounds or constraints within which all practices will be carried out in achieving the resource objectives of the alternatives. The management of the Forest is subject to all applicable laws and regulations. S&Gs are intended to help the manager achieve the goals and objectives, while staying within the constraints prescribed by law. Some of the management activities on the Forest could have adverse effects on the environment; the S&Gs provide mitigating measures for these activities.

Two categories of S&Gs are applied to management of the Forest: 1. Forest-wide S&Gs that apply to all management areas and 2. S&Gs specific to individual management areas. The area assigned to management areas varies widely and does not follow the allocations in the Forest Plan for other than the Preferred Alternative. In most instances, the direction for the management areas does not differ significantly between alternatives. A notable exception is the direction for riparian areas in management area 15.

The Forest-wide S&Gs for the Preferred Alternative are also found in Chapter IV of the Forest Plan. Most of the S&Gs in the Forest Plan are common to all alternatives and are not repeated here; the reader is referred to the Forest Plan document.

S&Gs THAT DIFFER FROM THOSE IN THE FOREST PLAN

The Forest-wide S&Gs and the management area-specific S&Gs in Chapter IV of the Forest Plan are applicable to all alternatives with the exceptions noted below.

Management Area Differences

Management area 15 S&Gs in Chapter IV of the Forest Plan apply only to Alternatives W (Preferred Alternative) and L. For Alternative D, all of the S&Gs apply except for Class III streams which would have timber harvest programmed at a rate of 5% of the suitable land per decade. Management area 15 direction would be modified for Alternatives K, A, J, and NC to allow 5% of the suitable lands along Class I and II streams and 7% of the suitable lands along Class III streams to be harvested during a decade. Approximately 21.5% of the lands along Class I, II, and III streams is identified as unsuitable to meet management requirements in all alternatives (see Riparian and Water discussions in Appendix B and Appendix G).

Forest-wide S&G Differences

Alternative NC

The NC Alternative would not adopt the S&Gs of the Forest Plan. The S&Gs for this alternative were established in the existing documents list below. This direction has not been revised to comply with the National Forest Management Act.

The Willamette National Forest Multiple Use Land Management Plan/Timber Management Plan FEIS (1977)

Belknap-Foley FEIS for Geothermal Development(1981)

Breitenbush II Geothermal EIS (1983)

Willamette Pass Alpine Winter Sports Site FEIS (1985)

Alternative K

Wildlife tree habitat would be maintained at 20% habitat capability levels at both the individual unit and the subdrainage level.

Less protection in the form of leave trees would be provided along Class IV streams and on potentially unstable slopes.

Most of biological diversity S&Gs would not apply.

Alternative A

Less protection in the form of leave trees would be provided along Class IV streams and on potentially unstable slopes.

Most of biological diversity S&Gs would not apply.

Alternative J

Less protection in the form of leave trees would be provided along Class IV streams and on potentially unstable slopes.

Most of biological diversity S&Gs would not apply.

Alternative W

The Forest Plan is based on Alternative W. All S&Gs in the Forest Plan apply.

Alternative D

Wildlife tree habitat would be maintained at 60% of habitat capability at both the individual unit and the subdrainage level.

Less protection in the form of leave trees would be provided along Class IV streams and on potentially unstable slopes.

S&Gs requiring 10 leave tree per acre on extended timber rotation management areas would not apply.

Alternative L

Wildlife tree habitat would be maintained at 60% of habitat capability at both the individual unit and subdrainage level.

S&G requiring 10 leave trees per acre would be extended to all management areas with programmed timber harvest.

APPENDIX E

WILD AND SCENIC RIVERS

BACKGROUND

The Wild and Scenic Rivers Act of 1968 (Public Law 90-542 as amended) established a method for providing Federal protection for certain of our remaining free-flowing rivers by preserving them and their immediate environments for the use and enjoyment of present and future generations. Rivers are included in the system so that they may benefit from the protective management and control of development for which the Act provides. Section 4(a) of the Act mandates that all rivers designated as potential additions to the system be studied as to their suitability for inclusion in the system.

In order to facilitate the study process, the Departments of Agriculture and Interior have developed a uniform evaluation and management approach: the *Guidelines for Evaluating Wild, Scenic and Recreational River Areas Proposed for Inclusion in the National Wild and Scenic Rivers System Under Section 2, Public Law 90-542*. The Guidelines provide guidance for Forest managers during river study and land planning processes. Additional management direction is provided by the Land and Resource Management Planning Handbook (FSH 1909.12) and the Forest Service Manual 1924.

Rivers can be identified for study for potential inclusion in the Wild and Scenic River System by several means:

1. Federal statute that mandates Federal agencies to study a river pursuant to section 5(a) of the Act.
2. Identification for study by the Secretary of Agriculture or the Secretary of the Interior pursuant to section 5(d) of the Act.
3. The Nationwide River Inventory (NRI) developed by the National Park Service.
4. The land management planning process.

The study and assessment process follows a three-step procedure including:

- determination of eligibility
- potential classification
- determination of suitability

Eligibility of a river is determined by applying criteria ("free-flowing" conditions of the waterway and "outstandingly remarkable values" of the corridor, such as scenic, recreational, geological, fish and

wildlife, etc.) from the Act and from the USDA-USDI Guidelines and is primarily based on the professional judgement of an interdisciplinary study team. When a river or river segment is found to be eligible, it is given a potential classification of Wild, Scenic, or Recreation. The classification of a river is based on the conditions of the river and the adjacent lands. Determination of suitability is the final step in the river assessment. This step provides the basis for the decision to recommend designation or nondesignation of the river to the United States Congress. In Oregon, rivers can be designated as part of the National Wild and Scenic Rivers System through an Act of Congress or an Act of the Oregon Legislature and subsequent applications by the Governor of Oregon to the Secretary of Interior.

On the Willamette National Forest there are two Federally designated Wild and Scenic Rivers (W&SR) and two Federal Study rivers (see Table E-1). In addition, within the boundaries of the Forest are segments of rivers which have been designated as State Scenic Waterways. The Oregon Scenic Waterways program, established in 1970, is administered by the Oregon State Parks and Recreation Department (ORS 390.805-ORS 390.925).

Table III-O-2. Wild and Scenic Rivers¹

River Name	National WSR	State Scenic Waterway	National WSR Study River
Little North Santiam		X	
McKenzie	X	X	
Blue River			X
South Fork McKenzie		X	
NF MF Willamette	X	X	

¹See also Figure III-O-4 for location and extent of designated rivers.

Segments of Forest rivers have been evaluated for their eligibility as W&SR by the Forest interdisciplinary team. Further, each eligible segment has been assigned a potential classification of Wild, Scenic, or Recreation River as described in Table E-2.

Table E-2. Wild and Scenic River Classifications

Classification	Description
Wild	Free of impoundments Inaccessible except by trail or water surface Watershed or shorelines primitive Waters unpolluted
Scenic	Free of impoundments Shorelines largely primitive Accessible in places by roads Timber harvest may be practiced within the 1/4-mile corridor
Recreation	Readily accessible by road or railroad Some development along shorelines Some impoundment or diversion in the past Segments may be in or near urban areas Timber harvest may be practiced within 1/4-mile corridor

¹See also Figure III-O-4 for location and extent of designated rivers.

Past and future input from the public has a significant influence on Forest management direction of potential W&SR. Public comment and response to the 1987 Draft Environmental Impact Statement were contributing factors in the Forest's decision to identify and evaluate potential W&SR.

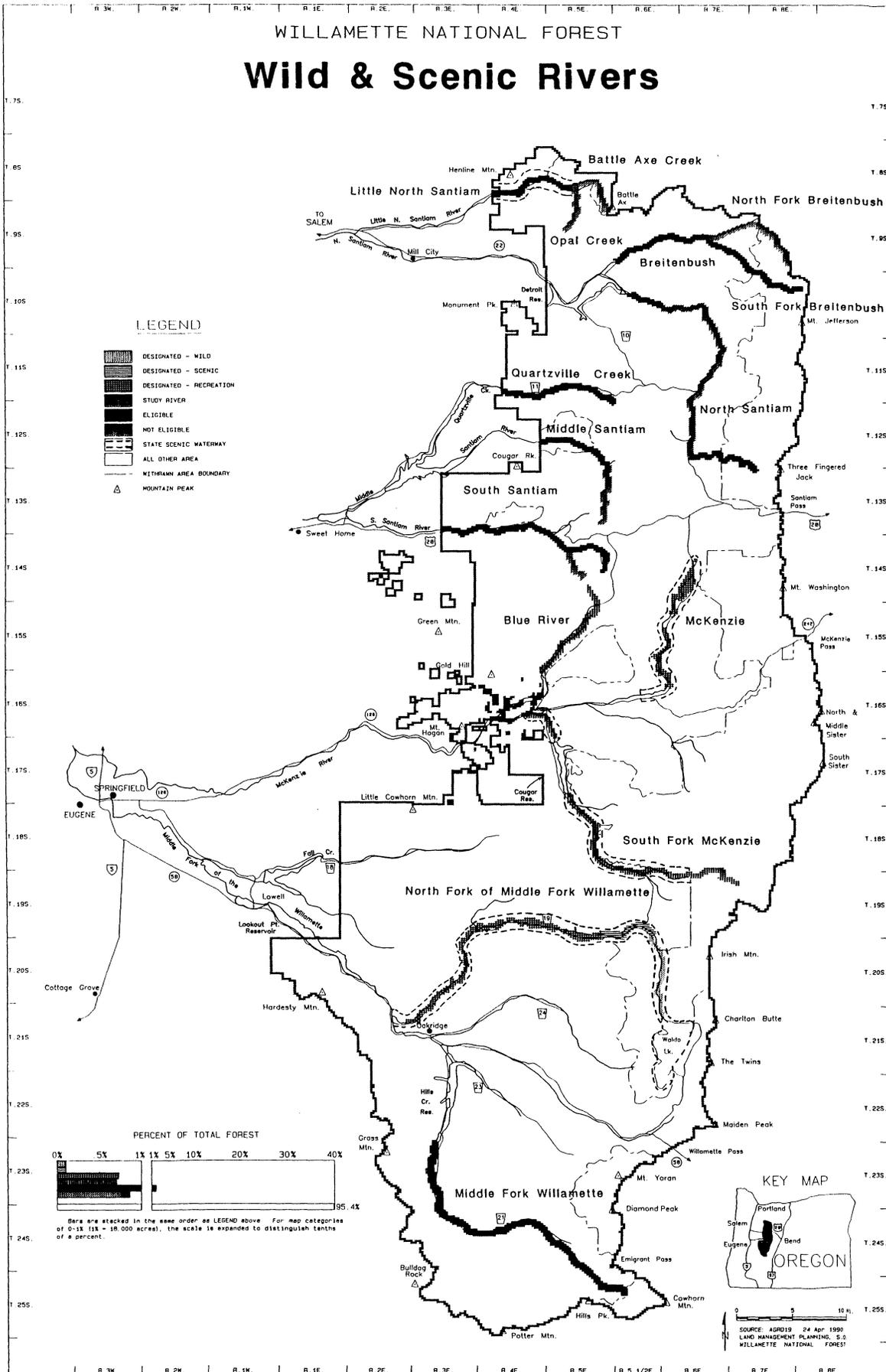
As a result of the identification and assessment process initiated by the Forest, 15 segments of eight rivers within the Forest boundaries have been considered eligible for WSR designation. Figure E-3 is a summary display of designation, eligibility, and classification status and related information of Forest rivers and Figure E-4 illustrates the location and extent of each river listed. Eligible rivers, Federally designated W&SR and Study rivers, and those rivers designated as State Scenic Waterways are described in the following narratives. For management direction which applies to these rivers or river segments refer to Chapter IV, Management Direction, Forest Land Management Plan.

Figure E-3. Eligibility and Classification Status of Forest Rivers

River	Segment Description	River Class	Outstanding Values	Miles	Acres ¹
Designated Wild and Scenic Rivers					
McKenzie River	Clear Lake to Carmen Reservoir	Recreation	Recreation Scenic, Fish Geology, H2O quality	1.8	749
	Carmen Dam to Trailbridge Reservoir	Recreation	"	4.3	1,789
	Trailbridge Dam to Scott Creek	Recreation	"	6.6	2,091
NF of the MF of the Willamette River	Waldo Lake to South Bdy. of Section 36	Wild	Recreation Scenic, Ecology Vegetation Geology, H2O Quality	8.8	2,820
	South Bdy. of Section 36 to Fisher Creek Fisher Creek to Forest Bdy. near Westfir, OR.	Scenic Recreation	" "	6.5 27.0	1,850 8,160
Designated Wild and Scenic Study Rivers					
Blue River	Headwaters to Blue River Reservoir	Recreation	--	8.5	2,720
SF of the McKenzie River	Headwaters to Wilderness Boundary	Wild	--	5.2	1,664
	Wilderness Boundary to Cougar Reservoir	Recreation	--	16.0	5,120
	Cougar Dam to confluence with the McKenzie River	Recreation	--	4.5	1,440
Eligible Rivers					
Little North Santiam River	Battle Axe Creek to Forest boundary	Scenic	Scenic	7.8	2,626
Battle Axe Creek	Headwaters to confluence with Opal Creek	Not eligible	--	5.0	1,727
Opal Creek	Opal Lake to confluence with Battle Axe Creek	Not eligible	--	4.0	1,493
North Fork Breitenbush River	Confluence with NF of NF and SF of NF to SF Breitenbush	Not eligible	--	6.6	1,941
	Headwaters of SF of NF to confluence with NF of NF Breitenbush	Not eligible	--	6.0	1,764
South Fork Breitenbush River	Russell Lake to Wilderness boundary	Wild	Scenic, Wildlife	4.0	1,749
	Wilderness boundary to Breitenbush River	Scenic	Scenic, Wildlife	6.5	1,834
Breitenbush River	North Fork Breitenbush River to Detroit Reservoir	Recreation	Recreation	10.5	3,200

North Santiam River	Headwaters to Wilderness boundary	Wild	Wildlife	3.8	1,450
	Wilderness boundary to Highway 22	Scenic	Scenic	4.2	1,088
	Highway 22 to Rainbow Creek	Recreation	Ecology	19.5	6,912
	Rainbow Creek to Detroit Reservoir	Not eligible	--	3.5	1,130

Figure E-4.



MCKENZIE RIVER

DESIGNATED NATIONAL WILD AND SCENIC RIVER

State of Oregon Willamette National Forest Lane and Linn Counties

The McKenzie River is designated as included in the National W&SR System by the Oregon Omnibus Wild and Scenic Rivers Act of 1988. This River is also included in the Oregon State Scenic Waterways System.

Description

Location and Access:

The McKenzie River is located in the Central Oregon Cascades. The river originates at Clear Lake, and flows south and west through the Forest.

The portion of the McKenzie River (T. 14, 15 and 16S., R.6E.) that is included in the National W&SR System begins at the headwaters from Clear Lake and terminates at Scott Creek.

Access to the river is easily attained by State Highway 126 and Clear Lake Highway which parallels the river. This corridor is approximately 12.7 miles long. The McKenzie River National Recreation Trail also accesses the river, Forest Roads 2650, 2654, 2655-140, and 655 bridge the river.

Designation and River Mileage:

Segment 1. The 1.8-mile segment from Clear Lake to the head of maximum pool at Carmen Reservoir as a recreational river;

Segment 2. The 4.3-mile segment from a point 100 feet downstream from Carment Dam to the maximum pool at Trail Bridge Reservoir Dam to Scott Creek as a recreational river; and

Segment 3. The 6.6-mile segment from the developments at the base of Trail Bridge Reservoir Dam to Scott Creek as a recreational river.

Outstandingly Remarkable Values:

The McKenzie River possesses numerous outstandingly remarkable values: prominent recreational opportunities, spectacular scenery, unique geologic attributes, diverse fish population and habitat.

The McKenzie River endures a national reputation for its outstanding scenery, cold, clear water, and magnificent vegetation. The McKenzie is an important and valuable river to Oregon in terms of challenge to the skills of whitewater rafters, kayakers, and driftboat users. Its close proximity to the Eugene-Springfield area help make it one of the most popular developed and dispersed recreational areas easily accessible from the Willamette Valley, and is also classified as a Scenic Waterway by the State of Oregon. Another highlight is the 26-mile McKenzie National Recreation Trail which provides recreation opportunities and allows easy accessibility to some spectacular geological phenomenon. The river corridor has not been systematically surveyed to identify cultural resources but it has a high potential to bear prehistoric cultural resources.

Landownership:		River Miles
Willamette National Forest		Approx. Acres
Clear Lake to Carmen Reservoir	1.85	749
Carmen Dam to Trailbridge Reservoir	4.3	1,789
Trailbridge Reservoir to Scott Creek	6.6	2,091
Total		4,629

Mineral and Energy Resource Activities:

There are no mining activities or claims within the corridor, although there are several existing Forest Service rockpits which have varying degrees of development.

Cal Energy has two applications for geothermal leases in T.14S., R.7E sections 4,9, and 16 but the leases have not been granted. This area is included in the Belkap-Foley Geothermal Area Final EIS.

A power license to Eugene Water and Electric Board (EWEB) withdraws 2,700 acres from mineral entry. However, the mineral potential in this area is low or unknown.

Water Resource Developments:

Carmen-Smith and Trail Bridge Dams and Reservoirs located along the upper McKenzie Corridor are components of a 90 megawatts Eugene Water and Electric Board (EWEB) hydroelectric project. A power project license is held by EWEB on about 2700 acres. The generators are located in the vicinity of Trail Bridge Reservoir and supply electricity to the city of Eugene. The Carmen-Smith and Trail Bridge facilities combined produce about 12 percent of the total EWEB system use.

Transportation Facilities and Other Developments:

In addition to State Highway 126, a paved two-lane road which parallels the river throughout the designated section, the dam and power generation facilities mentioned above, there are other developments within the corridor. Highway 126 is visible from the river in a few areas, but in most instances it is fairly well buffered from the river by vegetation.

There are numerous recreation opportunities and developments in the river corridor and they include:

- Three developed Forest Service campgrounds with 65 developed sites, two highly developed scenic viewpoints, two developed boat launches, a national recreation trail that traverses the entire segment, numerous dispersed recreation sites, and undeveloped hot springs.
- There are several bridges scattered across the McKenzie and they are Frissell-Carpenter Forest Road 2650, Deer Creek Forest Road 2654, and Trail Bridge Forest Road 730. Two trail bridges built for the McKenzie National Recreation Trail also cross the McKenzie in the designated segment.

Recreation Activities:

The McKenzie is renowned for its scenic beauty and recreational opportunities and has a very high recreational value. Approximately 2/3rds of the states population live within a three hour drive of the river. The quality of the upper McKenzie is quickly being discovered and the recent National W&SR designation may enhance interest and recreational uses of the corridor. The McKenzie River National Recreation Trail offers a unique and quality recreational experience for visitors to explore the McKenzie River corridor. The recent addition of the McKenzie-Santiam National Scenic Byway will also emphasize the scenic features of the McKenzie River. Recreation use is predominantly camping, sightseeing, hiking, fishing, and whitewater boating.

Recreation use of Forest Service facilities and lands within the corridor during 1988 was as follows:

Camping	71,300
Fishing, Sightseeing	66,350
Whitewater Floating	2,500
Guided Service Days	2,090

Wildlife and Fish:

The McKenzie river corridor is known to inhabit many wildlife species and a majority of the area lies within winter range for big-game. The sensitive species are being managed by specific designations to protect their habitat by mature and old-growth timber. It includes a spotted owl habitat area, pine marten network area, pileated woodpecker habitat area, and a special wildlife area. There are several known osprey nests and bald eagle activity has been witnessed but no nests have been located.

Spring chinook salmon and steelhead runs are present in the McKenzie River up to Trail Bridge Dam. A unique feature downstream from Trailbridge Dam is a Chinook salmon spawning facility maintained by EWEB.

Streamflow:

Flows reach maximum during spring snowmelt, with up to 2,500 cubic feet per second (cfs) average. From late summer through early winter, flows average at approximately 1,100 cfs. These figures for the river are taken from the guage at 1.7 miles east of McKenzie Bridge. Trail Bridge dam serves as a regulating reservoir to provide an even flow of water in the McKenzie below the dam.

Streamflow above Trail Bridge reservoir is relatively complex. The McKenzie River officially begins at the outlet to Clear Lake. From that point to Carment Diversion Reservoir the river flows normally. At Carmen Reservoir the McKenzie is diverted, via tunnel, to Smith Reservoir which provides the hydrolic head for the generators located on Trail Bridge regulating facility. From Carmen Dam downstream to Tamolich Falls the old river bed is essentially dewatered. Presently only during major runoff events does the river flow over the lip of the falls.

From a historical perspective this may not be an unusual situation. In the past the McKenzie regularly disappeared into the highly permeable lavas of Tamolitch Valley during the summer months only to reappear as a full fledged river in the pool below Tamolitch Falls. While the flow in the dry channel is variable during the winter and spring (from a few hundred yards to 1/2 mile, and rarely over the falls) the river stills flows from Tamolitch pool.

Geology:

The upper McKenzie River Basin is fascinating because it has undergone several violent transformations in the recent geological past. The basin was the site of frequent volcanic activity and the river has cut through numerous layers of tuff (consolidated volcanic ash) and basalt flows. A geologically recent basalt flow is responsible for the formation of Clear Lake and the course of the McKenzie River has been altered by lava flows. Lava flows which poured from the Belknap Crater dammed up part of the McKenzie creating the spectacular Sahalie and Koosah waterfalls.

Botany:

The river contains significant old growth stands of true fir forests and the species transform quickly in spots where the lava flows are prominent to a drier species functioning on less water. Douglas Fir, Western Hemlock, Western Red Cedar, Incense Cedar, and Lodgepole Pine are some of the species that occur in the river corridor. Hardwood species such as big leaf maple and alder occur throughout the drainage. Significant understory species include vine maple, oregon grape, rhododendron, bracken fern, swordfern, oxalis, and vanilla leaf.

Presently there are no threatened and endangered species confirmed along the designated National W&SR System river corridor.

Cultural Resources:

In the McKenzie River corridor, a total of nine prehistoric sites have been found and recorded. Historic resources include 1930's Civilian Conservation Corps. (CCC's) projects, (culverts, buildings, etc...). There has not been a systematic search of the corridor area, but future plans include a full survey of the area adjacent to the McKenzie for additional prehistoric and historic resources.

Timber:

The McKenzie River corridor is being modeled in the proposed Forest Plan without programmed harvest to respond to the management intent for this area prior to designation as a W&SR and to fully respond to the public's concern for this rivers outstanding values.

Livestock Grazing:

There are no grazing allotments within the river corridor.

Socioeconomic Effects:

The upper McKenzie River corridor local economy is largely dependant on both tourism and wood products. There is a significant amount of retired and leisure homes below the designation and this growth of housing has continued to increase recently. Designation of the McKenzie River will protect or enhance river values and likely will benefit those with work and live along the river.

NORTH FORK of the MIDDLE FORK of the WILLAMETTE RIVER

Designated National Wild and Scenic River

State of Oregon Willamette National Forest Lane County

The North Fork of the Middle Fork of the Willamette River is designated as included in the National Wild and Scenic River System by the Oregon Omnibus Wild and Scenic Rivers Act of 1988. The river is also included in the Oregon State Scenic Waterways Systems.

Location:

From the outlet of Waldo Lake downstream approximately 42.3 miles to the National Forest boundary near Westfir, Oregon.

- Segment 1. The North Fork of the Middle Fork of the Willamette River, from its outlet of Waldo Lake downstream approximately 8.8 miles to its intersection with the south section line of Section 36, T19S, R5-1/2 E of the Willamette Meridian.
- Segment 2. North Fork of the Middle Fork of the Willamette River, from its intersection with the south section line of Section 36, T19S, R5-1/2 E of the Willamette Meridian, downstream approximately 6.5 miles to Fisher Creek.
- Segment 3. North Fork of the Middle Fork of the Willamette River, from Fisher Creek downstream approximately 27 miles to the National Forest boundary, upstream from the Southern Pacific bridge near Westfir, Oregon.

Designated segments:

Segments 1, 2, and 3.

From the outlet of Waldo Lake downstream to the National Forest boundary near Westfir, Oregon. (42.3 miles)

Outstandingly Remarkable Values:

Inventory and study of the North Fork of the Middle Fork of the Willamette River for Oregon State Scenic Waterways designation revealed attributes that are important to this waterway and set it apart as "special" among the State's Waterways.

Water Quality.

Water quality is probably the most outstanding attribute of both Waldo lake and the river. The level of purity of the lake is equal to laboratory distilled water. Waldo Lake, included in the state's designation, is regarded by some experts as one of the purest lakes in the world.

Recreation.

The variety of recreational experiences available on the North Fork W&SR are an important attribute. For example, primitive, remote forest areas are available for hiking and fly fishing for wild trout in crystal clear water amid towering Douglas-fir trees. The State of Oregon currently manages the North Fork as a wild trout river and restricts angling to fly fishing only. The river is well known to local anglers as a high quality fly fishing area.

During high flows, the river is moderately used by local rafters. The lower 8 or 9 miles of the river are heavily used during the summer for swimming and picnicking by residents of Oakridge and Westfir.

There is one campground on the North Fork, Kiahanie Campground, which is about 24 miles upstream from the city of Westfir. There are 39 dispersed campsites, mostly in the middle section of the river (from Road 1920 to Fisher Creek), that are heavily used during the summer and fall months by campers, anglers and hunters.

The Constitution Grove Commemorative Site was established along Forest Road 19 in 1987. The 200 year old Douglas-fir stand commemorates the many individuals who signed the U.S. Constitution.

Several Forest Service trails parallel the upper 9 miles of the North Fork with the Shale Ridge Trail (#3567) being a major trail in accessing the Waldo Lake Wilderness Area. Plans have also been made to construct a trail that will parallel the North Fork from Westfir to the beginning of the Shale Ridge Trail.

Natural Features.

The outstanding and unique natural features of the river and related adjacent lands are another attribute. Among these unique natural features is a steep river canyon that drops 2,400 feet in 6 miles and has 34 waterfalls. The Cedar Bog area, in the upper North Fork Canyon below Waldo Lake, was formed by a glacial moraine. There is also a large flood plain along the middle portion of the river that is up to 1/2-mile wide which is, for the most part, covered with a diverse riparian forest containing trees up to 600 years old.

The lower 12 miles of the North Fork flows through a steep canyon approximately 1,000 feet deep. This canyon is the result of the river eroding through a large ancient lava flow that filled the North Fork's ancestral valley. In many places within the canyon, the river flows on bedrock and has in places formed deep pools in hard bedrock.

Historic and Cultural Resources.

The North Fork has been an important travel and hunting route for nearly 10,000 years. Evidence remains of the early logging railroads and Civilian Conservation Corps work.

Threatened and Endangered Animal and Plant Species.

Another feature is the unusual variety of wild plant and animal life. The North Fork is home to several threatened and endangered species (both State and Federal lists) such as the wolverine, fisher, bald eagle, northern spotted owl, bog orchid, coralroot orchid, mountain lady slipper and others.

River Mileage:

Approximately: 42.3 miles

Classification:

Segment 1	Designated Wild	8.8 miles
Segment 2	Designated Scenic	6.5 miles
Segment 3	Designated Recreation	27.0 miles

Landownership:

All of the lands adjacent to the Federally designated W&SR are National Forest System Lands. State designation includes the entire river. The lower 2.0 miles from the end of the Federal designation to the confluence with the Middle Fork is privately owned by a variety of people.

	River Miles	Corridor Acres
Willamette National Forest	42.3 miles	12,830 acres

Mineral and Energy Resource Activities:

Mining activity has been limited on the North Fork to historic claims around Christy Creek, which are outside of the W&SR corridor. However, within the corridor there are 36 claims that have been recorded with no notices of intent filed.

Recent mineralogical studies by the Oregon Department of Geology and Mineral Resources on the Fall Creek Mining District 1983, have indicated that several metals including gold, silver and copper may be present in commercially recoverable quantities within the W&SR but more likely in better concentration in the Christy Creek subdrainage.

There is one Forest Service rockpit in the W&SR corridor which is currently being rehabilitated to be less visually apparent. No geothermal, oil or gas leases or lease applications exist in or near the W&SR corridor.

Water Resource Developments:

There are no active hydropower permits in the vicinity of the North Fork River corridor. Several preliminary hydropower permits had been issued in 1982 and 1983 but as of 1986 all permits were surrendered.

Transportation Facilities and Other Developments:

Forest Service Road 19 (Aufderheide Forest Drive) is a paved double lane road and is a designated Scenic Byway which parallels Segments 2 and 3 for approximately 30 miles. The road is the approximate

center of a managed scenic corridor and a number of interpretive signs exist explaining forest management practices. Approximately 20-30 percent of the North Fork (Segment 3) is not well buffered by vegetation from the road.

A number of administrative facilities exist along the W&SR corridor. These developments include:

Eight concrete bridges cross Segment 3 of the river. These are located above Short Creek, 1/2-mile above Dartmouth Creek, below intersection of Forest Service Road 1919, above FS Road 1920, below confluence of Christy Creek, 3/4-mile above confluence of Christy Creek, 1/2-mile above Kiahanie Campground, and 3/4-mile below confluence of Fisher Creek. Three of the eight cross the North Fork river on Forest Service Road 19 at mile post 11.8 (Lower Gorge Bridge) at the entrance of a narrow gorge, mile post 12.7 (Upper Gorge Bridge) leaving the gorge and at mile post 23.6 (Brock Bridge).

Shale Ridge Trail #3567 parallels approximately 1 mile of upper Segment B and approximately all of Segment 1.

Forest Service recreation developments include 1 campground. Approximately 39 heavily used disperse recreation sites in the upper half of Segment 2 are accessed by many low standard timber access roads and segments of the Old Box Canyon road.

Many Forest Service collector roads lead from Forest Service Road 19 to adjacent lands managed for timber production. Numerous timber harvest activities have taken place along the corridor with some visible from the river and road 19.

Segment 3 ends at the National Forest Boundary and mile post 3.1 of Forest Service Road 19. Located in the near vicinity is a water intake pipe, water treatment facility, old water diversion structure and water tank for the City of Westfir. Also a covered bridge crossing the North Fork River, accessing an old mill site, is in this vicinity.

Along the lower part of Segment 3 are portions of an old abandon railroad grade. This railroad was used to access logging sites and transport logs to the mill in Westfir.

An environmental assessment has been prepared for the construction of a trail paralleling the river from the Forest Boundary to the Shale Ridge trailhead.

Recreation Activities:

The North Fork of the Middle Fork of the Willamette has a very high recreation value. Approximately two-thirds of the State's population live within a 2.5-hour drive of the river. Recreation on the river includes camping, hiking, hunting, swimming, fly fishing, sight-seeing, biking and boating.

Recreation Activities (Estimated Recreation Visitor Days - RVD's):

		Year 1989	Year 2000
Whitewater boating		100	1,200
Fishing		2,000	4,000
Camping:	developed	12,000	24,000
	dispersed	13,000	26,000
Hiking		200	3,000
Viewing scenery		15,800	31,000
Biking		200	1,200
Swimming		700	1,400
Total	44,000	91,800	

Wildlife and Fisheries:

The entire length of Segment 3 and portions of Segment 2 provide big game winter range habitat. Several Roosevelt elk herds use all or portions of the W&SR corridor during the winter, along with blacktail deer, black bear and cougar. These latter also use the area on a year-round basis. The lower 14 miles of the North Fork provides different quality of habitat due to young Douglas-fir stands resulting from the logging that occurred during the 1920's and 1930's.

Smaller mammals common in the North Fork riparian area include coyotes, bobcats, beaver, mink, river otters, flying squirrels, snowshoe hares and numerous species of chipmunks, squirrels, mice, voles and shrews. Wolverines, fishers and pine martins are also seen occasionally in the upper reaches of the North Fork near Waldo Lake.

A large variety of birds can be found along the North Fork, including northern spotted owls, pileated woodpeckers, water ouzel, ducks of various kinds, osprey, grouse and quail. Bald eagles, though they do not live in the area, are sometimes seen traveling along the river during migration season. The upper third of Segment 3, the entire portion of Segment 2 and the lower 2 miles of Segment 1 provides an old growth forest habitat suitable for the northern spotted owls. Approximately 6 miles of the North Fork flows through or adjacent to areas designated by the Forest as Spotted Owl Habitat Areas.

The North Fork previously supported steelhead and chinook salmon runs which were stopped by the Hines Lumber Co. dam built in Westfir in the early 1950's. Dam construction on the lower Middle Fork near Lowell, Oregon has further blocked anadromous fish movement.

Rainbow trout were stocked in the river until the mid 1970s. The Oregon Department of Fish and Wildlife now manages the North Fork as a wild trout river. Angling is restricted to fly fishing only.

Streamflow:

The outlet of Waldo Lake is the headwaters of the North Fork of the Middle Fork of the Willamette River. Waldo Lake has a relatively small watershed with water replenishment by rain, snow melt run-off and subsurface run-off as there are no permanent inlet streams. Due to its small watershed, it takes almost 30 years of run-off and precipitation to completely replace the water volume in Waldo Lake. A gauging station recording daily outflow is maintained by the U.S. Geological Service at the outlet of Waldo Lake (beginning of the North Fork). Measurements range from a low of 0 CFS to a high of 143 CFS, with an average annual flow of 35 CFS.

From Waldo Lake downstream, the flow in the North Fork gradually increases due to numerous tributaries. Several underground sources add substantially to the stream. The largest tributary is Christy Creek which joins the river near Forest Service Road 1926 (Segment 3). The North Fork watershed totals 246 square miles. The river drops 4,400 feet over its 42.3 length. The first 6 miles drops 2,400 feet in elevation.

Nearly all of the "sediment" carried by the river is coarse gravel and rock; the only serious bank erosion is occurring at the toe of two recent slides near the main USFS road. The average daily flow recorded on the lower river at the town of Westfir has a minimum daily flow of 84 CFS, maximum daily flow of 19,320 CFS, with an average annual daily flow of 789 CFS.

Geology:

Much of the present North Fork River canyon has been altered by glacial action, slides and intercanion lava flows. As alpine glaciers moved down the canyon, the ice carved and undercut many of the lava and tuff layers. When the glaciers receded, they left behind many glacial features like the water falls of the upper segments of 1 and 2, and the moraine in the upper North Fork Canyon below Waldo Lake that blocks the river to form Cedar Bog. Segment 2 also contains a large flood plain along the middle portion of the river that is up to 1/2 mile wide.

As the glaciers melted, they caused numerous slides and slumps. One of these slides blocked the river between the first and second bridge at milepost 9 and is known as the Gorge. The lower 12 miles of the river flows through a steep canyon approximately 1,000 ft. deep. This canyon is the result of the river eroding through a large lava flow that filled the N. Fork's ancestral valley. In many places the river flows on bedrock and has formed numerous deep pools in hard bedrock.

Botany:

The upper five miles of the river flows through Pacific silver fir and mountain hemlock forests. Typical understory species in these forests include devils club in the wettest areas, huckleberries, bunchberry, foamflower, bead lily and false-solomons seal.

At 3,000 feet in elevation, the river flows through a large and very unique marsh/bog complex that is approximately 160 acres in size. This marsh contains a large variety of plant life including dense sitka alder and willow brush fields, sedge and grass meadows, skunk cabbage and vine maple swamps, as well as a large variety of other flowering herbs typical of wet meadows. Nearly pure stands of western redcedar and grand fir occur along the edges of the marsh. The stream channel itself contains a relatively large number of plants due to its low gradient in the marsh. Four species of flowering aquatic plants grow on the bottom gravels and rock along with several species of moss.

Below about 3,200 feet the river flows mostly through Douglas-fir/western hemlock forests. These forests also contain smaller amounts of grand fir, incense cedar, redcedar, cottonwood, red alder and bigleaf maple. These last 3 trees tend to grow most often on the banks of the river or near associated wetlands. From river mile 17.5 to 36, these forests are composed mostly of old-growth stands that range in age from 250 to over 600 years old, with the exception of the 15 percent of the area which has been harvested and converted to young plantations. Understory vegetation in these older stands is composed mostly of vine maple, Pacific rhododendron, salal, Pacific yew, sword fern, and Oregon grape, along with a fairly diverse set of herbaceous species. At river mile 20, there is a grove of especially tall Douglas-fir which range from 240 to 270 feet in height.

From river mile 2 to 17.5, the river flows through dense second growth Douglas-fir stands which have understory vegetation dominated by salal, vine maple and sword fern. This stretch of the corridor also contains small amounts of several introduced plants, including Himalayan blackberry, tansey ragwort, scotch broom and foxglove.

Between river mile 22 and 27, there are several meadows that are within the river corridor but at some distance from the river. These meadows contain a variety of plants types; dry areas are dominated by grasses, service berry and oceanspray; wetter areas are dominated by sedges and dense spirea brush fields. Several native ponderosa pine occur in the dry areas, the only known native occurrence of this tree in the North Fork watershed. There have been reports of quaking aspen, which generally only grows on the east side of the Cascades, growing in one of the spirea swamps but this has not been verified in recent years. Buffalo Rock, located near river mile 21, supports a dry rock garden plant community which contains a number of ferns, mosses and spring ephemeral flowering plants adapted to extremely dry conditions. This area also contains rabbit brush, another plant generally found only on the east side of the mountains.

There have been no plants found within the W&SR corridor which are classified as threatened, endangered or sensitive by the U.S. Fish and wildlife Service or the Forest Service. There is potential for several species to occur in some of the non-forest vegetation types, including: *Lycopodium annotinum*, *Ophioglossum vulgatum*, *Agoseris elata*, *Allium campanulatum*, *Arnica viscosa*, *Asplenium septentrionale*, *Phacelia verna*, and *Pellaea andromedaefolia* and one species, *Montia diffusa*, which could occur in the more general habitat of forested moist areas.

Cultural Resources:

The Forest Service has identified at least six archaeological sites on the North Fork with 4 sites being within the W&SR designation. Evidence from these sites indicate that Indians (8,000 - 10,000 years) used the areas for hunting, food gathering and as a travel route across the Cascades.

Early logging activities on the North Fork are still evident today. Near Eighth Creek, the Western Lumber Co. of Westfir and Oakridge built an inclined railroad about 1924-1925 that utilized a "steam donkey" and "snubber" to move rail cars up and down this 72 percent grade incline. At other locations along the river there are remnants of the trestle that once supported the railroad that was used to transport logs from the North Fork drainage.

In the vicinity of Christy Creek, early miners operated a stamp mill with the power generated by a 30 foot diameter cedar waterwheel fed through a flume.

The Civilian Conservation Corp. (CCC's) operated out of a camp near Brock Creek while they constructed campgrounds at Kiahanie, Skookum Creek, North Waldo Lake and Taylor Burn. They also built part of the North Fork road from Box Canyon to Skookum Creek.

Timber:

Segment 3 contains 40-50 year old stands of Douglas-fir that regrew after the railroad logging occurred in the lower 14 miles of the canyon during the 1920s. This young timber is just beginning to be commercially thinned. The upper portion of Segment 3 and Segment 2, totaling about 22 miles, contains old growth Douglas-fir, western hemlock and red cedar. Approximately 15 percent of this area has been harvested within the last 30 years. This area supports young plantations of Douglas-fir from 1 to 30 feet in height. The portion of this river corridor in the commercial forest land base contains approximately 221 million board feet of timber.

The annual sale quantity for the Recreation and Scenic portions of this W&SR are estimated to be 1.8 MMBF.

Livestock grazing:

The river corridor is not located within any existing grazing allotment.

Socioeconomic Effects:

Due to the current Forest Service strategy of increased marketing of the Aufderheide Forest Drive and National Scenic Byway, an increase in tourism is anticipated. However, with a W&SR designation, a much greater increase in tourism may occur with a corresponding increase in tourism related businesses in the Westfir and Oakridge area.

Current management and management under the prepared Forest Plan limits timber harvest in the corridor. The designation of the North Fork as a W&SR will result in slightly lower timber harvest levels in the corridor.

The North Fork of the Middle Fork corridor begins about 45 miles from the Eugene/Springfield metropolitan area. The local economy is relatively dependent upon the timber industry with tourism increasing in importance.

Current Administration:

The entire designated river corridor is currently managed by the Forest Service, Oakridge Ranger District.

Funding Needs as a Wild and Scenic River:

The following are anticipated funding requirements for the North Fork of the Middle Fork of the Willamette River for the first five years:

	Expenses Expected Independent of Designation	Additional Expenses Ex- pected with Designa- tion
General Administration	\$ 25,000	\$ 6,250
Costs of Implementation	-0-	6,000
Development of Management Plan	-0-	45,000
Development Costs	289,000 ¹	-0-
Operation and Maintenance Costs	89,000	10,500
Total - First 5 Years \$	403,000 \$	74,750

¹Development costs include a campground in Segment 3 and a trail running parallel to Segment 2 and 3 with a horse loading ramp.

Forest Plan Alternatives:

None of the alternatives in the DEIS and Draft Forest Plan recommended National W&SR designation for any segment of the North Fork of the Middle Fork of the Willamette River. Plan references refer to the North Fork of the Middle Fork of the Willamette River as included in the Oregon State Scenic Waterway System, October 1983.

BLUE RIVER

Designated Wild and Scenic Study River

State of Oregon Willamette National Forest Linn and Lane Counties

The Blue River is proposed for study as a potential Wild and Scenic River. This river was designated for study by the Oregon Omnibus Wild and Scenic River Act of 1988. A study team on the Willamette National Forest is currently evaluating Blue River to determine its eligibility and suitability for inclusion into the National System.

Location:

From the headwaters to the confluence with the Mckenzie river.

Segment 1: From its headwaters at the junction of Mann Creek and Wolf Creek in the NE1/4 of Section 2, T.15S., R.5E. to the Blue River Reservoir in the NW1/4 of Section 6, T.16S., R.5E. (approximately 8.5 miles).

Potential for Designation:

From the headwaters of Blue River downstream to Blue River Reservoir (segment 1).

River Mileage:

Study:	- 8.5 miles
Eligible:	- 0.0 miles
Draft Forest Plan:	- 0.0 miles

Outstandingly Remarkable Values:

Upper stream area has a number of bedrock cascading falls, 6-10 feet high along with numerous pools and riffles. River flows along areas of mature/old growth Douglas-fir. Lower section of the river contains deep bedrock pools, cliffs and canyons with excellent water clarity.

Potential Classification:

Segment 1	Recreational	8.5 miles
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Landownership:

	River Miles	Corridor Acres
Willamette National Forest	8.5 miles	2,720 acres

Mineral and Energy Resource Activity:

There are no known mining claims within the corridor of the river. No interest has been expressed in mineral exploration or development, and the lands within the corridor have low mineral potential,

making entry unlikely. There are no geothermal leases in the area with low potential for any geothermal development.

Water Resource Developments:

There are no existing impoundments nor potential water resource development sites located in the corridor. Blue River Reservoir is immediately down stream. In 1985 a small earthen dam broke on private land sending a large flow of water down Mann Creek into the headwaters of Blue River causing some stream scouring along the upper section. Along the lower section a small hand operated cable car is located for research purposes for the H.J. Andrews. Along this same section are water gaging stations on minor tributaries from research areas on the H.J. Andrews.

Transportation, Facilities, and Other Developments:

Forest Development Road 15, is a paved, two-lane road for the first 1.5 miles and then becomes a gravel surfaced road. It parallels the river for all of its length, providing access to the river. Along the lower 5 miles the road is visible from the river in certain areas. Numerous timber harvest activities have taken place and are readily apparent from the river. There are a number of dispersed recreation sites located along the lower 1.5 miles of this river.

Recreation Activities:

Overall, compared to the south end of the district, the Blue River corridor does not receive much recreation traffic. What it does receive is concentrated in the lower section, especially the last 2 miles. Above Blue River Reservoir there are no developed campgrounds or established hiking trails. Fishing is the major recreation use. Directly above the headwaters is Wolf Rock, the second largest monolith in the world. It receives moderate use from rock climbers with principle access to this area along the river corridor.

Recreation Activities (Estimated Recreational Visitor Days - RVD's)

Activity	1989	2000
Fishing	10,000	12,000
Camping	7,500	10,000
Picnicking	3,000	5,000
Total	20,500	27,000

Wildlife and Fisheries:

The river corridor is important big game winter range. Mature/old growth Douglas-fir along stream is suitable as a spotted owl nest area and 2 foraging habitat. Blue River is stocked with rainbow trout by ODFW. Native cutthroat trout are present, however, spawning gravels is low to moderate, especially in lower half of stream.

Streamflow:

The river's annual flow is approximately 390 cfs with high fluctuations in flows. High flows occur in winter and spring from rainfall and snow melt.

Low base flow in summer occurs in August and September with flows of 15 - 20 cfs. January flows average 800 - 1200 cfs.

Geology:

Andesite and basalt bedrock pools 12 feet deep, cliffs and canyons 15-20 feet high are scattered along the stream course in the lower 5 miles of the stream. The upper section is mainly alluvial material, cobbles, stones, boulders, and gravels. There are four bedrock cascading falls, 6 -10 feet high.

Cultural Resources:

The study corridor includes high probability zones with good potential for bearing prehistoric cultural resources. There are six archeological sites (lithic scatters), and 3 isolated artifacts.

Timber:

The portion of the river corridor that is eligible for Recreation River designation includes about 2,720 acres. Stands of mature/old growth Douglas-fir, and western hemlock occupy the area. Estimated ASQ without River designation is 2.5 MMBF and 2.3 MMBF if the area were designated as a Recreation River.

Socio-Economic Effects:

The Blue River is close to the Eugene/Springfield metropolitan area. The local economy is dependent on both timber industry and tourism. Designation as a Wild and Scenic River should increase recreational use due to enhanced name recognition. Current management and the preferred alternative restrict timber harvest in the lower corridor. Designation as a Wild and Scenic River would lower timber harvest in the corridor.

Current Administration:

The study segment of the river is currently managed by the Willamette National Forest along it's entire length.

Funding Needs If Classified as a Wild and Scenic River:

The following are expected funding requirements for Blue River for the next 5 years:

Cost Category	Expenses Expected Independent of Designation	Additional Expenses Expected with Designation
General Administration	\$ 15,000	\$ 8,000
Costs of Implementation		10,000
Development of Management Plan		130,000
Development Costs	50,000	
Operation and Maintenance	35,000	5,000
Total - Five Years	\$100,000	\$153,000

General administration and operation and maintenance costs are estimated to continue at \$15,000 annually.

Forest Plan Alternatives:

The DEIS and Draft Forest Plan did not recommend designation of Blue River as a Wild and Scenic River. The Draft Forest Plan, however, recommends designation of the upper corridor as a scenic foreground.

SOUTH FORK MCKENZIE RIVER

Designated Wild and Scenic Study River

State of Oregon Willamette National Forest Lane County

The South Fork Mckenzie River is proposed as a potential Wild and Scenic River. This river was designated for study by the Oregon Omnibus River Act of 1988. A study team on the Willamette National Forest is currently evaluating the South Fork McKenzie River to determine its eligibility and suitability for inclusion in the National System.

Location:

From the headwaters in the Mink Lake Basin to the confluence with the Mckenzie River.

Segment 1. From its headwaters located in Beaver Marsh, part of the Mink Lake Basin, in T.19S., R.7E., NW1/4 of Section 6 down to the Wilderness boundary (approximately 5.2 miles).

Segment 2. From the Wilderness boundary to Cougar Reservoir (approximately 16.0 miles)

Segment 3. Cougar dam base developments downstream to confluence with main Mckenzie River (approximately 4.5 miles).

Potential for Designation:

From the headwaters down to Cougar Reservoir, segments 1 and 2, and base facilities of Cougar Dam to confluence with main Mckenzie River (segment 3), approximately 25.7 miles.

River Mileage:

Study:	- 25.7 miles
Eligible:	- 0.0 miles
Draft Forest Plan:	- 0.0 miles

Outstandingly Remarkable Values:

The outstandingly remarkable values associated with the Mckenzie River are excellent fishery, spectacular scenery, and significant recreational opportunities to appeal to the full range of forest visitors.

The outstanding scenery coupled with the proximity to Eugene/Springfield makes it an important recreational area in the Mckenzie Valley. Fully developed campgrounds and dispersed sites are distributed along it's entire length. In conjunction with these sites are a number of major trail heads providing access to the Three Sisters Wilderness, roadless areas and general forest trails.

Another significant feature of the river is the Aufderheide Drive, a National Scenic Byway. This is a two-lane, paved surface which parallels the river, providing easy access. The Aufderheide Drive is part of a 145 mile scenic loop from the Eugene-Springfield metropolitan area.

Under the Draft EIS and Forest Plan, a companion trail system is proposed along the entire length continuing along the North Fork of the Middle Fork Willamette River, also being considered a candidate for Federal Wild and Scenic River.

Potential Classification:

Segment 1	Wild	5.2 miles
Segment 2	Recreational	16.0 miles
Segment 3	Recreational	4.5 miles

Landownership:	River Miles	Corridor Acres
Willamette National Forest	25.2	8,064
Private	0.5	160
Total	25.7 Miles	8,224 Acres

Mineral and Energy Resource Activity:

There are no known mining claims within the corridor of the river. No interest has been expressed in mineral exploration or development, and the lands within the corridor have low mineral potential, making entry unlikely.

There are no geothermal leases in the area with low potential for any geothermal development. There is one geothermal area, Terwilliger Hot Springs also known as Cougar Hotsprings which has been identified as a Significant Interest Area (SIA) in the DEIS. There are no oil or gas leases within the corridor and the potential for exploration and development is low.

Water Resource Developments:

Segment 1 is located totally within the Three Sisters Wilderness; therefore, no impoundments or potential water resource developments. There are no existing impoundments nor potential water resource development sites located within segment 2. Segment 3 starts from the base of Cougar Dam under the administration of the Army Corps of Engineers. A generator facility is located at the base of the dam and is visible from the uppermost section of the river along with past dam construction activity. Further downstream a side channel was reopened for development of anadromous fish habitat. The proposed Strube Regulatory dam site lies along this stream segment.

Transportation, Facilities, and Other Developments:

- Forest Development Road 19 is a paved, two-lane road which parallels the river for most of its length in segment 2 and 3, providing easy access to the river. Forest Road 19 was recently designated a National Scenic Byway as Aufderheide Drive. In some areas the road is visible from the river.
- There are bridges scattered along the river in segments 2 and 3. One bridge in segment 3, and 4 bridges in segment 2. Two of the bridges in segment 2 provide access for major arterial forest roads, Forest Road 19-1980 and 19-1927.

- There are bridges scattered along the river in segments 2 and 3. One bridge in segment 3, and 4 bridges in segment 2. Two of the bridges in segment 2 provide access for major arterial forest roads, Forest Road 19-1980 and 19-1927.
- In addition to Cougar Dam and its power generation facilities which are visible from the upper section of the river, a high tension power line crosses the river in segment 1.
- Timber harvest activities have taken place along the corridor and in a few locations are somewhat visible from the river.
- Forest Service recreation developments include 3 campgrounds and a number of dispersed recreation sites scattered along segments 2 and 3.
- In some locations low standard timber access roads in the corridor provide access to timber management areas.

Recreation Activities:

The South Fork Mckenzie River, as a whole, has very high recreational values. A major population center lives within a 1 hour drive of the river. Recreational use on segments 2 and 3 is predominantly camping, fishing, and hiking. A number of trailheads providing wilderness access are located within the corridor.

Segment 3 is all within the Three Sisters Wilderness and provides great scenic values of numerous cascading falls and white water. Wilderness trails are around the headwaters with excellent fishing from glacial lakes.

Segments 2 and 3 provide a variety of developed and dispersed recreational opportunities. User density in some areas is very high, with equal amounts of day users and overnight users. Fishing is second only to camping and viewing scenery in terms of popularity.

Recreation Activities (Estimated Recreational Visitor Days - RVD's)

Activity	1989	2000
Fishing	4,000	5,000
Camping	10,000	20,000
Picnicking	5,000	8,000
Hiking	3,000	6,000
Viewing Scenery	50,000	75,000
Car Touring	50,000	75,000
Total	122,000	189,000

Wildlife and Fisheries:

Important high use big game winter range (deer and elk) and a critical winter travel corridor along river in segment 2. The river flows through the South Fork Old Growth Corridor, Special Interest Area (SIA) and flows by mature old growth Douglas-fir along the majority of the stream corridor. The

Delta Old Growth Grove is located in segment 3. The stream corridor crosses old growth habitat suitable for 2 spotted owl nest areas and 3 foraging areas; 1 osprey nest site, and 1 nearby pileated woodpecker nest area. In segment 3 are nearby ponds and backwaters, with some waterfowl and beaver activity.

Upper sections are stocked with rainbow trout by ODFW. Abundant native cutthroat trout are found in the upper portions of the stream. Spring chinook salmon and steelhead runs are present in segment 3 up to Cougar Dam.

Streamflow:

The river is considered to be of high quality and free from manmade pollutants. Even during periods of heavy rainfall, sedimentation is not a major problem.

Segment 1 has very high water quality. It is fed by snowmelt from the Cascades via porous lava beds, resulting in sustained flows throughout the summer and fall months. Segment 2 is fed by rain and snowmelt. Sustained flow throughout the year with flows averaging 1000-1500 cfs and summer/fall flows averaging 235 cfs.

Segment 3 is regulated by Cougar Dam with mean annual flow of 820 cfs. Winter flood release may be as high as 1600 cfs while summer flows vary from 300 to 800 cfs.

Geology:

The headwaters originate over gentle lava flows that have been glaciated, leaving many glacial lakes. Below the headwaters, the stream flows through a very narrow, steep, rugged canyon that is 4 miles long and 1200 feet high. The canyon is forested, with large rock bluffs and cliffs of andesite/basalt. Wider floodplain/valley walls are found in the upper section near the confluence with Roaring River. As the river flows downstream it turns into a wide meandering river channel, with alluvial and glacial deposits.

Cultural Resources:

The entire study corridor has a high percentage of prehistoric cultural use. Identified are 11 archeological sites (prehistoric); 12 isolated artifacts; and 2 historic sites (1 campsite, 1 corral). In recent historic times (late 14th - early 20th), the South Fork Mckenzie was an aboriginal travel route used by Indians on horseback, who travelled from the east side of the Cascades to hunt big game and gather berries. More ancient artifacts indicate much earlier occupations and resource exploitation by native hunters but it is unknown whether they were year round residents. In later times the South Fork Mckenzie was a historic travel access for mining exploration and stock raising (sheep).

Timber:

The portion of the river corridor that is eligible for Recreation River designation includes about 3,840 acres. Stands of mature/old growth Douglas fir, and western hemlock occupy the area. Estimated ASQ without river designation is 0.0 MMBF considering proposed management of the corridor in the Draft Forest Plan. The ASQ of the corridor, if designated as a Recreation River, is also estimated to be 0.0 MMBF in consideration of proposed management for this area in the Draft Forest Plan.

Socio-Economic Effects:

The South Fork Mckenzie River is close to the Eugene/Springfield metropolitan area. The local economy is dependent on both timber industry and tourism.

Designation as a Wild and Scenic River along with the newly designated Scenic Byway route would increase recreational use due to enhanced area recognition.

Current management and the preferred alternative restrict timber harvest in the corridor. Designation as a Wild and Scenic River would have no effect on timber harvest in comparison to the Draft Forest Plan.

Current Administration:

The study segment of the river is currently managed by the Willamette National Forest along the majority of its length except for a small area of private land located in segment 3.

Funding Needs If Classified as a Wild and Scenic River:

The following are expected funding requirements for the South Fork Mckenzie for the next 5 years:

Cost Category	Expenses Expected Independent of Designation	Additional Expenses Expected With Designation
General Administration	\$ 15,000	\$ 8,000
Costs of Implementation		10,000
Development of Management Plan		130,000
Development Costs	50,000	
Operation and Maintenance	35,000	5,000
Total - Five Years	\$100,000	\$153,000

General administration and operation and maintenance costs are estimated to continue at \$15,000 annually.

Forest Plan Alternatives:

The DEIS and Draft Forest Plan did not recommend designation of any of the segments as a Recreational River under the Wild and Scenic Rivers Act. The Draft Forest Plan recommends a Special Interest Area (SIA) designation along the river corridor, 1/8 mile wide on either side of the river for segment 2. Segment 3 is designated as "Scenic - Retention Foreground". Segment 1 is included in Wilderness.

LITTLE NORTH FORK of the SANTIAM RIVER

Potential Wild and Scenic River

State of Oregon Willamette National Forest Marion County

The Little North Santiam River has been studied for potential Wild and Scenic River designation. It was identified for review through public input to the Willamette National Forest DEIS and Draft Forest Plan. These were issued for public review in December 1987.

Location:

From the headwaters at the confluence of Battle Axe and Opal Creeks in T. 8 S., R.5 E., Section 28, SW 1/4 (Willamette National Forest) to the Forest boundary near the community of Elkhorn in T.8 S., R.4 E., Section 32, NE 1/4 (Willamette National Forest).

Eligible for designation:

From the confluence of Battle Axe Creek and Opal Creek to the Forest boundary, (7.8 river miles).

Outstandingly remarkable values:

The outstanding scenery and essentially undisturbed nature of the Little North Santiam River canyon combined with the proximity to Salem and other Willamette Valley communities make it a very popular area for dispersed recreation. The river is classified as a Scenic Waterway by the State of Oregon.

The Little North Santiam River is visually dramatic. It flows through dense virgin stands of old-growth Douglas-fir, western redcedar and western hemlock as well as younger stands of these species. The canyon walls are often deeply cut and steep walled. Rock outcrops are common and spectacular - vertical banks over 300 hundred feet high can be found. The riverbed in many areas consists of sculptured bedrock which creates many clear pools, rapids and waterfalls that drop as much as thirty feet.

The Little North Santiam Canyon is one of the few historic mining districts in western Oregon. Scattered remains of historic mining activity are present; however, few are visible from the river. The area is popular with "recreational miners" who pan for gold in and near Shady Cove Campground.

River Mileage:

Study:	7.8 miles
Eligible:	7.8 miles
Draft Forest Plan:	0.0 miles

Potential Classification:

Entire segment - Scenic

Landownership:	River Miles	Corridor Acres
Willamette National Forest	7.8 miles	2621 acres

Private Land	0.0	5 acres
Total	7.8 miles	2626 acres

Mineral and Energy Resource Activities:

Early day prospecting and mining activity is evident throughout the Little North Santiam Canyon; however, nearly all claims that had significant development are located outside the corridor. There is a mining camp and millsite known as Jawbone Flats within the 1/4 mile wide corridor near the headwaters at the confluence of Battle Axe and Opal Creeks. The one active claim associated with the millsite is located outside of the corridor. There are many staked locations for mining claims in the river corridor. None of these claims have had any significant mining activity in the recent past other than panning or occasional small dredge operation. The lands within the corridor have relatively low mineral potential, making anything other than recreational prospecting unlikely. There is one mining claim in the corridor which is currently involved in a patent contest. Pending a decision, the claim will either become private land or be declared null and void.

There are no known geothermal resource areas in the Little North Santiam Canyon.

Water Resource Developments:

There are no existing impoundments nor potential water resource development sites within the proposed study area.

Transportation, Facilities and Other Developments:

Forest Service road 2209 and 2207 generally follow the river allowing good access in some areas and more difficult in others. These roads are rarely visible from the river. Road 2207 crosses the river with a wooden truss bridge with a concrete span at Shady Cove Campground. There is a mining access spur with a log stringer bridge that crosses the river several miles upstream of Shady Cove.

There are no developed recreation facilities in the river corridor. Shady Cove Campground is considered a dispersed site.

The Little North Santiam trail follows the river from the Forest Boundary to Shady Cove Campground. Planning is in progress to extend this trail from Shady Cove Campground to the confluence of Battle Axe and Opal Creek.

A mining camp, known as Jawbone Flats, which consists of approximately fifteen rustic cabins and buildings is located at the confluence of Battle Axe and Opal Creeks.

Recreation Activities:

A number of dispersed recreational opportunities exist within the river corridor. Heaviest use is from Shady Cove Campground to the Forest boundary. This lower stretch of the river is popular for camping, fishing, hiking, tubing, swimming and sunbathing. Many heavily used dispersed sites exist along this stretch of the river.

The area from the confluence with Gold Creek up to the headwaters is very popular for hiking and sightseeing, and to a lesser degree, fishing and photography. Currently there is no trail along the river; however, current plans will extend the trail from Shady Cove along the full length of the river to tie

with the proposed Opal Creek Trail (a popular hiking route). Road 2209 is rather primitive and closed to public vehicles east of a locked gate near Gold Creek. This road winds through old-growth groves and has spectacular views of the river.

Recreational gold panning is common from Shady Cove Campground to the Forest boundary.

This area has a long season of use due to its low elevation and easy access from Salem (40 miles).

Wildlife and Fisheries:

A sensitive wildlife species known to inhabit the river drainage is the northern spotted owl. Other species known to frequent the river are deer, waterfowl, cavity nesting birds and numerous species of small birds and mammals.

The river has resident native cutthroat trout, eastern brook trout and anadromous species. Steelhead are the principal anadromous fish. Legal size trout are occasionally stocked by Oregon Department of Fish and Wildlife at the Shady Cove bridge.

Streamflow:

Streamflows are adequate to maintain a fishery and recreation opportunities year-round. The river water is extremely pure with exceptional clarity, low organic content and low levels of aquatic life. The river runs very clear all year.

Geology:

The river flows through predominantly volcanically derived rock of the Western Cascade Sequence. Unlike other Cascade areas, flow lavas predominate over fragmental rocks. This accounts for the large number of rock outcrops, cliffs and gorges that occur along the river. The river bed is often bedrock. Several dioritic intrusive bodies, which are relatively rare in the Cascades, exist in this area. These intrusive formations are typically dacite porphyries containing veins of chalcopyrite, pyrite, and complex sulfides.

Botany:

The forests along the river are predominantly dense stands of Douglas-fir, western hemlock and western redcedar. The stands on the lower reaches of the river are typically younger, naturally regenerated after relatively recent fires (about 60 years old), whereas the upper reaches are primarily old-growth. Hardwood species such as red alder, bigleaf maple and cottonwood occur near the river on the lower half of the segment. Significant understory species include vine maple, dwarf Oregon-grape, salal, twinflower, sword-fern, red huckleberry and bracken-fern. No sensitive plant species are known to be present.

Cultural Resources:

Evidence of prehistoric Indian activity is evidenced by lithic scatters found near the river below Shady Cove Campground, as well as other locations within the corridor. Early day prospecting/mining activity is evident throughout the area. Placer and lode claims still exist, but are inactive except for recreational panning.

Timber:

The portion of the river corridor that is eligible for Scenic River designation includes about 2,626 acres. Stands of native old growth Douglas fir, western hemlock and western red cedar occupy the area. Estimated ASQ without designation is approximately 0.8 MMBF and 0.7 MMBF if the area were designated as a Scenic River.

Livestock Grazing:

There are no grazing allotments within the river corridor.

Socio-Economic Effects:

The Little North Santiam River corridor under consideration begins about 37 miles from Salem and 15 miles from the towns of Lyons/Mehama. The local economy is largely dependent on the timber industry, along with an increasing tourism industry.

Designation of the river would most likely increase the number of people visiting the area. This increase in number of recreation visitors would benefit the tourism related businesses in the local area.

Current management direction and the preferred alternative in the 1987 Draft PLAN restrict timber harvest in the corridor. Designation as a Wild and Scenic River would have little effect on timber harvest level relative to the preferred alternative.

Current Administration:

The entire corridor, with the exception of 5 acres of private land, is administered by the Willamette National Forest, Detroit Ranger District.

Funding Needs If Classified as a Wild and Scenic River:

The following are expected funding requirements for the Little North Santiam River for the next five years.

Cost Category	Expenses Expected Independent of Designation	Additional Expense Expected with Designation
General Administration	\$15,000	\$8,000
Implementation		\$10,000
Development of Management Plan		\$130,000
Development Costs	\$50,000	
Operation and Maintenance	\$35,000	\$5,000
Total - Five Years	\$100,000	\$153,000

General administration and operation and maintenance cost are estimated to continue at \$15,000 annually.

Forest Plan Alternatives:

This river was not studied or considered for Wild and Scenic River classification in the Draft EIS and Draft Forest Plan. The outstandingly remarkable values and characteristics of the 7.8 mile stretch of the Little North Santiam River will, however, be protected in the Current Forest Plan, and in the Proposed Forest Plan when implemented, until a determination of suitability is made with regard to the river's potential inclusion the National Wild and Scenic River system.

BATTLE AXE CREEK

Potential Wild and Scenic River

State of Oregon Willamette National Forest Marion County

Battle Axe Creek has been studied for potential Wild and Scenic River designation. It was identified for review through public input to the Willamette National Forest DEIS and Draft Forest Plan. These were issued for review in December 1987.

Location:

From the headwaters of Battle Axe Creek in Section 1, T.9S., R.5E. in Bull of the Woods Wilderness to its confluence with Opal Creek in the SW 1/4 of Section 28, T.8S., R.5E., W.M. (5.0 miles).

Eligible for Designation:

Battle Axe Creek was found to be not-eligible for inclusion in the Wild and Scenic River System.

Outstandingly Remarkable Values:

The stream was reviewed and evaluated by an interdisciplinary team in 1989. Several attributes of the stream including scenic, recreational, geologic, fish, wildlife, historical/cultural and ecological qualities were reviewed. No attributes or features of Battle Axe Creek were identified which had a significance level of "outstandingly remarkable." This qualification is required, as a minimum, to establish eligibility for further consideration as a potential Wild and Scenic River.

River Mileages:

Study:	5.0 miles
Eligible:	0.0 miles
Draft Forest Plan:	0.0 miles

Potential Classification:

Not applicable.

Land Ownership:

River Miles:

Corridor acres:

Willamette National Forest

5.0

1,727

Mineral and Energy Resource Activity:

Early-day mining activity is evident along the lower two miles of the corridor. Some claims within the corridor had significant development. Approximately 30 existing mineral claims are within the corridor including 3 millsites at the confluence of Battle Axe and Opal Creeks. Mining related activity has occurred recently on some claims. Three claims and the millsites are presently involved in a patent contest. After a decision, the claims and millsite will become private land or be declared null and void and remain public land. There is no known geothermal potential in Battle Axe Creek corridor.

Water Resource Developments:

There are no existing or planned impoundments or diversions within the corridor.

Transportation, Facilities and Other Developments:

Access to the west end of the corridor at Jawbone Flats millsite is via Forest Road #2209. The last three miles of the road are not open for vehicular use by the public. This limits public access to foot, horse or bicycle travel to reach the corridor.

The east end of the corridor is accessed from Breitenbush Road #46 via Forest Road #4697. The last few miles of the road is extremely rough and not passable by low clearance vehicles. At one time, the road connected to Forest Road #2209 at the mining area. It now ends at Beachie Saddle, on the ridge dividing the Little North Santiam and Breitenbush River drainages. This is the boundary of Bull of the Woods Wilderness.

A primitive mining road parallels the creek its entire length. It is drivable by high clearance vehicles for approximately two miles upstream from the confluence. The last four miles of the road are now within Bull of the Woods Wilderness and have been allowed to deteriorate. This segment is managed as Battle Axe Creek Trail #3339. The trail connects to Forest Road #4697 at Beachie Saddle. The road and trail are not generally visible from the creek.

Whetstone Mountain Trail #3369 leaves from the former road just inside the wilderness boundary. It quickly crosses Battle Axe Creek and then climbs steeply away from the creek. It is within the corridor for approximately one-half mile.

There has been no timber harvest or other management activities in the corridor.

The lower two miles of Battle Axe Creek serves as the southern boundary of Bull of the Woods Wilderness. The upper reaches of the creek are entirely within the wilderness.

Recreation Activities:

Historically, recreation activity within the corridor has been relatively light. However, it has grown in recent years and some growth is expected to continue in the future. Principal activities are hiking on existing trails and sightseeing. The stream is not navigable and it does not support a significant recreational fishery.

Wildlife and Fisheries:

The general area supports wildlife species indigenous to the western Cascades, except elk. No listed species are known to be present and there are no special habitat areas in the corridor. The stream supports a native population of small cutthroat trout. No fish stocking is done.

Streamflow:

The creek has perennial flow its entire length. Its water is free of pollutants and has exceptional clarity. It has low organic content and low levels of aquatic life. Discoloration does occur during periods of high run-off.

Geology:

The corridor is in volcanically derived and glaciated landforms typical of the western Cascades Sequence. The stream bed is often of bedrock. Dioritic intrusive bodies are present in the area. The formations are typically dacite porphyries containing veins of chalcopyrite, pyrite and complex sulfides.

Botany:

The corridor is forested with Douglas-fir/western hemlock and Pacific silver fir associations common to the western Cascades. Forest stands in the lower portion of the corridor are represented by mature and old growth stages. Forest stages in the upper reaches, in the vicinity of Beachie Saddle, are pole and small saw timber. These young stands are a result of natural fire occurrence late in the last century.

Cultural Resources:

Evidence of early mining activity including abandoned roads, adits and deteriorated structures are present along the lower reaches. The millsite at the confluence is still using some structures which are of historic age. The corridor has not been intensively surveyed for evidence of prehistoric use. Lithic scatters have been located in the vicinity of the millsite.

Timber:

Most of the corridor is within Bull of the Woods Wilderness. The proposed allocations for the the portion outside of wilderness have Visual Quality Objectives of Partial Retention-Foreground and Retention-Foreground. These allocations have timber yields of 7% and 5%, respectively. The total acreage within these allocations is relatively small.

Livestock Grazing:

There are no grazing allotments within the corridor.

Socio-Economic Effects:

Battle Axe Creek is approximately 50 miles from Salem, the nearest metropolitan area in the Willamette Valley. The local economy is largely dependent on the timber industry. Designation of the stream would most likely increase the number of recreation visits to some degree. This increase would benefit tourism related businesses serving the North Santiam area.

Current Administration:

The river corridor is wholly within and administered by the Willamette National Forest, Detroit Ranger District.

Funding Needed if Classified as a Wild and Scenic River:

Not applicable.

Forest Plan Alternatives:

Battle Axe Creek was not considered for Wild and Scenic classification in the DEIS and Draft Forest Plan.

OPAL CREEK

Potential Wild and Scenic River

State of Oregon Willamette National Forest Marion County

Opal Creek has been studied for potential Wild and Scenic River designation. It was identified for review through public input to the Willamette National Forest DEIS and Draft Forest Plan. These were issued for review in December, 1987.

In 1987, the Oregon State Legislature directed that Opal Creek be reviewed for inclusion in the Oregon State Scenic Waterway System. The decision of the reviewing body was that the creek did not meet state criteria for inclusion.

Location:

From the headwaters at Opal Lake in Section 17, T.9S., R.5E. to its confluence with Battle Axe Creek in the SW 1/4 of Section 28, T.8S., R.5E., W.M. near the Jawbone Flats mining millsite. (4.0 miles)

Eligible for Designation:

Opal Creek was found to be not-eligible for inclusion in the Wild and Scenic River System.

Outstandingly Remarkable Values:

The stream was reviewed and evaluated by an interdisciplinary team in 1989. Several attributes of the stream including scenic, recreational, geologic, fish, wildlife, historical/cultural and ecological qualities were reviewed. No attributes or features of Opal Creek were identified which had a significance level of "outstandingly remarkable." This qualification is required, as a minimum, to establish eligibility for further consideration as a potential Wild and Scenic River.

River Mileages:

Study:	4.0 miles
Eligible:	0.0 miles
Draft Forest Plan:	0.0 miles

Potential Classification:

Not applicable.

Land Ownership:	River Miles:	Corridor Acres:
Willamette National Forest	4.0	1,493

Mineral and Energy Resource Activity:

Early day mining activity is evident along the lower mile of the corridor. Approximately four existing claims re within the corridor, however, none have had significant development. Three millsite claims are located at the confluence of Opal and Battle Axe Creeks. The most prominent millsite, known as Jawbone Flats, has about sixteen buildings including office, bunkhouses, repair shops and a small concentrating mill. The Millsites are presently involved in a patent contest. After a final decision is made, the millsites will become private property or be declared null and void and remain as public land. There is no known geothermal potential in the vicinity of Opal Creek.

Water Resource Developments:

An eight inch pipe diverts water for domestic use and power generation from a small tributary of Opal Creek at 0.6 mile. The overflow from a settling pond at the concentrating mill drains into Opal Creek just upstream of its mouth. No channel work or impoundment exists or is planned in the creek.

Transportation, Facilities and Other Developments:

Access to the north end of the corridor at the mouth of Opal Creek is via Forest Road #2209. The last three miles of this road beyond Gold Creek is not open for vehicular use by the public. This limits public access to foot, horse or bicycle travel to reach the corridor. Opal Lake at the south end of the corridor is reached via Forest Road #2207 and a short trail which ends at the lake.

There are no existing system roads or trails within the corridor. An unauthorized "user" trail has been constructed from the mining camp water intake for approximately one and a half miles along the east side of the creek. This trail is very primitive and does not meet standards for location, grade or surfacing. It will need some rehabilitation work to prevent adverse impact on Opal Creek. A system trail running the length of the corridor is proposed but has not yet been funded.

A proposed timber sale road has been surveyed and located on the ground but not constructed. This route enters the corridor about midway from the mouth and Opal Lake. It would cross the creek once. Visitors sometimes use the "P-line" of the road location as a trail to access the interior of the corridor.

Timber was harvested early in this century in the vicinity Jawbone Flats for lumber and mine timbers. Timber was harvested near Opal Lake in the late 1950's. Both of these areas are reforested. No timber has been harvested within the central portion of the corridor. However, two timber sales are presently planned but not sold.

Recreation Activities:

Principal attraction of the Opal Creek area is enjoyment of the scenery. Opal Creek is very picturesque amid an old growth timber setting. Interest in the mining area around Jawbone Flats is also an attraction.

Historically, recreation use has been relatively light due to difficulty of access. The recent controversy over management of the Little North Santiam drainage, with its focus on Opal Creek, has resulted in a significant increase in visitation. Continued growth is expected in the future. Nearly all use is day

oriented hiking, sightseeing and general enjoyment of the outdoor environment. Opal Creek is not navigable and does not support a significant recreational fishery.

Wildlife and Fisheries:

The area supports wildlife species indigenous to the western Cascades, except elk. No listed species are known to be present, although a sighting of the northern spotted owl has been reported. Its presence has not been confirmed. A pileated woodpecker management area is proposed in the lower portion of the corridor.

The creek has a small population of rainbow trout. Eastern brook trout were planted in Opal Lake several years ago and have migrated down stream. A 1976 stream survey estimated about one legal-size fish per 100 yards of stream length. Anadromous species are not present due to an impassable falls on the Little North Santiam River. No stocking of fish is done in Opal Creek.

Streamflow:

Opal Creek is a perennial stream its entire length. Its volume is highly variable and largely precipitation dependent. Flows range from a high of over 200 cubic feet per second to less than five. Its water is free of pollutants and has exceptional clarity due to low organic content and little aquatic life. Discoloration does occur during periods of high runoff.

Geology:

The corridor has volcanically derived and glaciated landforms typical of the Western Cascades Sequence. The creek flows through a stable bedrock channel with little evidence of natural instability. The stream varies from 200 foot waterfalls below Opal Lake, to a meandering low gradient stream in a vine maple thicket, to a series of cascades in a bedrock chute with no riparian vegetation. Opal Creek has an average of three 10-20 foot waterfalls per mile of stream. Visibility from the stream channel is generally limited by the bedrock stream channel and dense understory vegetation.

Botany:

Opal Creek is within Douglas-fir/western hemlock and Pacific silver fir plant associations. The forest stand are primarily in the mature and old growth stages.

Cultural Resources:

Historic use has been limited to the lower reaches near the mining area. Jawbone Flats was inventoried and considered for listing on the National Register of Historic Places, but was determined to be ineligible. Large lithic scatters have been found in the vicinity of the confluence, however, artifact evaluation has not been conducted. The remainder of the corridor has not been intensively surveyed for cultural materials.

Timber:

Proposed management allocations within the Opal Creek corridor include no-harvest allocations of Special Habitat (lakeside) in the vicinity of Opal Lake and Special Interest Area from the mouth of Beachie Creek, downstream to the mouth of Opal Creek. These are connected by a scenic corridor of Scenic Foreground-Retention which has a 5% harvest rate. The periphery of the potential wild and scenic corridor is proposed General Forest with full timber yield.

Livestock Grazing:

There are no grazing allotments within the corridor.

Socioeconomic Effects:

Opal Creek is located approximately 50 miles from Salem, the nearest metropolitan area in the Willamette Valley. The local economy is largely dependent on the timber industry. Designation of the stream would most likely increase the number of recreation visits to some degree. This increase would benefit tourism related businesses serving the North Santiam area.

Current Administration:

The river corridor is wholly within and administered by the Willamette National Forest, Detroit Ranger District.

Funding Needed if Classified as a Wild and Scenic River:

Not applicable.

Forest Plan Alternatives:

Opal Creek was not considered for designation as a Wild and Scenic River in the DEIS and Draft Forest Plan.

NORTH FORK BREITENBUSH RIVER

Potential Wild and Scenic River

State of Oregon Willamette and Mt. Hood National Forests Marion County

The North Fork Breitenbush River, including the South Fork of the North Fork Breitenbush, has been studied for Wild and Scenic River designation. It was identified for review through public input to the Willamette National Forest DEIS Draft Forest Plan. These were issued for review in December, 1987.

Location:

From the headwaters of the South Fork of the North Fork Breitenbush in Section 3, T.10S., R.8E. to the confluence of the North Fork Breitenbush and South Fork Breitenbush Rivers in Section 21, T.9S., R.7E., W.M.

Segment 1 The South Fork of the North Fork Breitenbush and North Fork Breitenbush within Mt. Jefferson Wilderness. (6.6 miles)

Segment 2 The North Fork Breitenbush downstream from the Mt. Jefferson Wilderness boundary. (6.0 miles)

Eligible for Designation:

Both segments were found to be not-eligible for inclusion in the Wild and Scenic River system.

Outstandingly Remarkable Values:

The stream was reviewed and evaluated by an interdisciplinary team in 1989. Several attributes of the stream including scenic, recreational, geologic, fish/wildlife, historical/cultural and ecological qualities were reviewed. No attributes or features were identified which had a significance level of "outstandingly remarkable." This qualification is required, as a minimum, to establish eligibility for further consideration as a potential Wild and Scenic River.

River Mileages:

Study:	12.6 miles
Eligible:	0.0 miles
Draft Forest Plan:	0.0 miles

Potential Classification:

Not applicable.

Land Ownership:	River Miles:	Corridor Acres:
Willamette and Mt. Hood National Forests	12.6	3,705

Mineral and Energy Resource Activity:

Portions of Segment 2 are within a Known Geothermal Resource Area (KGRA) associated with Breitenbush Hot Springs, which is just downstream of the river corridor. This suggests a high potential for geothermal development. Preliminary exploration leases were awarded within the corridor in 1976. Several companies performed various exploration procedures in the corridor and throughout the adjacent KGRA lands. None of the companies chose to continue with further development of geothermal development. There are no known mineral claims within the corridor. The area has low potential for locatable minerals.

Water Resource Development:

There are no existing or planned dams or diversions of either segment.

Transportation, Facilities and Other Developments:

Segment 1 is entirely within Mt. Jefferson Wilderness. There are no trails or developments of any type in the corridor.

Segment 2 is paralleled by Breitenbush Road #46 on the north side and local road #4685-302 on the south side. Both roads are only occasionally visible from the river. Forest Road #4685 crosses the river via concrete bridge approximately one mile above the confluence. Local road #46-015 accesses Flagstone rock pit which is within the corridor in section 13.

Timber harvest activities have occurred throughout the corridor including extensive salvage and clear-cut units. These activities are readily evident from the river. Past timber salvage practices removed all blown down timber and stumps from the river channel. This resulted in increased widening during high water. This activity was discontinued several years ago and woody debris is again accumulating in the river. Some stream channelization has been done to protect the bridge on road #4685.

A high voltage transmission line managed by Bonneville Power Administration is located along the northern edge on the corridor.

Recreation Activities:

Segment 1 receives very little recreational use due to its inaccessibility. Activities in Segment 2 include recreational driving, dispersed camping, fishing and hunting.

Wildlife and Fisheries:

Segment 1 of the corridor is mainly summer range for deer and elk. Black bear are also present. Segment 2 of the corridor is winter range and is heavily used by elk. The lower portion of Segment 2 is within a Spotted Owl Habitat Area. Both segments of the corridor have a resident population of rainbow trout. Oregon Department of Fish and Wildlife stock legal-size trout below the bridge on road #4685 throughout the summer.

Streamflow:

Both segments have perennial flow. The water is free of pollutants and very high in quality. It is generally very clear with short periods of discoloration during high runoff.

Geology:

The general area is characterized by volcanically derived and glaciated landforms typical of the western Cascades. In Segment 1 the river is confined within a narrow, steep sided canyon. Numerous waterfalls, cataracts and rapids are present. In Segment 2 the river enters a broad valley bottom of glacial outwash. The channel widens and is occasionally braided. Although it maintains a rapid flow, it is too shallow to float. Few pools are present.

Botany:

The river begins in sub-alpine meadows and bogs. It passes through mountain hemlock/lodgepole pine associations and enters Douglas-fir/western hemlock forest types in the valley. No presently listed threatened or endangered species are known to be present.

Cultural Resources:

It is known that early Americans visited the area as evidenced by lithic scatters found in Segment 2. It is likely that this area was heavily used due to the nearness of Breitenbush Hot Springs. Also, the river supported runs of anadromous fish prior to the construction of Detroit Dam. Fish traps were in use in the vicinity of the hot springs during historic time.

Timber:

The corridor of Segment 1 is wholly within Mt. Jefferson Wilderness. Proposed land management allocations in Segment 2 include Scenic-foreground with a Visual Quality Objective (VQO) of Retention and Scenic-middleground with a VQO of Partial Retention. These management areas have timber harvest rates of 7% and 10%, respectively, per decade.

Livestock Grazing:

There are no grazing allotments within the corridor.

Socioeconomic Effects:

The North Fork Breitenbush River is within a two hour driving time of several major cities, including Bend, Eugene, Salem and Portland. Detroit Reservoir, a large state park, several National Forest campgrounds and a private resort are principal recreational attractions within a few miles of the river. The local economy is dependent on timber, although tourism is significant and growing. Community and business associations are actively working to diversify the economy. Designation would likely increase the numbers of visitors to the area, benefitting tourism related businesses.

Current Administration:

The river corridor is wholly within and administered by the Willamette National Forest, Detroit Ranger District.

Funding Needed if Classified as a Wild and Scenic River:

Not applicable.

Forest Plan Alternatives:

The North Fork Breitenbush River was not considered for Wild and Scenic River classification in the DEIS alternatives or the Draft Forest Plan.

SOUTH FORK of The BREITENBUSH RIVER

Potential Wild and Scenic River

State of Oregon Willamette National Forest Marion County

The South Fork of the Breitenbush River has been studied for potential Wild and Scenic River designation. It was identified for review through public input to the Willamette National Forest DEIS and Draft Forest Plan. These were issued for review in December, 1987.

Location:

From the headwaters at Russell Lake in the SW 1/4 of Section 11, T.10S., R.8E. in Mount Jefferson Wilderness to its confluence with the North Fork of the Breitenbush River in the NW 1/4 of Section 21, T.9S., R.7 E., W.M.

Segment 1. Russell Lake to the Wilderness Boundary (4.0 miles).

Segment 2. Wilderness boundary to it's confluence with the Breitenbush River
(6.5 Miles).

Eligible for Designation:

Segments 1 and 2.

Outstandingly Remarkable Values:

Scenic quality is the most outstandingly remarkable feature of the South Breitenbush River. Its clear waters travel from sub-alpine meadows to mature forest vegetation zones. Scenic variety includes cascades and falls as the river enters a steep walled canyon, emerging as a fast flowing stream through a shady "park-like" setting.

Other distinctive features include a geologic formation which constricts the river through a very narrow gorge for a few hundred feet, and an attractive biological surrounding. The corridor is recognized for its "old growth" Douglas fir/western hemlock forest type and as habitat for the northern spotted owl. Outside of wilderness, the river is easily accessible via the South Breitenbush Gorge National Recreation Trail, which parallels the river for 2 1/2 miles.

River Mileages:

Study:	10.5 miles
Eligible:	10.5 miles
Draft Forest Plan:	0.0 miles

Potential Classification:

Segment 1	Wild	4.0 miles
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Wildlife and Fisheries:

Segment 1 of the corridor is summer range for elk. Black bear are also present in this area. Segment 2 of the corridor is also winter range and is heavily used by elk in winter and spring. Approximately three miles of the corridor below Roaring Creek is a Spotted Owl Habitat Area. Resident cutthroat trout and eastern brook are present although not in large number or size. No stocking of legal size fish is done.

Streamflow:

The river flows year around its entire length. Its water is free of pollutants and is very high in quality. Short periods of discoloration sometimes occur during heavy winter storms as a result of natural bank sloughing at a point within the wilderness.

Geology:

The river begins as an outlet to Russell Lake in a sub-alpine "hanging valley" at the crest of the Cascades. It soon loses elevation rapidly with a series of falls and cascades, entering a steep-sided canyon. The gradient drops near the wilderness boundary as the stream enters a narrow alluvial valley bottom. A notable attraction is Breitenbush Gorge where the river has eroded through a basalt dike. At this point, the river is constricted by a rock walled channel as narrow as five feet wide for approximately 100 yards. Overall, the channel is well defined except for a short segment near Crag Trail crossing where the it meanders somewhat. The stream is generally not navigable.

Botany:

The river passes through vegetation zones from sub-alpine meadows through mountain hemlock-lodgepole pine association to Douglas fir-western hemlock forest. The latter type presents a very cool and shady setting with large mossy "park-like" areas. Most of the corridor below Roaring Creek is allocated as an Old Growth Grove in the existing and proposed land management plans. No presently listed threatened or endangered species are known to be present.

Cultural Resources:

The South Breitenbush Trail was an early administrative trail. It also received significant recreational use for its day. Numerous trees near Breitenbush Gorge bear carved names and dates from the early 1900's. It is assumed the trail was on, or very near, aboriginal routes between the Jefferson Park area in the wilderness and Breitenbush Hot Springs, just downstream of the confluence. Significant lithic scatters have been found at both ends of the corridor. The general area within the corridor has not been intensively surveyed, but several incidental finds have been recorded.

Timber:

The portion of the river corridor that is eligible for Scenic River designation includes about 3,583 acres. Stands of old growth Douglas fir and western hemlock occupy the area. Estimated ASQ without designation is approximately

0.5 MMBF and 0.4 MMBF if this area were designated as a Scenic River.

Livestock Grazing:

There are no grazing allotments within or near the corridor.

Socioeconomic Effects:

The South Fork of the Breitenbush River is within a two-hour driving time of Bend, Eugene, Salem and Portland. It is accessible by paved roads except for a short distance travelled on Forest Road #4685. National Forest campgrounds, private resorts, a large state park and Detroit Reservoir are major recreation attractions within a few miles of the river. The local economy is dependent on timber, although tourism is significant and growing. Community and business associations are actively working to further diversify the economy. Designation would likely increase the number of visitors to the area, benefitting tourist related business.

Segment 1 is completely within the Mr. Jefferson Wilderness. Segment 2 includes allocations of Old Growth Grove, Scenic Influence II and General Forest. Proposed allocations would dedicate the core area of the corridor adjacent to the river to Old Growth Grove and Retention-foreground. Portions of the outer edges of the corridor would have a management direction of Partial Retention-middleground and General Forest. Designation as a Wild and Scenic River would not appreciably reduce timber harvest from what these allocations provide.

Current Administration:

The river corridor is wholly within and administered by the Willamette National Forest, Detroit Ranger District.

Funding Needs if Classified as a Wild and Scenic River:

The following are expected funding requirements for the South Fork of the Breitenbush River for the next five years.

Cost Category	Expenses Expected Independent of Designation	Additional Expense Expected with Designation
General Administration	\$15,000	\$8,000
Implementation		\$10,000
Development of Management Plan		\$130,000
Development	\$50,000	
Operation and Maintenance	\$35,000	\$5,000
Total - Five Years	\$100,000	\$153,000

General administration and operation and maintenance cost are estimated to continue at \$15,000 annually.

Forest Plan Alternatives:

This river was not studied or considered for designation as a Wild and Scenic River in the DEIS and Draft Forest Plan. However, the outstandingly remarkable values and characteristics of the South Fork of the Breitenbush River will be protected in the current Forest Plan and proposed Forest Plan until a determination of suitability for Wild and Scenic status is made.

BREITENBUSH RIVER

Potential Wild and Scenic River

State of Oregon Willamette National Forest Marion County

The Breitenbush River has been studied for potential Wild and Scenic River designation. Initially, the river was included in the Nationwide Rivers Inventory in 1980. This review was conducted by the Heritage Conservation and Recreation Service, now part of the U.S. Park Service. The river was found to be ineligible at that time and was removed from the inventory.

In subsequent years, public interest in, and use of, resources within the corridor has increased. Consequently, the Breitenbush River was identified for review again through public input to the Willamette National Forest DEIS and Draft Forest Plan, which was released in December, 1987. In order to ensure public participation in the eligibility process, the river was included with other streams being evaluated. This report summarizes the results of the second review.

Location:

From the confluence of the North and South Forks of the Breitenbush River in the NW 1/4 of Section 21, T.9S., R.7E., to Detroit Reservoir near Canyon Creek is the NE 1/4 of Section 36, T.9S., R.5E., W.M. (10.0 miles)

Eligible for Designation:

Segment 1 From the confluence of the North and South Forks of the Breitenbush River to Detroit Reservoir near Canyon Creek.

Outstandingly Remarkable Values:

The most outstandingly remarkable value of the Breitenbush River is the variety and quality of recreational opportunities. The entire river length is intensively used. Recreational pursuits include camping, fishing, commercial resort activities, kayaking, hiking, recreational driving and general enjoyment of the forest environment. Additional distinctive features within the corridor are quality of the ecological setting and wildlife variety. The area contains magnificent stands of "old growth" timber, heavy use by elk and deer and habitat areas for sensitive and threatened species.

River Mileage:

Study:	10.0 miles
Eligible:	10.0 miles
Draft Forest Plan:	0.0 miles

Potential Classification:

Segment 1	Scenic	10.0 miles
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Land Ownership:	River Miles	Corridor Acres
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Willamette National Forest	9.5	3,040
Private	0.5	160
Total	10.0	3,200

Mineral and Energy Resource Activities:

There are no known mineral claims within the corridor. The area has low potential for locatable minerals. A portion of the corridor in the vicinity of Breitenbush Hot Springs is within a Known Geothermal Resource Area (KGRA). This suggests a high potential for development. Preliminary exploration activities were undertaken by several companies from 1978-1980. To date, there has been no interest expressed in pursuing development. Similar work has been performed throughout the KGRA, also without further development.

Water Resources Development:

Some channeling has been done on private land to protect structures and create a partial diversion for power generation. Diverted water is returned to the river on the private land. A buried log on National Forest land, just below the private boundary, raises the river approximately four feet. This allows some water to flow into a power generator beside the river at a resort development under Special Use Permit. Diverted water is returned immediately to the river.

There are no planned impoundments or other diversions on the river.

Transportation, Facilities and Other developments:

Forest Road #46, a paved two lane route, parallels the river the length of the corridor. This route crosses the river once with a concrete bridge. The river is also crossed by Forest Road #2231 near Cleator Bend Campground, also via concrete bridge. Several local roads are in the corridor, which provide access to timber management areas, recreation sites and a private resort.

Timber harvest activity has occurred in the corridor in several locations. Eagle Rock area, adjacent to the river, was burned by wildfire in 1967. The timber was subsequently salvaged. It is now fully reforested and has been precommercially thinned.

A High voltage transmission line managed by Bonneville Power Administration runs the length of the corridor. It crosses the river twice with overhead lines.

Three fully developed campgrounds are adjacent to the river. Numerous dispersed campsites are located along road 46 and the river. A commercial resort is located on private land immediately downstream from the headwaters. It is operated as a healing retreat and conference center with a primary focus on Breitenbush Hot Springs as an attraction. It primarily serves groups on a reservation basis. A second commercial resort (presently being reconstructed) is located on National Forest land. It will be operated as a destination resort featuring natural hot water, bathing, dining and lodging serving the general public. It is operated under a Special Use Permit. A system trail follows the river for one mile below Humbug Campground.

Recreation Activities:

The river provides a variety of recreation opportunities. Developed and dispersed camping and fishing are the most popular activities. Early season kayaking, hiking and swimming also occur. The river is

a major element in the scenic drive along Forest Road #46. This is a loop route connecting to Portland. The corridor receives heavy recreational use from May through October.

Wildlife and Fisheries:

Portions of proposed habitat areas for spotted owls and pileated woodpeckers are within the corridor. The corridor is entirely within big game winter range. Deer and elk are frequently sighted in the area.

The river has a population of native cutthroat trout. Oregon Department of Fish and Wildlife periodically plants legal size rainbow trout at several locations throughout the summer. The lower 1/2-mile has a spawning run of Kokanee (land-locked silver salmon) from Detroit reservoir in the fall.

Streamflow:

The river flows year around its entire length. Water is generally clear and of high quality. Brief periods of discoloration occur during heavy winter rainstorms.

Geology:

The river begins at the end of a broad glacial outwash plain. It quickly enters a steep sided channel which constrains it the rest of its length. This results in alternating rapids and deep pools for much of its course.

Botany:

The river corridor is forested with virgin Douglas fir/western hemlock associations and young plantations, primarily of Douglas fir. Many flowering brush species, including rhododendron and flowering currant add spectacular color in the spring. In fall, vine and big leaf maple present many hues of yellow, gold and red to river users and those travelling the road.

Cultural Resources:

Prehistoric use is known to have occurred along the entire length of the river for thousands of years. Major deposits of lithic material have been found in the vicinity of Breitenbush Hot Springs and along the former river channel in, what is now, Detroit Reservoir. Historic use along the river included trapping, development of a hotel and lodge at the hot springs and logging by railroad. Breitenbush Guard Station, still in active service, is listed on the National Register of Historic Places. It is an example of Depression Era construction by the Civilian Conservation Corps.

Timber:

The portion of the river corridor that is eligible for designation as a Recreation River includes about 3,200 acres. Stands of old growth Douglas fir and western hemlock occupy the area. Estimated ASQ without River designation is approximately 1.2 MMBF and 1.1 MMBF if this area were designated as a RecreationRiver.

Socio-economic Effects:

Current land management allocations for the corridor includes Scenic I and II and General Forest. Proposed allocations under the new land management plan are Scenic Retention-foreground along the river and Scenic Modification-middleground on the outer edges of the corridor.

Current Administration:

The corridor is administered by the Willamette National Forest, Detroit Ranger District, except for the tract of private land at Breitenbush Hot Springs.

Funding Needs if Classified as a Wild and Scenic River:

The following are expected funding requirements for the Breitenbush River for the next five years.

Cost Category	Expenses Expected Independent of Designation	Additional Expense Expected with Designation
General Administration	\$15,000	\$8,000
Implementation		\$10,000
Development of Management Plan		\$130,000
Development	\$50,000	
Operation and Maintenance	\$35,000	\$5,000
Total - Five Years	\$100,000	\$153,000

General administration and operation and maintenance cost are estimated to continue at \$15,000 annually.

Forest Plan Alternatives:

This river was not studied or considered for designation as a Wild and Scenic River in the DEIS and Draft Forest Plan. However, the outstandingly remarkable values and characteristics of the Breitenbush River will be protected in the current Forest Plan and proposed Forest Plan until a determination of suitability for Wild and Scenic River status is made.

NORTH SANTIAM RIVER

Potential Wild and Scenic River

State of Oregon Willamette National Forest Linn County

The North Santiam River, above Detroit Reservoir, has been studied for potential Wild and Scenic River designation. It was identified for review through public input to the Willamette National Forest DEIS and Draft Forest Plan which were issued in December, 1987.

Location:

From the headwaters at Santiam Lake in SE1/4 of Section 34, T.12S., R.71/2E in Mount Jefferson Wilderness to Dry Creek in the NW1/4 of Section 17, T.10S., R.6E, W.M.

- Segment 1 Santiam Lake to wilderness boundary (3.8 miles).
- Segment 2 Wilderness boundary to bridge on State Highway 22 (4.2 miles).
- Segment 3 State Highway 22 to Rainbow Creek (19.5 miles).
- Segment 4 Rainbow Creek to Dry Creek (3.5 miles).

Eligible for Designation:

Segments 1, 2 and 3.

Outstandingly Remarkable Values:

The most outstandingly remarkable values of the North Santiam River are its ecological setting and its wildlife. The river corridor includes vegetative associations ranging from sub-alpine meadow to Douglas fir/western hemlock "old growth." Big Meadows, a very large wet meadow adjacent to the river, is a significant complex of ecosystems. The variety of wildlife and density of wildlife use within the corridor has long been an attraction to visitors.

A distinctive feature of the corridor is the range of recreational opportunities present. Visitors can enjoy camping experiences from developed to primitive settings on a single trail system. Portions of the corridor are used year-around. This variety of opportunities is a result of an unusual combination of land management allocations along the upper reaches of the North Santiam River. The corridor has a progressive transition in land management direction and recreation opportunity from Roaded Modified through Semi-primitive Motorized and Non-motorized to Wilderness. The intensity of timber management is gradually reduced through longer rotations and smaller unit sizes to directly enhance the recreational and wildlife resource values in the area.

River Mileages:

Study:	31.0 miles
Eligible:	27.5 miles
Draft Forest Plan:	0.0 miles

Potential Classification:

Segment 1	Wild	3.8 miles
Segment 2	Scenic	4.2 miles
Segment 3	Recreation	19.5 miles

Land Ownership:	River Miles	Corridor Acres
Willamette National Forest	27.5	9,450s

Mineral and Energy Activity:

There are no known mineral claims within the river corridor. The land has low potential for locatable minerals or geothermal development.

Water Resource Development:

There are no existing or planned dams or diversions on either river segment.

Transportation, Facilities and Other Developments:

Portions of several system trails are within the corridor of both segments, east of Forest Road #2257. Some segments run parallel to the river, but are generally not visible from the river. The river is crossed by trail fords at three points. Additional trail mileage is proposed within the corridor. The river is crossed at a right-angle by Forest Road #2257, providing the only vehicle access to the river within the corridor. The crossing structure is twin metal culverts.

Big Meadows Campground, a nine unit facility designed for equestrian use, is in the corridor, west of Forest Road #2257. There are plans to add additional camp units to this facility. A few timber harvest units are within the corridor but not visible from the river.

Recreation Activities:

Principal attraction of the area is its primitive setting. Main activities in the corridor are camping, hiking, horseback riding, hunting, fishing and general enjoyment of nature. Although there is little direct access to the river by roads and trails, cross country access is not difficult. The area in the vicinity of Big Meadows receives significant winter use in the form of cross-country skiing. The area east of Forest Road #2257 is closed to motorized vehicles including snowmobiles. Motorized use west of the road is not specifically restricted, but is essentially non-existent.

Wildlife and Fisheries:

The corridor is within a Spotted Owl Habitat Area in the vicinity of Big Meadows. The general area serves as calving and summer range for a large herd of elk. Some of the recreation trails are heavily used by big game. Beaver activity is readily evident in numerous places along Segment 2. Small native cutthroat trout are present. The river is not stocked with fish.

Streamflow:

The North Santiam River is a Class I stream. It is the principal source of potable water for several downstream municipalities, including the city of Salem. Segment 1 flows intermittently during late summer. Segment 2 has relatively constant flow, year-around. The river is free of pollutants and rarely exhibits high turbidity or discoloration, even during snowmelt and periods of high rainfall. There has been no channelization or bank stabilization work along segment 1. The bank of segment 2 has been stabilized with coarse rock at the crossing of Forest Road #2257. This work only extends a few feet above and below the culverts to prevent erosion of filled material.

Geology:

The river source is a collection of smaller streams draining lake basins near the summit of the Cascades. It passes through relatively gentle terrain formed by glaciation and washing of soft volcanic materials.

Botany:

Vegetation along Segment 1 varies from sub-alpine meadow types to a mountain hemlock-silver fir association at lower elevations. The corridor of Segment 2 is forested with a mixed species stand of Douglas fir, silver fir, western hemlock and Engleman spruce. Shrubs include rhododendron, vine maple and several species of huckle-berry. Ground cover consists of bear grass, twinflower, prince's pine and mosses. No listed plants are known to be present. The corridor has been intensively surveyed where activities have been proposed. However, a survey of the general area has not been done.

Cultural Resources:

Intensive survey for historic and prehistoric resources has been accomplished wherever activities have been proposed within the corridor. The general area has not been surveyed, however. There are two known gravesites within the corridor. No significant prehistoric sites have been found, but the area is presumed to have high potential for sites in some locales.

Timber:

The portion of the river corridor that is eligible for designation as a Wild and Scenic River includes about 9,450 acres. Stands of Douglas fir, western hemlock and silver fir occupy the area. Estimated ASQ without river designation is approximately 0.4 MMBF and 0.3 MMBF if this area were designated as a Wild and Scenic River.

Livestock Grazing:

There are no grazing allotments within the corridor.

Socio-economic Effects:

This area is within a two hour drive of the Willamette Valley from Portland to Eugene and the Central Oregon cities of Bend, Redmond and Sisters. It is adjacent to Mt. Jefferson Wilderness, one of the heaviest visited in the Region. Designation would likely increase visitation to the area. An increase in use would benefit tourist related businesses locally and regionally. Current land management allocation for the corridor of Segment 1 is Wilderness. Segment 2 includes Dispersed Non-motorized Recreation/ Timber and General Forest. Segment 3 includes scenic retention foreground. The proposed Forest Plan would retain the dispersed recreation and scenic retention foreground allocations and change the General Forest allocation to Partial Retention Foreground. The management direction for current allocations is compatible with a Wild and Scenic River designations of both "scenic and recreation."

Current Administration:

The river corridor is wholly within and administered by the Willamette National Forest, Detroit Ranger District.

Funding Needs if Classified as a Wild and Scenic River:

The following are expected funding requirements for the North Santiam River for the next five years.

Cost Category	Expenses Expected Independent of Designation	Additional Expense Expected with Designation
General Administration	\$15,000	\$8,000
Implementation		\$10,000
Development of Management Plan		\$130,000
Development	\$50,000	
Operation and Maintenance	\$35,000	\$5,000
Total - Five Years	\$100,000	\$153,000

General administration and operation and maintenance cost are estimated to continue at \$15,000 annually.

Forest Plan Alternatives:

This river was not studied or considered for designation as a Wild and Scenic River in the DEIS and Draft Forest Plan. However, the outstandingly remarkable values and characteristics of 27.5 miles of the North Santiam River will be protected in the current Forest Plan and proposed Forest Plan until a determination of suitability for Wild and Scenic status is made.

QUARTZVILLE CREEK

Potential Wild and Scenic River

State of Oregon Willamette National Forest Linn County

Quartzville Creek has been studied for potential Wild and Scenic River designation. It was identified for review through public comment to the DEIS and Draft Forest Plan, which was published in December, 1987.

Location:

From the headwaters in T. 11S., R.5E., Section 35, N.E. of the N.W. to the Forest boundary (12.3 miles).

Segment 1 From the headwaters to an unnamed creek west of Brule Creek.
Segment 2 From an unnamed creek west of Brule Creek to the Forest boundary

Eligible for Designation:

Segments 1 and 2

Outstandingly Remarkable Values:

Quartzville Creek has numerous values which cause it to stand out. It is very scenic as a rapid current flows through large exposed boulders, cascading into deep pools. The canyon sides are steep and incised with old growth timber down to the water. Recreation values are high as the road parallels the creek most of it's length. There are many dispersed sites which receive user in the summer and fall. Fishing is also popular as the state maintains a stocked fishery of rainbow trout. The area is also rich in mining history and prehistoric sites along the creek. Wildlife is abundant throughout the area. Osprey nests and pine marten habitat areas are present.

River Mileage:

Study	12.3 Miles
Eligible	12.3 Miles
Draft Forest Plan	0.0 Miles

Potential Classifications:

Segment 1	Recreation	2.3 Miles
Segment 2	Recreation	10.0 Miles

Land Ownership:	River Miles	Corridor Acres
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Willamette National Forest	12.1	3,761
Private	.2	58
Total	12.3	3,918

There is one private parcel within the corridor. It is a patented mining claim located in T. 11S., R.4E., Section 27 S.E. of the S.E.

Mineral and Energy Activity:

There are many placer mining claims within the corridor and a few lode claims. Quartzville mining district is well known and has a rich history of mining activities for 150+ years. The potential for continued and increased mining activity is high.

Water Resource Development:

There are no existing impoundments nor potential water resource development sites within the proposed eligible segment.

Transportation, Facilities, and Other Developments:

Forest Road 11000 parallels the creek for approximately the lower 8 miles. There are 6 concrete bridges and one wood/steel structure that cross the creek. Adjacent to the creek near it's confluence with McQuade Creek there is a mining operation that consist of a settling pond, a road along McQuade Creek, wooden bridge (mentioned above), and semi-permanent residence. Dispersed campsites are scattered along the creek over most of its length.

Recreation Activities:

Fishing is a popular pastime on the Quartzville Creek for native as well as stocked trout. Some swimming occurs in the deep pools od the Creek, however cold water temperatures tends to limit this activity. Sightseeing, driving for pleasure, and picnicking occur throughout the corridor as the road is a through connector to Highway 22 from Highway 20. Dispersed camping during the summer and fall is common. Many of these sites are related to mining claims. The Middle Santiam Wilderness lies to the south of Quartzville Creek and is accessed via the McQuade Creek trail. Mining is a significant recreational activity in the corridor below Freezeout Creek. The area is rich in big game and upland birds and hunting is a very popular recreational activity during the fall season.

Wildlife and Fisheries:

The creek drainage provides habitat for numerous species of big game, including elk, deer, bear and cougar. Smaller game such as pine marten are also dependent on this ecosystem for survival. The lower part of the creek serves as winter range for elk and deer. Osprey are evident in the area also. Fisheries consist of native and stocked trout. Some steelhead have been introduced to establish a future run.

Streamflow:

Streamflows are adequate to maintain the native fisheries. The creek is very clear and blue green. It is considered to be of high quality with limited pollutants introduced by humans. Heavy rainfall brings short term sedimentation and discoloration.

Geology:

The geology of the area is derived from volcanic origin with basalt outcrops on the surface. The creek falls consistently with numerous small waterfalls over bedrock. Boulders are common all through the corridor in the creek bed itself. Generally steep incised draws cut through ridge systems throughout the area.

Botany:

An old growth ecosystem dominates the corridor with clearcutting occurring along the creek in the upper reaches. Douglas fir, hemlock and cedar are the dominant species. Hardwoods such as alder, maple, and vine maple are prevalent. The understory consists of rhododendron, swordfern, bracken fern and other riparian related species.

Cultural Resources:

There is evidence of prehistoric use along the flat areas near Quartzville Creek. The area was likely used as a summer travelway and for fishing and hunting by Native Americans.

Timber:

The portions of the river corridor that are eligible for designation as a Wild and Scenic River include about 3,918 acres. Timber stands within proposed corridor are primarily old growth Douglas fir and western hemlock. Estimated ASQ for this area without river designation is approximately 2.5 MMBF and 2.1 MMBF if this area were designated as a Wild and Scenic River.

Livestock Grazing:

There are no grazing permits in this area.

Social-Economic Effects:

The local economy is timber dependent and would suffer minor loss of timber production resulting from designation of this river corridor. Designation would likely increase recreation use of the area and would benefit local tourist related business.

Current Administration:

The river corridor is wholly within and administered by the Willamette National Forest, Sweet Home Ranger District.

Funding Needed if Classified as a Wild and Scenic River:

The following are expected funding requirements for Quartzville Creek for the next five years.

Cost category	Expenses Expected Independent of Designation	Additional Expense Expected with Designation
General Administration	\$15,000	\$8,000

Implementation		\$10,000
Development of Management Plan		\$130,000
Development	\$50,000	
Operation and Maintenance	\$35,000	\$5,000
Total - Five Years	\$100,000	\$153,000

General administration and operation and maintenance cost are estimated to continue at \$15,000 annually.

Forest Plan Alternative:

This river was not studied or considered for designation as a Wild and Scenic River in the DEIS or Draft Forest Plan. However the outstandingly remarkable values and characteristics of 12.3 miles of Quartzville Creek will be practiced in the current Forest Plan and proposed Forest Plan until a determination of suitability for Wild and Scenic Rivers status is made.

MIDDLE SANTIAM RIVER

Potential Wild and Scenic River

State of Oregon Willamette National Forest Linn County

The Middle Santiam River has been studied for potential Wild and Scenic River designation. It was identified for review through public comment to the DEIS and Draft Forest Plan which was published in December 1987.

Location:

From the confluence of two streams in T13S., R5E., north edge of section 25 on private land to Green Peter Reservoir.

- Segment 1 From the confluence of two streams in T13S., R6E., north edge of section 25 on private land to where river leaves private land in section 31 T12S., R5E. (6.0 miles)
- Segment 2 From section 36, T12S., R5E., to Forest Road (F.R.) 2041. (2.0 miles)
- Segment 3 From F.R. 2041 to Western Forest Boundary (6.0 miles)
- Segment 4 From Western Forest Boundary to Green Peter Reservoir (7.8 miles)

Eligible for Designation:

Segments 2 and 3.

Outstandingly Remarkable Values:

The Middle Santiam River has several remarkable values: large, high density stands of old-growth timber, spectacular scenery, an excellent trout fishery and outstanding opportunities for geological interpretation involving large land flows.

The river's scenery, coupled with the geological and ecological/biological uniqueness, and it's proximity to a major population area give this river outstanding recreational opportunities.

Segment 3 of this river lies wholly in the Middle Santiam Wilderness Area as well as flowing through a designated Research Natural Area. It flows through spectacular old-growth forests of western red cedar, hemlock and Douglas-fir including an area with a volume of (450M) per acre that is located right on the river. In addition to the ecological/biological attributes, the corridor offers geological interpretation with a large land flow on the eastern end of this segment. The area is suitable spotted owl habitat as well as elk range. Segment 2 also includes spotted owl habitat. In addition, this segment contains both historical and prehistorical sites. Shed Camp, located approximately mid-way in this segment dates to 1912. Several prehistoric sites have been identified.

River Mileage:

Study:	21.8 Miles
Eligible:	8.0 Miles
Draft Forest Plan:	0.0 Miles

Potential Classification:

Segment 2	Scenic	2 Miles
Segment 3	Wild	6 Miles

Land Ownership: River Miles Corridor Acres

Willamette National Forest	8.0	2,346
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Mineral and Energy Resource Activities:

There are no known mining claims within the corridor of Segments 2 or 3. No interest has been expressed in locatable mineral exploration or development in segment 2. Segment 3 is a designated Wilderness so it is withdrawn from mineral entry. There are no geothermal leases in the corridor nor any oil or gas leases.

Water Resource Developments:

There are no existing impoundments nor potential water resource development sites within the proposed eligible segments.

Transportation, Facilities and Other Developments:

Forest Road 2047733 is located about 1/3 mile from the beginning of segment 2. This road is gated. Forest Road 2042 is located about 1/2 mile from the beginning of segment 2. Forest Road 2041 crosses the river with a concrete bridge and is the ending point of segments 2. Timber harvest activity has taken place near the corridor in segment 2 and is visible from the river. No harvest activity is visible from segment 3.

Recreation Activities:

The majority of this river corridor lies within a designated Wilderness. There are no trails directly to the river. Use is primarily fishing in the vicinity of the bridge on Forest Road 2041, hunting, and people engaged in orienteering within the Wilderness. Access from the west is limited due to large tracts of private land outside the Forest.

Wildlife and fisheries:

Wildlife species that inhabit the drainage include the northern spotted owl, pine marten, elk, deer, black bear, beaver, bobcat, cougar, and numerous species of small birds and mammals. The drainage is a major elk winter range. The river has brook, rainbow, and cutthroat trout. Because of the dams downstream, there is no anadromous fishery.

Streamflow:

Streamflows are adequate to sustain a native fishery. The river is generally considered to be of high quality and free from manmade pollutants. During periods of heavy rainfall, sedimentation causes short-term discoloration.

Geology:

The river flows through volcanically derived rock of the Western Cascade Sequence.

Botany:

Segment 2 includes some true firs as well as the old-growth western red cedar, hemlock and Douglas-fir that occur in segment 3. The understory species include rhododendron, swordfern, bracken fern, salal and Oregon grape.

Cultural Resources:

The Middle Santiam River drainage was used extensively by prehistoric man. Many significant cultural sites exist along the river in both segments 2 and 3. In addition, segment 2 contains the historical Shed Camp which dates to 1912.

Timber:

The portions of the river corridor that are eligible for designation as a Wild and Scenic River include about 2,346 acres. Timber stands within a portion of the corridor that are available for timber harvest (Segment 2) consist of old growth Douglas fir, western red cedar and western hemlock. Estimated ASQ for this area, without river designation, is approximately 0.5 MMBF and 0.3 MMBF if this area were designated as a Wild and Scenic River.

Livestock Grazing:

There are no existing grazing allotments in this corridor.

Socio-Economic:

The local economy is heavily dependent on the timber industry. Designation would have little impact on the economy as the majority of the river corridor lies within a designated Wilderness. Timber harvest would continue but at reduced rates within segment 2. Tourism is a growing industry in Linn County and designation would likely attract a greater number of recreationists to the area.

Current Administration:

The river corridor is wholly within and administered by the Willamette National Forest, Sweet Home Ranger District.

Funding Needs if Classified as a Wild and Scenic River:

The following are expected funding requirements for the Middle Santiam River for the next five years.

Cost Category	Expenses Expected	Additional Expense
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	Independent of Designation	Expected with Designation
General Administration	\$15,000	\$8,000
Implementation		\$10,000
Development of Management Plan		\$130,000
Development	\$50,000	
Operation and Maintenance	\$35,000	\$5,000
Total - Five Years	\$100,000	\$153,000

General administration and operation and maintenance cost are estimated to continue at \$15,000 annually.

Forest Plan Alternatives:

This river was not studied or considered for designation as a Wild and Scenic River in the DEIS or Draft Forest Plan. However the outstandingly remarkable values and characteristics of 8.0 miles of Middle Santiam River will be protected in the current Forest Plan and proposed Forest Plan until a determination of suitability for Wild and Scenic Rivers status is made.

SOUTH SANTIAM RIVER

Potential Wild and Scenic River

State of Oregon Willamette National Forest Linn County

The South Santiam River has been studied for potential Wild and Scenic River designation. It was identified for review through public comment to the DEIS and Draft Forest Plan that was published in December, 1987.

Location:

From the headwaters of Sevenmile Creek beginning at edge of a clearcut in T.14S., R.5E., Section 13 N.E. downstream to western forest boundary.

- Segment 1 From the headwaters of Sevenmile Creek at edge of a clearcut in T.14S., R.5E., Section 13, N.E. 1/4 downstream to where stream enters private land T.14S., R.5E., Section 9 (4.0 miles).
- Segment 2 From the headwaters of Squaw Creek beginning at the confluence of two streams on the east edge of Section 21, T.14S., R.5E., downstream to its confluence with the South Santiam River in T.14S., R.5E., Section 9, N.W. of N.E. 1/4 (2.7 miles).
- Segment 3 South Santiam River from its confluence with Squaw Creek and Seven Mile Creek where it enters Forest Service land in Section 5, T.14S., R5E., downstream to western forest boundary (15.3 miles).

Eligible For Designation:

Segments 1 and 3.

Outstandingly Remarkable Values:

The South Santiam River has several remarkable values. It flows through old-growth forest, with steep side canyons and cascading water falls providing outstanding scenic opportunities. The upper reaches sustain a native fishing and provide habitat for elk as well as old growth dependent species such as Pine Marten. In addition the historic Old Santiam Wagon Road parallels most of the river providing an opportunity for interpretation of the areas colorful history.

River Mileage:

Study	22.0 Miles
Eligible	19.3 Miles
Draft Forest Plan	0.0 Miles

Potential Classifications:

Segment 1	Wild	4.0 Miles
Segment 3	Recreation	15.3 Miles

Land Ownership:	River Miles	Corridor Acres
Willamette National Forest	14.8	4,563
Private	4.5	1,430
Total	19.3	5,993

There are several parcels of private land in the corridor. They are located in T.14S., R.5E., Section 5; T.13S., R.4E., Section 25, 26, 34 and T.13S., R.3E., Section 36 and 34.

Mineral And Energy Activities:

There are no known mining claims within the corridor of the river. No interest has been expressed in locatable mineral exploration or development, and the lands within the corridor have low mineral potential.

Water Resource Developments:

There are no existing impoundments nor potential water resource development sites within the proposed eligible segments.

Transportation, Facilities And Other Developments:

State Highway 20, a two laned paved road, parallels the river, to where it enters T.13S., R.5E., Section 31, and crosses the river one time in T.13S., R.3E., Section 36. Forest Road 2044, a single lane gravel surfaced road crosses the river in T.14S., R.5E., Section 5. There are five road bridges and one log footbridge that also cross the river. The Old Santiam Wagon Road (Forest Service 2042-302) parallels the river from T.13S., R.3E., Section 36 to T.14S., R.5E., Section 10 and provides hiker and equestrian access to areas within the corridor.

Piers from two old bridges. One at Longbow and the other at the Long Ranch. Power lines and telephone lines parallel the river from the the Forest boundary on the west to T.13S., R.4E., Section 25. These are composed of both buried and above ground lines. A powerline crosses the river in T.14S., R.4E., Section 26. The Falls Creek Hydroelectric facility is located in T.14S., R.4E., Section 32 and is visible from Trout Creek Campground.

A recreation residence tract of 10 homes is established in T.13S., R.4E., Section 27. Longbow, a CCC organizational site, and four developed campgrounds lie along the river providing camping and picnicing opportunities.

Recreation Activities:

This is a popular river for fishing and is stocked with trout several times each season from T.14S., R.5E., Section 5 to the western Forest boundary. Segment 1 above Road 2044 sustains a native fishery. Winter Steelhead inhabit the entire river.

Some swimming occurs at the five developed sites but the cold temperature of the water limit this activity. Five campgrounds are built on the banks of the river and camping and viewing scenery are

second only to fishing as an activity. An elk viewing area on the historic Long Ranch site is also a popular attraction.

The designation of the Old Santiam Wagon Road as a Special Interest Area will increase the number of users looking for historical and cultural opportunities. The Menagerie Wilderness lies on the North side of Highway 20. It is a 5,000 acre wilderness with numerous rock spires which are visible from the river.

There are three trailheads in the corridor. Two, Trout Creek and Rooster Rock, provide access to the Wilderness. The third, located at House Rock campground, crosses the river on a log bridge and provides access to a beautiful waterfall. Fall colors are spectacular and driving along the river is a very popular fall activity.

Wildlife and Fisheries:

This river drainage provides habitat to numerous species. Among these are old-growth dependent species such as the pine marten. It is likely habitat for species requiring a minimum of disturbance. Segment 1 is being surveyed as a likely Peregrin Falcon habitat. It is also elk winter range. In addition, there are osprey along segment 3 and a known northern Spotted Owl nest tree. The fishery consists of native trout, winter Steelhead and the Oregon Department of Fish and Wildlife stocked trout.

Streamflow:

Streamflows are adequate to maintain a native fishery. The river is generally considered to be of high quality with limited man made pollutants. During periods of heavy rainfall sedimentation causes short-term discoloration. There is some riprap along the river in House Rock Campground and Longbow Organizational Camp, but the streamflow is not affected.

Geology:

The river flows through volcanically derived rock of the Western Cascade Sequence. There are numerous basalt spires along the Corridor. A multitiered waterfall occurs near House Rock Campground. Squaw Creek and Sevenmile Creek which join to form the South Santiam River come together at a 180 degree angle. Segment 1 is marked by a steep very rugged canyon, well dissected with draws and with numerous exposed rock outcroppings. There are many large exposed boulders.

Botany:

Douglas-fir and western hemlock are the predominate species. The stands range in age from old-growth at the eastern end to mature second growth at the lower end of the river. Stands of western red cedar occur throughout the drainage. Hardwood species such as Alder, big leaf maple and vine maple exist all along the river. The understory consists of rhododendron, swordfern, bracken fern, salal and Oregon grape as well as many types of wildflowers.

Cultural Resources:

The South Santiam River drainage was a byway for both prehistoric and historic peoples. The area was used both for hunting and berry picking as well as a route to Central Oregon. Several prehistoric sites have been found along the river. In 1853 Andrew Wiley and party followed the South Santiam River east to locate the first pass across the Cascades south of the Barlow Road. This route became the Old Santiam Wagon Road and was used extensively by the early settlers of Oregon. Several way

stations were erected and remnants of these remain today as well as approximately 22 miles of the original wagon road.

Timber:

The portions of the river corridor that are eligible for designation as a Wild and Scenic River include about 5,993 acres. Timber stands within the corridor consist of both old growth and second growth. Douglas fir and western hemlock are the predominant species in the corridor. Estimated ASQ for this area, without river designation, is approximately 2.1 MMBF and 0.9 MMBF if the area were designated as a Wild and Scenic River.

Livestock Grazing:

An existing grazing allotment provides for grazing in the Elk Viewing Area pasture in T.13S., R.4E., section 32.

Socio-economic Effects:

The local economy is heavily dependent on the timber industry. Because of current and proposed Forest Plan classifications along the corridor, designation would have little effect on future timber harvests. If designated, harvest would be discontinued along Segment 1. Harvests would continue at current rates in the corridor, except within the riparian zone where harvest is not permitted.

Tourism is a growing industry in Linn County and designation would likely increase the number of tourists using Highway 20 as a primary route between Eastern and Western Oregon. There is commercial development (Mountain House Restaurant) on the north side of the river in T.13S., R.4E., Section 26.

Current Administration:

The river corridor is wholly within and administered by the Willamette National Forest, Sweet Home Ranger District.

Funding Needed if Classified as a Wild and Scenic River:

The following are expected funding requirements for the South Santiam River for the next five years.

Cost Category	Expenses Expected Independent of Designation	Additional Expense Expected with Designation
General Administration	\$15,000	\$8,000
Implementation		\$10,000
Development of Management Plan		\$130,000
Development	\$50,000	
Operation and Maintenance	\$35,000	\$5,000
Total - Five Years	\$100,000	\$153,000

General administration and operation and maintenance cost are estimated to continue at \$15,000 annually.

Forest Plan Alternative:

This river was not studied or considered for designation as a Wild and Scenic River in the DEIS or Draft Forest Plan. However the outstandingly remarkable values and characteristics of 19.3 miles of South Santiam River will be protected in the current Forest Plan and proposed Forest Plan until a determination of suitability for Wild and Scenic Rivers status is made.

MIDDLE FORK WILLAMETTE RIVER

Potential Wild and Scenic River

State of Oregon Willamette National Forest Lane and Douglas Counties

The Middle Fork Willamette River has been studied for potential Wild and Scenic River designation. It was identified for review through public comment to the Willamette National Forest DEIS and Draft Forest Plan, which were issued in December, 1987.

Location:

From lower Timpanogas Lake in T. 25 S., R. 5 E., Section 15, NW 1/4 to slack water at Hills Creek Reservoir in T. 23 S., R 3 E., Section 4, SW 1/4 (Willamette National Forest).

Segment 1 From Timpanogas Lake (T. 25 S., R. 5 E., Section 15, NW 1/4 to the confluence of the Middle Fork Willamette River and Echo Creek (T. 24 S., R 4 E., Section 16, SW 1/4). This terminus was selected as the character of the river begins to change at this point (16.0 miles).

Segment 2 From the confluence of the Middle Fork Willamette River and Echo Creek (T. 24 S., R. 4 E., Section 16, SW 1/4) to slack water at Hills Creek Reservoir(T. 23 S., R. 3 E., Section 4, SW 1/4)(14.0 miles).

Eligible for Designation:

Segments 1 and 2

Outstandingly Remarkable Values:

The Middle Fork Willamette River has several outstandingly remarkable values: spectacular scenery, significant recreation opportunities, a wide variety of wildlife, a significant historic site, and the districts' most diverse ecological/biological site at Big Swamp.

The entire river drainage is managed under a watershed plan. The river corridor is lined with hardwoods such as cottonwood and maple, and large old trees of Douglas-fir and western red cedar. A five hundred plus foot set of waterfalls and cascades, a gorge of 100 plus feet in height, numerous rock outcrops, cliffs, and islands offer photographic opportunities.

River Mileage:

Study:	30.0 miles
Eligible:	30.0 miles
Draft Forest Plan:	0.0 miles

Potential Classification:

Segment 1	Recreation	16.0 miles
Segment 2	Recreation	14.0 miles

Land Ownership:	River Miles	Corridor Acres
Willamette National Forest	29.75	10,841
Private Land	0.25	80
Total	30.00	10,921

One parcel of private land is located in T. 24 S., R 5 E., Section 21, SW 1/4 SW 1/4.

Mineral and Energy Resource Activities:

There are no known mining claims within the corridor of the river. Occasional recreational gold dredging can be observed but no interest has been expressed in development. The lands within the corridor have low mineral potential, making entry unlikely. There are no geothermal leases on the river.

Water Resource Developments:

There are no existing impoundments, but the Army Corps of Engineers has identified potential water resource development sites within the proposed study area. Potential sites have been identified at the points along the Middle Fork where Coal Creek and Staley Creek enter the river. There has been some interest in the development of small hydroelectric facilities near the lower end of Hills Creek Reservoir with a diversion canal being built to take water from the Middle Fork several miles upstream from the reservoir.

Transportation, Facilities, and Other Developments:

Forest Development Road 21 is a paved, double lane road that parallels the river providing easy access to the river for better than one-half of the river’s length. In areas, this road is visible from the river but for the most part, the road is not readily apparent. There are local roads in the corridor which provide access to timber management areas and recreation sites. In segment 1, the upper four miles of the river is isolated from roads except for Forest Road 2153 353 and Forest Road 2154 which provide crossings of the river.

Timber harvest activities have taken place along the corridor with some harvest units visible from the river. Four developed campgrounds and many dispersed campsites occur along the length of the river, especially in Segment 2 where motorhome/travel trailer camping use is high. There are six crossings of the river by roads along in the thirty mile length of the corridor.

Recreation Activities:

The Middle Fork Willamette River has its headwaters located in the Oregon Cascades Recreation Area at Timpanogas Lake. This is a popular river for dispersed camping as a result of the broad floodplain along most of the road accessible portion of the river. Fishing is probably the second most popular activity after camping. Water play in the forms of canoeing, tubing in pools, and just general water play take place during the summer months.

Hiking along the existing portions of the Middle Fork Trail provides scenic views, fishing holes, and photographic opportunities of rock outcrops, the gorge, mossy cliffs, and the fall color change of the hardwood leaves. The Middle Fork Trail is a river trail that will eventually follow the river along its entire length. The lower portion of the river is highly used by dispersed and developed site campers during holiday and summer weekends. There are thirty-nine plus dispersed campsites along the lower portion of the river and every available dispersed site and developed campgrounds are filled to capacity. User density is low in the upper isolated portion of Segment 1.

Recreation Activities (Estimated Recreation Visitor Days-RVDs):

Activity	1989	2000
Fishing	6,500	8,320
Camping Developed	8,162	10,447
Camping Dispersed	4,992	6,390
Hiking	500	1,200
Total	20,154	26,357

Wildlife and Fisheries:

Sensitive wildlife species known to inhabit the river drainage include bald eagle, two Northern Spotted Owl pairs, pine marten, and osprey. There is a productive pair of bald eagles located near the terminus of the lower portion of the river that successfully fledge at least two young annually. An osprey nest is located several miles upstream from Sand Prairie Campground. Other species known to frequent the river are deer and elk in critical winter range, black bear, cougar, bobcats, and coyotes.

Wildlife viewing opportunities include river otters, mink, beaver, weasels, and skunks. Owls include Great Greys, screech, sawwhet, and pigmy; frogs include tailed, tree, and Red Legged; there are Northwest, Pacific Giant, woodland, and Oregon slender salamanders; and snake species include Northwestern, common garters, and rubber boas. Nesting waterfowl such as Western Grebes, mallard ducks and Canadian geese can be found in the river corridor. There are two pileated woodpecker habitat areas located in the corridor.

Fishing is an attraction due to the native cutthroat trout population and the stocking of rainbow trout in the lower portion of the river on a regular basis by the Oregon Department of Fish and Wildlife. There are four ODFW stocking sites on the lower portion of the river. Stocking is done to supplement the native fish populations due to heavy fishing. No threatened or endangered species are known to inhabit the river.

Streamflow:

Streamflows are adequate to maintain a fishery resource year-round. Only in the very upper portion of the river below Timpanogas Lake is the surface flow reduced to pools and moist gravel during late August and September. This distance is about one mile long. The river is generally considered to be of high quality and free from manmade pollutants. During periods of heavy rainfall, sedimentation causes short-term discoloration.

Geology

The river begins its journey in the Recent Cascades volcanic rock and spills from the plateau down a series of cascades and waterfalls to the lower elevation Western Cascades geological formations. Along the way, the river passes through a 100 plus foot high gorge, past a series of natural springs in the Chuckle Springs area, and then flows through a series of braided channels and islands.

Botany

The upper reach of the river includes the high elevation true fir forest of noble fir, Pacific silver fir, and mountain hemlock. Along the channel, willow and alder can be found. At the lower elevations, Douglas-fir, western hemlock, and western red cedar are found. Adjacent to the river grow cottonwood and big leaf maple. Understory species include Oregon grape, rhododendron, twinflower, bracken fern, and vanilla leaf. There is the Paddys Valley Old Growth Grove. At Rigdon Meadows, there is the endangered and sensitive species of *Sisyrinchium sarmentosum* (endangered Oregon State and Regional Forester's sensitive species list for Washington and Oregon); and *Carex comosa* (sensitive Washington State and Regional Forester's sensitive species list for Washington).

Cultural Resources:

The river corridor hosts both historic and archaeological sites. About two-thirds of the river corridor was first accessed by the Oregon Central Military Wagon Road which dates back to the 1860's. The OCMWR provided a route from central Oregon to the lower Willamette Valley.

An important site along the river is Rigdon Meadows. The meadows were named for Stephen Rigdon who with his wife Zilphia operated a way station for travelers on the Oregon Central Military Wagon Road. They grazed sheep and cattle, sold meals, supplies, small items, and did blacksmith repairs until the 1890's. Rigdon Meadows was the site of a forest Servic Guard Station until the mid 1960's.

The upper segment of the river corridor is the site of old way trails, three prehistoric archaeological campsites and lithic scatters. The lower segment contains twenty-eight prehistoric archaeological sites the range from small lithic scatters to campsites. There are rockshelters, vision quest cairns, peel bark trees, and one cabin.

Timber:

The portions of the river corridor that are eligible for designation as a Wild and Scenic River include about 10,921 acres. Timber stands within the corridor consist of true fir, Noble fir and Pacific silver fir in the upper reaches of segment one. Douglas fir, western hemlock, and western red cedar are the predominant species in the lower reaches of the corridor. Estimated ASQ for this area, without river designation, is approximately 5.1 MMBF and 3.4 MMBF if the area were designated as a Wild and Scenic River.

Livestock Grazing:

There are no existing grazing allotments within the river corridor.

Socio-Economic Effects:

The Middle Fork Willamette River corridor begins less than fifteen miles from the town of Oakridge. The local economy is dependent largely upon the timber industry and to a minor extent upon recreation. Designation of the river would likely increase the number of people visiting the area. Any increase in recreation visitors would benefit the tourist related businesses in the area. Current management as well as the proposed Forest Plan reduce timber harvest in the river corridor due to the scenic resource and riparian management. Designation as National Wild and Scenic River would have limited effect on timber harvest in the area.

Current Administration:

The river corridor is wholly within and administered by the Willamette National Forest, Rigdon Ranger District.

Funding Needs If Classified as a Wild and Scenic River:

The following are expected funding requirements for the Middle Fork of the Willamette River for the next five years.

Cost Category	Expenses Expected Independent of Designation	Additional Expense Expected with Designation
General Administration	\$15,000	\$8,000
Implementation		\$10,000
Development of Management Plan		\$130,000
Development	\$50,000	
Operation and Maintenance	\$35,000	\$5,000
Total - Five Years	\$100,000	\$153,000

General administration and operation and maintenance cost are estimated to continue at \$15,000 annually.

Forest Plan Alternatives:

This river was not studied or considered for designation as a Wild and Scenic River in the DEIS or Draft Forest Plan. However, the outstandingly remarkable values and characteristics of both river segments will be protected in the current Forest Plan and proposed Forest Plan until a determination of suitability for Wild and Scenic status is made.

APPENDIX F

SELECTION OF HARVEST CUTTING METHOD

INTRODUCTION

This appendix documents the rationale used to determine appropriate harvest systems to be used in managing coniferous forest stands on the Willamette National Forest during the next 10 years (or the life of the Plan) where timber production is a management goal. Criteria for the selection of harvest cutting methods to be used on National Forests in Oregon are provided in 36 CFR 219.27(b) and in the Pacific Northwest Regional Guide (USFS, May 1984). These sources of direction are in turn derived from Legislation, Executive Orders, and administrative decision by the Secretary of Agriculture and the Chief of the Forest Service. Silvicultural systems (even-aged or uneven-aged) appropriate for use on the Willamette National Forest are identified for each management area where scheduled timber harvest may occur.

The intent here is to document the rationale for selection of the broad harvest cutting methods (even-aged or uneven-aged) to be applied on the Forest. The specific harvest treatment methods (such as clearcutting, seedtree cutting, or group selection) will be selected on a site specific basis, in accordance with direction contained in the Forest Plan, and as identified in environmental assessments or in silvicultural prescriptions written or approved by certified silviculturists.

The clearcutting, seed-tree, and shelterwood systems are even-aged systems; which means that all of the trees in the stand are approximately the same age. The single-tree and group selection systems are uneven-aged systems, the trees in the stand differ markedly in age, with at least three major age classes present. Uneven-aged stands have no beginning or end points in time. A full discussion of the current condition of the timber environment is in Chapter III, Affected Environment, Timber Section.

TIMBER YIELD AND REGULATION OF FORESTS AND STANDS

Timber yield is the amount of wood that is harvested periodically from a specified Forest area. The maximum yield allowed from a National Forest for a planning period (typically one decade), is called the Allowable Sale Quantity (ASQ). By Federal law (NFMA) Allowable Sale Quantity generally cannot exceed the Long Term Sustained Yield (LTSY) capacity of the Forest to grow wood. Within each National Forest, stands are managed by silvicultural systems to achieve continuous production of the allowable sale quantity. When this continuous production level is achieved, or the biological potential of a selected alternative is optimized, the Forest and tree stands are said to be "regulated."

A silvicultural system is a planned sequence of treatments, for controlling the species composition and structure of the vegetation during the life of a stand. A stand is a community of trees sufficiently uniform to be distinguishable as a silvicultural or management unit. A stand can be defined as a reasonably

SILVICULTURAL SYSTEMS

homogeneous unit that can be clearly differentiated from surrounding stands by its age, composition, structure, site quality, or geography.

Management objectives for stands typically are combinations of forest products and uses. Examples are: specific amounts of livestock forage, water runoff, and wood products; kinds of wildlife habitat; and specific scenic view qualities. No single silvicultural system can produce all desired combinations of products and uses from a particular stand, or from a National Forest. Forests are managed by using combinations of silvicultural systems to achieve the forest management objectives. The combinations vary greatly, depending on the characteristics of local forest ecosystems and differing management objectives.

Selection of the appropriate silvicultural systems occurs at both the National Forest land management planning level and Ranger District project level, by considering the overall planning objectives and ecological characteristics of broadly-defined land classes. Examples of land classes are: areas suitable for growing commercial wood products; streamside management zones; and spotted owl habitat areas. At the Ranger District, project level selection of silvicultural systems is typically made by a certified silviculturist. Choices are based on matching the attributes of the silvicultural systems with specific management objectives and ecological characteristics for specific stands.

SILVICULTURAL SYSTEMS

A silvicultural system typically includes harvesting trees, growing new trees, and controlling competing plants. Harvesting is classified as regeneration cuttings (those that help to replace stands), and intermediate cuttings (those that maintain or improve the character of existing stands, i.e., thinning harvests).

Silvicultural systems are adaptations of natural occurrences. Nature makes "regeneration cuttings" by means of fire, insects, disease, wind, and other phenomena; by removing a single tree, a small group of trees, a stand, or sometimes a whole forest.

Regeneration cuttings strongly influence stand characteristics and management options. Therefore, the five major silvicultural systems are named after them: clearcutting, shelterwood, seed-tree, single-tree selection, and group selection. Each of these systems includes regeneration cuttings to establish new tree seedlings or sprouts, and intermediate cuttings to develop the desired stand characteristics, such as species composition, spatial distribution, and plant vigor. The first three silvicultural systems are often referred to as Even-aged Systems, while the latter two are called Uneven-aged Systems.

Even-aged Systems

Clearcutting is the harvesting, in one operation, of all merchantable trees in a stand. A new stand may be created by natural processes such as seeding from trees in adjacent stands, or by sprouting from the stumps or roots of the cut trees. The new stand can also be created by people through broadcast scattering of seeds, or by planting seeds or seedlings. On this Forest, clearcut stands are usually regenerated by planting seedlings. Site preparation for seeding, planting, and to reduce slash and debris created during harvesting operations, is completed primarily through broadcast burning.

The shelterwood system requires leaving sufficient trees per acre (typically 10 to 20), during the regeneration cutting, to provide an environment that protects (shelters) the seedlings of a new even-aged stand. Protection may be needed from harsh conditions such as hot or moisture poor sites, excessive moisture stress, or frosts in some forest areas. Regeneration under shelterwoods by planting seedlings

is a common practice on the Forest. After the seedlings have shown sufficient growth (called establishment), the shelterwood trees (overstory) can be harvested. The shelterwood system is the second-most commonly used system on the Forest, after the clearcutting system.

The seed-tree system requires leaving a few good seed-producing trees per acre (typically 3 to 10) during the regeneration cutting. These trees produce the seed needed to establish a new even-aged stand. Following seedling establishment, the seed trees can be harvested. This system has seldom been used for intensive timber management on the Forest. The primary reasons are frequent unreliability of seed production in the desired periods; invasion of cleared lands by unwanted vegetation (particularly shrubs); the poor economics of harvesting the few seed trees after natural seedlings were established; and the high risk of blowdown.

Uneven-aged Systems

In the single-tree selection system each tree is evaluated for its contribution to the desired characteristics of the uneven-aged stand. Regeneration and intermediate cuttings are usually done in one operation. The desired seedlings or sprouts grow in the spaces created by harvesting of individual trees.

The current use of this system on the Forest is slight, limited mostly to developed recreation areas to remove trees that pose a hazard to people.

The group selection system requires harvesting trees in small groups (less than about two acres). The openings created in the stand resemble miniature clearcuts. The uneven-aged stand consists of a mosaic of even-aged systems described above to manage much smaller units of land. Currently, the group selection system is used only in areas of high scenic values (highway or trail foregrounds).

BIOLOGICAL CONTRASTS AMONG FORESTS AND STANDS MANAGED BY DIFFERENT SILVICULTURAL SYSTEMS

Appearance

Variation in Tree Age

A Forest managed by even-aged silvicultural systems consists of a mosaic of even-aged stands that differ by the age of harvest and seedling, young trees, and mature timber that replaced the original stand. Every age class would be represented by approximately the same number of stands. A regulated forest managed by the group selection system would resemble forests managed by the even-aged silvicultural systems; except that the even-aged components (groups) would be much smaller and more numerous. By contrast, each stand in a regulated forest managed by the single-tree selection system would have trees of many ages (perhaps all ages).

The oldest (or largest) trees in any managed forest depend primarily on the management objectives, not on the silvicultural systems. In particular, the amounts of large trees or old growth to be produced or maintained depend more on the willingness to forego or reduce timber yields than on the kinds of silvicultural systems used to manage stands.

Variation in Developmental Stages

In the even-aged and group selection systems, all stages of forest development are present in the forest, including grasses, forbs, shrubs, tree seedlings, and larger trees. Each stage is represented by entire

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stands or groups. By contrast, in the single-tree selection system the areas dominated by small plants such as grasses, forbs, or shrubs are commonly very small but they typically occur somewhere in every stand. In a regulated forest, the total area occupied by each stage should be about the same, regardless of the silvicultural system.

Occurrence of Shade-Tolerant and Intolerant Plants

Even-aged and group selection systems favor plants that can be readily established and which grow well in full sunlight (shade-intolerant plants). These include grasses, most forbs and shrubs, and many of the most valuable commercial tree species, such as Douglas-fir. The single-tree selection system favors plants that can be readily established and grow well at low light levels (shade-tolerant plants). Examples in Oregon forests are many ferns; a few grasses, forbs, and shrubs; many non-commercial hardwood tree species; and a few commercial conifer tree species, such as western hemlock, grand fir, Pacific silver fir, and western red cedar.

However, on low quality forest lands where lack of soil moisture or other soil conditions cause low plant densities, shading by trees is greatly reduced. There, shade-intolerant plants will persist if the single-tree selection system is used.

Diversity of Plant Species

Species diversity depends on the biological and physical environments as well as how the stands are managed under the different silvicultural systems. On moderate to high quality lands, stands managed by the single-tree selection system shift toward shade-tolerant species. This also means that the species diversity of plants near the ground would eventually be lower in stands managed by the single-tree selection system.

The composition of commercial tree species may be significantly increased or decreased during stand regeneration; depending on the environmental conditions, availability of natural seed, selection of species to be planted, and the success of the plantings. Potential seed trees of some species could have been harvested, or only certain species (for example, western hemlock) could regenerate naturally under the brush that can rapidly occupy newly harvested areas.

If both artificial and natural regeneration fail, the species diversity of commercial trees has been significantly reduced. The risk of a complete regeneration failure is least for the single-tree selection system. There is high probability of successful natural regeneration of all species where openings are small, seed sources are present, and ground environmental conditions are suitable for tree seedling establishment. The risk of loss of diversity in large openings can be reduced by planting all appropriate species, or by designating appropriate seed trees or shelterwood trees of mixed species.

Vertical Diversity

The vertical diversity in stands managed by the even-aged or group selection systems can be quite limited. Typically there is a single dominant layer of seedlings, saplings, or larger trees. However, usually there is considerable diversity in stands with the larger trees because some trees are significantly taller and have fuller crowns than others. Full vertical diversity still occurs over the forest, but not in each stand or group. By contrast, in the single-tree selection system, the vertical diversity within each stand should be much greater. Seedlings, saplings, and trees in larger tree classes should be seen from any point in the uneven-aged stand.

Tree Vigor

If the stands are well managed, tree and stand vigor should be independent of silvicultural systems. However, maintaining good vigor of small shade-intolerant species, such as Douglas-fir, can be very difficult in stands managed by the single-tree selection system. To promote vigor and growth of these trees, tree density may have to be reduced, which can significantly reduce tree biomass.

Many stands on the Willamette National Forest are infected with root diseases or dwarf mistletoes. With the group selection and single-tree selection methods it is very difficult and costly to maintain or improve tree vigor and productivity in infected areas. These root diseases and dwarf mistletoes infect other trees more easily in the uneven-aged stands.

Genetic Resources

Conservation of Genes

Genetic diversity is basically unaffected when natural or artificial regeneration of commercial tree species is successful. Successful artificial regeneration means that appropriate procedures are used during seed collection to ensure a large genetic diversity in the collected seed. However, if regeneration of a particular species were to fail repeatedly over broad areas, genetic diversity would be reduced.

Quality of Genes

Where improperly applied, the single-tree selection system can lead to "high-grading", which in turn reduces genetic quality for wood production. High-grading is the selective removal of the best trees (most rapidly growing, largest, and most valuable for wood), so that most regeneration comes from seed produced by the lower-quality, remaining trees. Leaving cull trees in shelterwood and seed tree cuts, and for wildlife tree replacement in clearcuts, can also cause problems.

The average genetic quality may be significantly lowered in a stand managed by the single-tree selection system, because of higher rates of inbreeding. Some forest geneticists theorize that inbreeding should also increase under the shelterwood or seed-tree systems. Nearby trees of the same species usually are closely related, and they can pollinate each other. The natural seedlings should be even more inbred. By contrast, artificial regeneration or natural regeneration from edges of large openings reduces the probability of significant inbreeding. Large openings facilitate pollen movement from more distant, less related trees.

Productivity

Scientific long-term comparisons of wood production using the different silvicultural systems have not been made anywhere in the world. Theoretically, the total biological productivity (biomass) may be greatest for stands managed by the single-tree selection system. This is because of more continuous tree cover, compared to the other systems. However, merchantable stand growth and timber yields may not be higher for the single-tree selection system. Merchantable yields are strongly influenced by managerial factors.

MANAGERIAL CONTRASTS AMONG FORESTS AND STANDS MANAGED BY DIFFERENT SILVICULTURAL SYSTEMS

Public Concern

In the last two decades the clearcutting system and to a lesser extent the shelterwood and seed-tree systems, have generated controversy in the United States and Europe.

There are at least six major concerns in Oregon and on the West Coast:

- Clearcut areas are regarded as visually unattractive.
- The risks of significant soil erosion and loss of soil productivity are thought to be much greater for the clearcutting system.
- Regeneration of clearcut stands is thought to be unreliable.
- The risks of significant genetic losses are thought to be much greater for the clearcutting system because new stands may be monocultures.
- The use of chemical herbicides (strongly opposed by some groups and individuals) is thought to be much greater if even-aged systems are used, particularly the clearcutting system.
- Artificial regeneration is thought to be too costly.

All of these undesirable effects can occur under any silvicultural system. However, the risks of some are significantly different for certain systems. Other managerial aspects of the silvicultural systems are also discussed in the sections below. They cover: risk of major wildfires; risk of infestation by insect, disease, or wildlife pests; production of wildlife big game forage; protection of archaeological resources; administration of silvicultural projects; timber harvesting efficiency; genetic improvements in forests; and effects on fisheries and wildlife.

Effects On Scenic Quality

Uneven-aged silvicultural systems are usually better than even-aged systems for creating or maintaining naturally-appearing landscapes. Uneven-aged systems apply treatments on a small scale. The treatments are also more selective in nature, and are well distributed in the forest. However, long-term administration and prevention of natural wildfires are more difficult. (See the section on Risk of Major Wildfires).

Where timber management activities are not permitted to be visually evident, the single-tree selection system may be the only feasible alternative. All silvicultural systems may be feasible where the management objective is to maintain the desired landscape character, depending on the circumstances. However, the uneven-aged systems would generally be better than the even-aged systems. All silvicultural systems may also be feasible where timber management objectives are dominant over visual quality objectives. Similarly, if the landscape character needs to be improved, any silvicultural system could be appropriate. For example, small or large temporary openings, created by timber harvest, that blend with the existing environment, can help to achieve a pleasing landscape.

Management Risks Of Adverse Effects On Watersheds And Soils

The management risks depend more on the characteristics of the watershed and soils, and on the care and quality of work, than on the kind of silvicultural system used. Adverse effects associated with any silvicultural treatment can usually be avoided or mitigated. The major possible adverse effects are

erosion, sedimentation in waterways, soil compaction, and loss of soil productivity through soil or nutrient loss.

The risks of significant, cumulative erosion and sedimentation effects in watersheds usually depend more on road quality and location, and the time of year when activities occur than on silvicultural treatments. Extensive and frequent use of heavy machines can cause unwanted compaction of some soils. The risk of this occurring should not be different among the even-aged silvicultural systems. Risk may be higher with uneven-aged systems due to the need for more vehicle access. Uneven-aged systems require more stand entries and increase risk of soil compaction.

The amount of risk of soil nutrient losses is increased where vegetation or litter is cleared or high-intensity fires occur. The risk due to clearing vegetation or litter is greater for the even-aged silvicultural systems. However, the risk of high intensity fuel is greater for the uneven-aged systems because of the ease of which a crown wildfire may occur. High-intensity fires may occur in any stand if controlled fires for site preparation are used improperly.

Management Experience

Timber harvesting has occurred in Oregon for over 140 years. However, the vast majority of experience with managing forests with the goal of regulating potential yields, has involved the even-aged silvicultural systems, particularly clearcutting.

Even-aged Systems - The oldest plantations on National Forest lands in the Region are about 80 years old. Some are soon to be harvested and replaced, thus completing the cycle of an even-aged silvicultural system. Extensive experience has been gained in the regeneration, promotion of young tree growth, intermediate cutting, and regeneration cutting treatments for even-aged systems in all major timber types in the region. Overall, artificial regeneration following clearcutting has been very reliable in Douglas-fir, and Mixed Conifer stands. Artificial regeneration has been significantly less reliable in high elevation noble fir or grand fir stands. The primary causes of planting failures are: (1) difficulties with consistently reproducing high-quality seedlings in the nurseries and (2) planting when the environmental conditions are inappropriate.

Wood Production

Need for Control of Competing Vegetation (Including the Use of Herbicides)

Control of competing vegetation is needed to ensure establishment and maximum growth of tree seedlings. Some have theorized that less control is needed in the single-tree selection system where tree cover is more continuous, resulting in fewer competing grasses, forbs, and shrubs. However, these competitors cause significant moisture stress in the seedling and sapling trees (in addition to the substantial moisture stress caused by the larger trees) thereby reducing their survival and growth. There is no compelling theoretical basis for concluding that the need for control of competing vegetation should be reduced. Major competing plants can retain good vigor for some time, when shaded by conifers. Using the single-tree selection system would definitely not reduce the need for controlling competition from such plants.

Frequency of control treatments varies by silvicultural system. Treatments under the single-tree selection system could be needed somewhere in every stand as often as every 5 to 10 years. The average treatment frequencies in the other systems are much lower. For example, in any of the even-aged systems, up to about three treatments may be needed until the stand is regenerated, a period that could exceed 50

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years. Thus, the average period between treatments would be greater than 20 years. Regardless of the silvicultural system used, the total acres treated (and the total pounds of herbicide applied per acre, if herbicides were used) should be about the same over the long term.

The aerial application of herbicides (usually the most cost-effective and the most controversial method of applying herbicides) could not be used in the single-tree selection system. Depending on topography and vegetation structure, aerial applications of herbicides could also be impractical in the group selection system.

The Forest Plan incorporates the Pacific Northwest Region's FEIS for Managing Competing and Unwanted Vegetation. In implementing the Forest Plan through project activities, the Forest will comply with the Record of Decision issued by the Regional Forester dated December 8, 1988, and the Mediated Agreement of May, 1989. Use of all vegetation management techniques is allowed only when other methods are ineffective or will unreasonably increase project costs. Emphasis must be on prevention and early treatment of unwanted vegetation and full public involvement in all aspects of project planning and implementation. The Forest Plan FEIS directs that:

- The selection of a treatment method will be made at the project level based on a site-specific analysis of the relative effectiveness, environmental effects (including human health), and costs of the feasible alternatives, and that herbicides will be selected only if their use best meets management objectives; and
- Monitoring and enforcement plans to implement specific methods will be developed for site-specific projects and described in the environmental analyses for these projects.

Restrictions on treatments would change timber yields and vegetation management costs in the following ways:

- If chemical use is restricted, the costs of vegetation management would increase, but timber yields would not be significantly reduced. (Allocations of resources would not change as a result.)
- If prescribed burning is restricted, costs of planting, animal control, and vegetation management would increase but timber yields would not be significantly reduced.
- If chemical use and prescribed burning were both restricted, reforestation costs would increase and timber yields would be reduced in some areas where regeneration could not be assured.

In any of these cases, the Forest Plan would be reexamined to determine the extent to which outputs or effects would change.

Treatment Costs

The size of a treatment area is a major factor in determining treatment costs and managerial feasibility. Generally, costs per acre in intensively managed forests are higher when the treatment units are smaller. Therefore, the even-aged systems are the most cost efficient whereas the group selection and the single-tree selection system (in that order) are the least cost-efficient.

Regeneration by clearcutting is the most cost-efficient among the even-aged systems. Shelterwood and seed tree systems are less so, in that order. The removal of shelterwood trees or seed-trees, after the seedlings are established, is a second cost not incurred in the clearcutting system.

In theory, the total cost of natural regeneration should be less than for artificial regeneration. The costs of seed collection, nursery operations, seedling handling, and planting are eliminated in natural regeneration. Natural regeneration often results in much greater densities of trees than would be planted or are desirable. Also, unreliable seed production by many commercial tree species often delays natural regeneration, which reduces wood growth. This delay, in many cases would extend beyond the 5-year regeneration period required in NFMA. These factors, including an increase in costs of precommercial thinning, would offset the initial low cost of regeneration. If natural regeneration is to be used, the shelterwood and seed-tree systems are usually more cost-efficient than the uneven-aged systems.

Achieving Regulated Forests, While Maintaining Forest Timber Harvest Levels

A regulated Forest can be accomplished most easily with the even-aged or group selection silvicultural systems because of their flexibility in meeting special management and multiple-use objectives and can be prescribed over larger areas. When managed appropriately even-aged or group selection systems are practical and economical in terms of transportation and procurement of a volume of marketable trees, while facilitating control of desired vegetation species composition, density, and growth rates.

There are two critical disadvantages of the single-tree selection system. First, foresters lack the detailed information about trees needed for cutting on a stand-by-stand basis. There are tens of thousands of stands on a typical National Forest in Oregon with up to about ten thousand potential crop trees per stand. Currently, inventory data needed for the single-tree selection system are lacking for about two-thirds of these stands. Second, in the Maritime climate in Oregon, large forest wildfires are inevitable. Reforestation after these fires creates many new, even-aged stands. It is very difficult to regulate a forest under a single-tree selection system when substantial acreages of unplanned even-aged stands occur.

Planning, Contracting, and Record Keeping

The many small units used in the uneven-aged systems makes for ineffective and costly operation and administration. If stands in a typical Ranger District were managed by uneven-aged systems, in excess of 50,000 separate areas would have to be inventoried, planned for, treated, and monitored. Even with computers the management complexity would be very costly and time consuming for uneven-aged management. Therefore, the extent to which uneven-aged management systems are used for intensive timber management will necessarily be very limited.

Timber Harvesting

Five important aspects of timber harvesting are strongly influenced by the choice among silvicultural systems: (1) variability in sizes of harvested trees, (2) area to be harvested, (3) complexity of the harvesting treatments, (4) the probability of causing significant damage to trees to be left in the stand, and (5) the probability of causing long-term root disease, mistletoe, and insect problems. The first three influence harvesting efficiencies, and the other two affect the vigor, tree stocking, and value of the residual stand.

There is wide size variation in trees harvested in each operation under the single-tree selection system. This reduces harvesting efficiency because logging equipment is size-dependent. However, this disadvantage could be insignificant in second-growth stands.

Harvesting in the single-tree selection system is much less efficient than for the other systems because more land must be treated in each operation to harvest the desired yield from the Forest.

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The complexity of harvesting treatments is also greatest in the single-tree selection system. Identifying which trees to cut, determining where they are to be felled, felling the trees in the designated areas, and removing the trees or logs out of the stand without damaging the residual trees can be very difficult and costly. In the single-tree selection system, cuttings occur as frequently as every five to ten years. Logging damage to trees left to grow in the stand is typically greatest for the single-tree selection system because of the frequent entries. It is very difficult to selectively harvest trees in dense stands without damaging many residual trees, particularly on steep slopes. Damaged trees are often infected by wood-decaying fungi that can persist in the soil for long periods, thus retaining the capacity to infect new trees. The fungi reduce the windfirmness, vigor, commercial value, and stocking of residual trees. This characteristic is a particular concern in developed recreation areas where selection systems are often applied. In the other systems, only the intermediate cuttings are as complex. The regeneration cuttings in the other systems are more straightforward operations. Clearcutting is the most efficient.

Genetic Improvements in Forests

Genetic improvements to increase timber growth, improve tree form and wood quality, or increase resistance to disease and insect pests, depend primarily on planting trees with desirable genetic characteristics. Therefore, the potential for genetic improvement is greater for silvicultural systems that use artificial regeneration. The clearcutting, group selection, and shelterwood systems (if artificial regeneration is used) have the greatest potential for improving the genetic quality of forest trees. The single-tree selection system, which its natural regeneration and higher rates of inbreeding, has the least potential.

Risk of Major Wildfires

The even-aged systems (clearcutting in particular) are best for reducing the risk of major wildfires because the greater control of fuel distribution makes wildfire prevention and suppression easier and less costly. The single-tree selection system is least desirable because fires burn intensely and are more difficult to control. Openings which can serve as fuel breaks occur less frequently in forests or stands managed by this system. Also, the multiple tree layers create "ladders", permitting ground fires to spread into the crowns of the large trees. Crown fires are more destructive and more difficult to control than ground fires. Finally, the use of controlled fires to reduce the risks of large wildfires is most difficult and costly in the single-tree selection systems.

Risk of Significant Insect and Disease Infestation

Silvicultural treatments reduce risks of insect and disease damage by selecting appropriate tree species, by diversifying within and among stands, and by maintaining tree vigor. Vigor is promoted by preventing the trees and other plants from becoming too dense. Well-managed stands in all systems reduce the risk of significant pest damage. However, there are significant exceptions.

Risk of significant insect or disease damage to trees increases if the trees have been wounded. Many wounds occur during silvicultural treatments. Accidental scarring of standing trees can be caused by felling nearby trees, by bumping them with machines, or scraping by logs being pulled through the forest. Risk increases with frequency of stand treatments, particularly cutting. Cutting frequency is much higher for the single-tree selection system than for others, so the risk of significant insect and disease damage is highest.

Two serious diseases, dwarf mistletoes and some roots rots, can be difficult, costly, and in some cases, impossible to control under single-tree selection systems. Damage from these diseases is most easily controlled by managing stands as wholes. Dwarf mistletoe plants can distribute seeds within about 30

feet radius, thereby infecting nearby susceptible species. Even-aged systems allow the manager to control damage from this pest through cutting treatments.

Many root fungi infect susceptible trees by root-to-root contact. Control may require killing trees in a zone around the infected area. Uneven-aged management, particularly the single-tree selection system, can perpetuate root disease "centers" and spread infection.

Generalizations about wildlife pest damage and silvicultural systems are difficult. The major potential wildlife pests in the Region include pocket gophers, deer, and bears. These animals feed in vegetation dominated by grasses, forbs, shrubs, or tree seedlings. Use of the even-aged or group selection systems can create large areas temporarily dominated by this kind of vegetation. This can cause higher densities of potential pests, which increases the risk of significant infestation to potential crop trees. However, often the actual damage levels are not increased where this occurs.

Production of Deer and Elk Forage and Browse

Even-aged systems and the group selection system are best for deer and elk production. Grasses, forbs, and shrubs used by deer and elk occur in the greatest quantity in openings.

Protection of Archaeological Resource

There should be no significant differences among the silvicultural systems in their risk of damage to undetected archaeological resources. Damage depends more on the intensity and frequency of management treatments than on the kind of silvicultural system, particularly when large machines are used.

Effects on Fisheries and Wildlife Habitat

Fisheries habitat is most easily protected where the water quality is high, stream temperatures are kept moderate through shading, and where the runoff quantity is sufficient to maintain spawning areas. The single-tree selection or group selection systems are usually more advantageous than the even-aged systems for managing the vegetation in streamside management zones and riparian areas. However, the silvicultural systems used outside these zones do influence the amount of sediment in the water. (See the discussion in the section titled Risks of Adverse Effects on Watershed and Soils.)

The choice of silvicultural systems to best manage wildlife habitat depends on which species are to be emphasized. Regardless of which treatment is used in a stand, some species will benefit and others will not. Most wildlife species are adapted to thrive in specific structures and species of forest vegetation. For example, the use of the even-aged or group selection systems favors deer and elk that use herbaceous and shrubby vegetation for food. The single tree selection system may favor animals that need vertical diversity, such as spotted owls and tree squirrels.

Almost all Forest wildlife species could use a particular young-growth stand at some time in its development regardless of the silvicultural system. (The exceptions are the few species that may be totally dependent on very large, decadent trees for habitat). The kind of system would influence the proportions of species and when and how they could use the stand as habitat. A significant exception is single-tree selection management applied to large areas. The absence of large openings could prevent use by wildlife adapted to this kind of habitat, such as soaring hawks. Overall, a mix of the silvicultural systems in the forest would probably best achieve most wildlife management objectives.

DISCUSSION OF EVEN-AGED vs. UNEVEN-AGED SELECTION CRITERIA

The criteria used for selection of harvest cutting methods were developed using selection criteria identified in the Regional Guide for the Pacific Northwest Region (1984) as well as direction provided in 36 CFR 219.27(b) for management prescriptions that involve manipulation of tree cover. A brief description of the criteria follows in the next sections. These brief descriptions are intended as a guide; refer to the Regional Guide and 36 CFR 219.27(b) for more precise interpretations.

Selection Criteria From The Regional Guide

1. The selected method must permit the production of a volume of marketable trees sufficient to utilize all trees that meet utilization standards and are designated for harvest.
2. The selected method must permit use of a logging method which can remove designated trees without excessive damage to the residual stand and while meeting other established land management objectives. Figure 3-1 in the Regional Guide displays the compatibility of logging systems with common harvest cutting methods. Generally, ground based logging methods, helicopters, and cable methods using slack-pulling carriages are appropriate for all harvest methods, while cable methods without slack-pulling carriages and balloons, are appropriate only for clearcuts.
3. The selected harvest method must be capable of providing special conditions that are required to meet resource management objectives. Figure 3-2 in the Regional Guide displays commonly used harvest methods which achieve desired forest character. Generally, both even-aged and uneven-aged methods can meet desired forest character with the exception of a mosaic of forest and opening and maximum wildlife species diversity. Here, uneven-aged methods are not applicable.
4. The selected method must permit control of vegetation to established desired numbers and rates of growth of trees as well as other vegetation needed to achieve special management objectives. Figure 3-3 and 3-4 in the Regional Guide outline these harvest cutting methods. Generally, both even-aged and uneven-aged methods can be used in vegetation zones occurring on the Forest, however uneven-aged methods are not applicable for wildlife forage production or optimum tree seedling and sapling growth.
5. The selected method must promote a stand structure and species composition which minimizes serious risk from insects, disease, animal damage, and wildfire and will allow treatment of existing insect, disease and fuel conditions. Figures 3-5 in the Regional Guide displays harvest cutting methods favorable to the reduction and treatment of these agents. Generally, uneven-aged methods are not applicable where dwarf mistletoe and root disease present serious risks.
6. The selected method must meet multiple-use management objectives identified in the Regional Guide and Forest Plan.

Selection Criteria From 36 CFR 219.27(b)

The seven criteria identified in 36 CFR 219.27(b) which direct management prescriptions for the manipulation of tree cover can be summarized as follows:

1. Be best suited to multiple-use goals, considering biological, environmental, engineering, economics, and other impacts.
2. Assure that lands can be adequately restocked within 5 years of final harvest.
3. Not be chosen primarily because of the greatest dollar return or timber output, although these factors should be considered.
4. Consider the potential impacts on residual trees and adjacent stands.
5. Avoid permanent reduction of site productivity and ensure conservation of water and soil.
6. Provide the desired effects to meet special management objectives.
7. Be practical in terms of transportation and harvesting requirements and total costs of timber sale preparation, logging, and administration.

Combined Criteria For Selection Of Harvest Cutting Method

The criteria identified in the Regional Guide and in 36 CFR 219.27(b) were subsequently combined to eliminate duplication of intent and simplify the rationale for selecting the harvest cutting methods used to implement the Willamette National Forest Forest Plan. These seven combined criteria are summarized as follows:

1. The selected method must permit the production of a volume of marketable trees sufficient to utilize all trees that meet utilization standards and are designated for harvest. (Regional Guide: criterion 1)
2. Selected method must use available and acceptable logging methods. (Regional Guide: criterion 2, 36 CFR: criterion 4)
3. Selected method must be capable of meeting special management & multiple-use objectives. (Regional Guide: criteria 3 and 6, 36 CFR: criteria 1 and 6)
4. Selected method must permit control of vegetation to establish desired species composition, density, and rates of growth (Regional Guide: criterion 4, 36 CFR: criteria 4 and 6)
5. Selected method must promote a stand structure and species composition which minimizes risks from insects, disease and wildfire. (Regional Guide: criterion 5)
6. Selected method must assure that lands can be adequately restocked (36 CFR: criterion 2)
7. Selected method must be practical and economical in terms of transportation, harvesting, preparation and administration of timber sales. (36 CFR: criterion 7)

In addition selected method must not be selected primarily because it resulted in the greatest dollar return or provided the highest output of timber, or if it permanently reduces site productivity, or impairs conservation of the water and soil resources. (36 CFR: criteria 3 and 5)

RATIONALE FOR SELECTION OF HARVEST CUTTING METHOD

Timber Type Stratification Working Group

The following analysis documents the rationale for selection of harvest cutting method to be applied within each working group/management area during the life of the Forest Plan based on those combined criteria that have a significant effect on the selection. As was stated previously, the specific harvest method (clearcut, shelterwood, seedtree, group selection, or single tree selection) will be identified on a site specific basis, in accordance with direction contained in the Forest Plan, and as documented in the environmental assessment or silvicultural prescription.

Douglas fir/hemlock

This is the major working group on the Forest comprising about 80 percent of the suited acres. It covers the whole broad spectrum of site and vegetation associations within the Douglas fir and western hemlock zones of forest communities. Habitat types range from the very dry Douglas fir/oceanspray types to the cool, wet, western hemlock/devils club type along streams where Douglas fir reaches its maximum growth potential. Silver fir and noble fir are generally not present. The full range of management activities can be practiced on these sites. On the hot, dry Douglas fir climax areas, either artificial or natural shade is necessary for prompt regeneration even though Douglas fir is considered a shade intolerant species. This allows the seedlings to adjust to the harsh conditions and become established on these south facing slopes. Douglas fir is generally the dominant species and is featured in management. On selected sites, ponderosa pine, grand fir, or sugar pine may be featured. Incense cedar, western redcedar and western hemlock are minor associates.

Management Areas 10a, 11a, 11b, 11c, and 14 - Lands within these management areas will be managed for timber, roaded natural dispersed recreation, scenic modification, and wildlife habitat and forage. Satisfactory tree growth rates should be maintained. Stands should be protected from insects, disease, and damage. Both even-aged and uneven-aged methods are biologically possible.

Even-aged methods generally provide enhanced forage production and maximize wildlife species diversity (Combined Criterion 3). Even-aged methods generally provide for enhanced seedling and sapling growth rates because of the significant depressing effect of mature or larger trees on height and diameter growth of understory trees (Combined Criterion 4). For this reason, uneven-aged methods generally produce reduced timber volumes.

Dwarf mistletoe and root disease are common in many forest stands. Where they occur, uneven-aged methods are not applicable (Combined Criterion 5). Even-aged methods are more economical and practical in terms of transportation, harvesting, preparation, and administration (Burns, 1983) (Combined Criterion 7).

Use of prescribed fire may in some instances reduce fuel accumulations and eliminate undesirable competitive vegetation (Combined Criterion 4). Even-aged methods are more compatible with this treatment. Although uneven-aged methods are biologically acceptable in most healthy stands, they generally produce reduced forage for big game, reduced timber yields, increased risk of disease and wildfire, and a considerable increase in management costs and complexity. For these reasons even-aged harvest cutting methods are selected for these management areas.

Management Areas 10b, 10d, 11d, 11e, 11f, and Riparian Zones - Lands within these management areas will be managed for dispersed, motorized and non-motorized recreation; scenic retention and partial retention; and protection of riparian habitat.

Forest stands managed in these areas will maintain visual diversity through variations of stand densities and size classes. Large trees will provide an important stand component. Both even-aged and uneven-aged methods are biologically possible in disease-free stands, and can provide for the visual variety and maintenance of a large tree component. Defoliating insects, dwarf mistletoe, and root diseases are common in many forest stands. Where they occur, uneven-aged methods are not appropriate (Combined Criterion 5). The special conditions required to meet other resource management objectives may take precedence over timber volume production (Combined Criterion 3). Tree growth rates should be sufficient to produce the characteristic large tree component within the rotation age and maintain trees in a healthy condition (Combined Criterion 4). Trees should be managed to minimize risks from insects, disease, animals, and wildfire (Combined Criterion 5).

Multiple canopy stands may be more susceptible to damage by defoliating insects. For these reasons, even-aged management will generally be practiced. Uneven-aged management, primarily group selection, may be practiced where site specific analysis determines it will best meet management direction.

Douglas fir/true fir

This is much like the Douglas fir/hemlock working group except it is within the silver fir zone. Douglas fir is the dominant species and is featured in management. Noble fir is also an important associate. Western white pine may also be planted but is more commonly featured in the true fir or mountain hemlock types. The strata is cooler and generally wetter than the Douglas fir/hemlock type with snow common in the winter. This working group starts at about 3,000 feet elevation on certain slopes and aspects and probably reaches maximum area between 3,500 and 4,000 feet.

The full range of management activities are available with artificial or natural shade necessary for plantation establishment on drier south facing slopes and ridgetops.

Management Areas: The rationale for selection of harvest cutting methods is the same for each of the management areas as presented for the Douglas fir/hemlock working group, above.

True fir

This working group occupies the least area on the Forest with about three percent of the area. It occurs in the same elevation range as the Douglas fir/true fir strata but on cooler and wetter sites. Most of it lies on the rolling uplands of the High Cascades. Noble fir is the preferred management species with Douglas fir, silver fir, white pine, and Englemann spruce as minor associates. Frost can be a major hinderance to regeneration establishment and where present, shelterwood regeneration systems are used in establishing Douglas fir and noble fir regeneration.

The shelterwood overstory must be removed as soon as the seedlings outgrow the frost zone in order to minimize logging damage to the young trees. White pine and Englemann spruce are used in areas with prolonged frost conditions as they are much more frost resistant.

Although site index is lower than in the Douglas fir types, noble fir responds well to stocking level control and reserch has shown that it can produce more volume than Douglas fir on better sites. All silvicultural practices may be used where applicable.

RATIONALE FOR SELECTION

Management Areas: The rationale for selection of harvest cutting methods is the same for each of the management areas as presented for the Douglas fir/hemlock working group, above.

Mountain Hemlock/Lodgepole Pine

This working group occupies the highest and coldest areas of our commercial Forest land. Most of it is located on the rolling land of the High Cascades. Seral species include lodgepole pine, silver fir, white pine, Englemann spruce, and noble fir. Alaska yellow cedar and Douglas fir are minor associates. The cedar tends to occur in well defined pockets. The lodgepole pine is often a pioneer species on cold, frosty sites; then silver fir and mountain hemlock come in underneath the lodgepole pine, replacing it in 60 to 80 years.

Frost is a major problem in the area. Saving young trees, obtaining natural regeneration, and the use of the shelterwood harvest system are important components of successful regeneration here. In these cold soils, all vegetation tends to occupy the same rooting zone. Root rot and Indian Paint fungus also have a high damage potential in this working group. Where either are present in the overstory, the residual hemlock and true fir are at great risk. In these cases pine should be favored, and if the risk is too high, the understory hemlock and fir should be destroyed. There is the additional tendency for trees to become established in very dense stands, which results in stagnation. Strict stocking level control is necessary to prevent this condition. Since most vegetation competes in the same root zone, vegetation immediately below tree crown height must also be considered when evaluating release opportunities, as well as that which is overtopping crop trees.

Because of the slower growth, commercial thinning must be delayed far into the rotation, and is often a borderline economic venture.

Management Areas: The rationale for selection of harvest cutting methods is the same for each of the management areas as presented for the Douglas fir/hemlock working group, above.

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APPENDIX G

MANAGEMENT REQUIREMENTS

INTRODUCTION

This appendix is included in the Final Environmental Impact Statement for the Forest Plan in response to decisions of the Chief of the Forest Service and the Deputy Assistant Secretary of Agriculture regarding appeal No. 1770, brought by the Northwest Forest Resource Council on September 18, 1986. The appeal centered on direction from the Regional Forester to incorporate "minimum management requirements" (MMRs) in forest plan alternatives. The appellant requested that the appropriateness of the MMRs be examined through the environmental impact statement process. The information in this appendix will refer to the minimum management requirements as Management Requirements or MRs and will also respond to comments about MRs that were raised during the review of the Draft Environmental Impact Statement.

A summary of Management Requirements is provided in Chapter II, "Management Requirements" section. Additional information is in Appendix B "Development of Management Requirements." The Standards and Guidelines (or specifications) for implementation of the Management Requirements are found in the Forest Plan.

This appendix addresses the issue raised by the appellant: For those management requirements which cause significant reductions in allowable sale quantity (ASQ) or present net value (PNV), alternate ways of meeting the management requirements are examined and their opportunity costs (reductions in ASQ and PNV) are compared.

Appendix H of the Draft Environmental Impact Statement, "Sensitivity Analysis for Minimum Management Requirements" has been replaced by the material presented here. The Appendix H of the Draft is part of the planning record.

BACKGROUND OF MANAGEMENT REQUIREMENTS

What are Management Requirements?

Many laws and regulations guide Forest Service activities. One law in particular, the National Forest Management Act of 1976 (NFMA), and its implementing regulations provide direction for the Forest planning process. The direction for National Forest Systems Land and Resource Management Planning, in Section 36 of the Code of Federal Regulations, Part 219 [36 CFR] specify: (1) the minimum specific management requirements to be met in accomplishing the goals and objectives of the National Forest System [36 CFR 219.27] and (2) the minimum requirements for integrating individual forest resource planning into the Forest Plan [36 CFR 219.14 through 219.26]. The term "management requirements (MRs)" will be used in this appendix to refer to these NFMA regulations instead of "minimum management requirements (MMRs)" which were used in the Draft Environmental Impact Statement and Proposed Forest Plan.

Some management requirements are procedural in nature and need not be dealt with here. Some requirements were analyzed and were available for review during the Regional Guide Environmental Impact Statement process and are not dealt with here. See Appendix B for a more complete discussion. The management requirements which have not been fully dealt with elsewhere, and which require additional analysis due to significant opportunity costs associated with implementation are:

1. Maintenance of habitat to assure viable populations of fish and wildlife populations particularly mature and old growth habitat,
2. Protection of water resources, particularly water temperatures, and
3. Opening sizes limited to 60 acres or less and dispersion of created openings.

These management requirements are described in greater detail in later sections of this appendix. MRs for dead tree habitat and other requirements noted in 36 CFR 219.27 which have not been addressed in other Environmental Impact Statements do not cause significant opportunity costs (less than 2 % ASQ or PNV) when implemented.

Legal Requirements Versus Implementation Methods

The management requirements from NFMA and its implementing regulations are legal requirements. They represent "ends" which must be met during forest plan implementation. For example, the NFMA implementing regulations require that "fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area." It is mandatory that, whatever implementation methods are chosen, the management requirement be met.

Specifications or standards for achievement for each management requirement are established at the national level or through analysis at the regional level for most of the management requirements. These are listed in the regulations or as Standards and Guidelines in the Regional Guide. Additional specifications identified on the Forest are listed as Standards and Guidelines in the FEIS, Appendix D, and the Land and Resource Management Plan, Chapter IV. The specifications must be based on knowledge of the resources involved. For example, in meeting the management requirement for viable populations of vertebrate species it is necessary to define the type of habitat required by the species, the maximum distance between habitats which will still provide reasonable assurance of genetic interaction, and the size of habitat area needed to support a breeding pair.

Often, the pool of scientific knowledge is insufficient to provide the entire basis for defining the specific conditions or standards that will satisfy or meet a management requirement. When this happens it is necessary to rely on the field experience and the professional judgement of knowledgeable professionals and to establish monitoring and research that will provide better information for future planning efforts.

Implementation methods are the "means" or "ways" in which the management requirements will be met. Usually there is more than one way in which a management requirement can be met. Determining the most appropriate means of meeting the specifications for each management requirement involves careful analysis at the Forest level. Considering and analyzing different means or ways of meeting a specific management requirement are particularly important if there are potentially significant reductions in present net worth (PNV) or allowable timber sale quantity (ASQ) involved.

How Implementation Methods to Meet the Management Requirements are Developed

The selection of means sufficient to meet management requirements is based on effectiveness in meeting resource protection and on minimizing reductions to PNV or ASQ. The general process used in evaluating alternative ways of meeting the management requirements is as follows:

1. Identify the desired result for each management requirement.
2. Assemble existing information about the resources addressed by the management requirement.
3. Analyze the existing information to determine what conditions or specifications need to exist on-the-ground to assure meeting the "ends" of the management requirement. (See Table G-1.)
4. Develop various ways or means to meet the management requirement. (See Table G-2.)
5. Evaluate the effectiveness of the alternative means in meeting the management requirements. Estimate the environmental effects of each set of means.
6. For each set of means, estimate the effects on economic efficiency (as measured by changes in present net value) and the effects on timber availability (as measured by allowable sale quantity).
7. Where opportunity costs of meeting a management requirement exceed 2% of PNV or ASQ of the present net value benchmark, the analysis used to select the means are presented. Two percent was used because differences less than 2% would not be significant in terms of opportunity costs of alternative means. A higher threshold would preclude evaluation of many alternatives.

For discussion purposes, opportunity costs are reductions in present net value (PNV) and reductions in allowable sale quantity (ASQ) that result from implementing resource protection measures (means or ways) to meet the management requirements set forth in NFMA regulations. In order to provide protections required by NFMA on Forest land, some opportunities to maximize present net value or to maximize timber production must be foregone.

Discussions are grouped by dispersion of created opening management requirements, water quality management requirements and wildlife management requirements in separate sections. In each section, the management requirements are displayed along with relevant specifications from national and regional guidelines, and alternative implementation methods (means or ways) are analyzed.

BACKGROUND OF MANAGEMENT REQUIREMENTS

Table G-1 summarizes each of the management requirements (ends) subject to analysis of opportunity costs on the Forest and summarizes the specifications or standards of achievement for those ends. Table G-2 shows the alternative means considered for implementing each management requirement where the opportunity costs exceeded 2%.

Table G-1. Summary of Management Requirements and Associated Specifications.

Required Result	Summary of Specifications
Disperse created openings	Maximum created opening size of 60 acres (with some exceptions). Corners of two or more created openings may touch, but are considered a single opening and cannot exceed 60 acres (with some exceptions) if they are not stocked with trees 4.5 feet tall. Site must be adequately stocked with trees 4.5 feet tall before a harvest area is considered a closed stand and not an opening.
Protect water temperature Protect streambank stability	Meet State water quality standards. Protect streams, streambanks, shorelines, lakes, wetlands and other bodies of water.
Habitat provided that maintains viable populations of existing native and non-native vertebrate species	
- Pileated Woodpecker and Marten (<i>Martes americana</i>)	Maintain mature conifer stands (for nesting and feeding) of adequate size and distribution to permit interaction among breeding pairs of dependent species. [See Tables G-6 and G-7.]
- Northern Spotted Owl	Maintain old growth conifer stands (for nesting and feeding) of adequate size and distribution to permit interaction among breeding pairs of dependent species.

BACKGROUND OF MANAGEMENT REQUIREMENTS

Table G-2. Summary of Alternative Means Considered for Implementing Each Management Requirement.

Management Requirements	Alternative Methods Considered
Harvest dispersion	<ol style="list-style-type: none"> 1. For all tree species, assume 10 years to grow to 4.5 feet in height to consider an opening "closed" or no longer an opening. 2. For true fir associations, mountain hemlock and lodgepole pine (high elevation species) assume 20 years and for all other species assume 10 years to grow to 4.5 feet in height to consider as opening no longer an opening.
Protect streams and streambanks and meet water quality temperature standards	<ol style="list-style-type: none"> 1. Set-aside all stream side vegetation (no scheduled timber harvest). 2. Selective harvest of streamside vegetation (scheduled timber harvest at 5% to 7% per decade). No harvest on potentially highly unstable streambanks (21.5% of the riparian areas).
Provide for adequate habitat to maintain viable populations of existing native and desired non-native vertebrate species	
- Pileated Woodpecker and Marten	<ol style="list-style-type: none"> 1. Dedicate habitat sites for no timber harvest. 2. Manage habitat sites on 140-year rotations.
- Northern Spotted Owl	<ol style="list-style-type: none"> 1. Dedicate habitat sites for no timber harvest. 2. Manage habitat sites on 300-year rotations.

In analyzing the effects of the alternative means of meeting the MRs on present net value (PNV) and allowable sale quantity (ASQ), FORPLAN analysis was done with and without constraints designed to simulate meeting the management requirement. The PNV benchmark was used for this analysis. This benchmark is a FORPLAN run which identifies the mix of management activities which would result in the highest level of economic efficiency (i.e., the highest PNV) in managing Forest resources. It also identifies the ASQ associated with the optimal mix of management activities. A benchmark was chosen to use in the with and without constraint comparison, rather than an issue-based Forest Plan alternative, because management practices necessary to meet other objectives of the issue-based alternatives may partially or fully meet the MR, thus clouding any analysis of opportunity costs induced by the management requirement.

Implementation Methods with High Opportunity Costs

Table G-3 displays the opportunity costs of the implementation methods selected for meeting management requirements on the Forest. Only those implementation measures with opportunity costs of 2% or larger ASQ or PNV are shown: dispersed openings, water quality, mature conifer (for pileated woodpecker and marten) and old-growth conifer (for spotted owl).

Implementation Methods with Low Opportunity Costs

Management requirements for other wildlife habitat requirements for threatened and endangered species, sensitive species (except spotted owl), special habitats, and dead and defective tree habitat are not addressed in this analysis because opportunity costs of providing sufficient habitat to maintain viable populations are less than 2%.

BACKGROUND OF MANAGEMENT REQUIREMENTS

Implementation Methods that Meet More than One Management Requirement

Implementation methods selected to meet water quality management requirements also provide fish habitat in streams to assure the maintenance of viable populations of species dependent on this habitat. In addition, the water quality implementation methods meet the harvest dispersion management requirement. Alternative implementation methods for meeting water quality management requirements will also meet fish habitat requirements. No additional discussion or analysis is displayed in Appendix G for fish habitat management requirements.

Table G-3. Opportunity Cost of Meeting the Management Requirements with the Selected Implementation

Selected Implementation Method	First Decade ASQ ¹ MMBF/Year (MMBF/Year)	Change in ASQ ² Percent	PNV MM \$	Change in PNV Percent
PNV Benchmark with All Protection Measures	117.3 (666.8)	--	3,788	--
Opportunity cost of Dispersed Openings	1.7 (28.4)	1	212	6
Opportunity Cost of Water Temperature and Streambank Stability	4.4 (25.7)	4	119	3
Opportunity Cost of Mature Conifer for Pileated Woodpecker and Marten	3.2 (21.8)	3	126	3
Opportunity Cost of Mature Conifer and Old Growth for Spotted Owl	10.9 (68.9)	9	455	12

¹ This comparative analysis does not include the salvable dead component in the calculation of ASQ.

² Percent change calculated on cubic foot basis

HARVEST DISPERSION MANAGEMENT REQUIREMENT

Source of the Harvest Dispersion Management Requirement

Direction for harvest dispersion comes from several sources. The National Forest Management Act (Section 6(g)(3)(F)) sets broad direction that the Forest Service is to, among other things, identify maximum sizes for openings created by harvest activities (created openings). This is further defined in the NFMA implementing regulations (36 CFR 219.27(d)) and in the Regional Guide for the Pacific Northwest Region (pages 3-7 and 3-8).

Specifications for the Harvest Dispersion Management Requirements

The specifications or standards for achievement of the harvest dispersion management requirement are:

1. A harvested area of commercial forest land will no longer be considered a created opening, for silvicultural purposes, when stocking surveys, carried out in accordance with Regional instructions, indicate prescribed tree stocking that is at least 4.5 feet high and free to grow.
2. The maximum size limit of harvest openings on the Forest is 60 acres. Some exceptions are permitted in specific situations.
3. Harvest openings will be separated by blocks of land that generally are adequately stocked with trees that are at least 4.5 feet high and that contain one or more logical harvest units of similar size.
4. Harvest openings that touch each other are not precluded, but will be considered a single opening in determining compliance with harvest area maximum size limits.

Alternative Ways of Meeting the Management Requirement for Harvest Dispersion

Alternative ways for meeting the specifications shown above could have been modeled in FORPLAN to simulate the required end conditions. These specifications become constraints in the model that set limits on how FORPLAN schedules timber harvest to maximize PNV. (FORPLAN constraints are discussed in the FEIS, Appendix B, "Development of Management Requirements.")

Alternatives Considered in Detail

Alternative 1: Assume that average site replanting occurs within three years of a regeneration harvest. - This modeling assumption leads to trees 4.5 feet tall being achieved, on average, 10 years after regeneration harvest for the Douglas-fir (low elevation) timber types. For the true fir associations, mountain hemlock and Lodgepole pine trees 4.5 feet tall will generally be achieved in 13 years.

Alternative 2: Assume that site replanting occurs five years after a regeneration harvest. - This alternative would slow the average achievement of trees 4.5 feet tall by two to three years because of the additional two years of regeneration lag and the increased vegetative competition. The low elevation timber types will reach 4.5 feet tall after 13 years and the high elevation areas after 15 years.

Evaluation of Implementation Methods to Meet the Dispersion Management Requirement

Either of the alternative means or implementation methods noted above would meet the management requirement but delaying the regeneration of timber stands increases the risks of plantation failure with no real benefit. No further evaluation of alternative 2 has been done. Alternative 1 was used in all Plan alternatives.

Implications for Forest Plan Alternatives

Appendix B discusses the effects of this alternative way of meeting the dispersion requirement in the FEIS alternatives. The analysis of opportunity costs of the selected means of dispersing created openings is shown in Table G-3. Predicting the opportunity cost in actual Plan alternatives is difficult because the interactions of dispersion and various standard and guideline requirements will increase the cost, while the reduction in general forest lands will decrease the cost (dispersion is only necessary in Management Area 14).

Role of Monitoring and Research

The assumption that trees will reach 4.5 feet in height in the designated times is based on extensive experience and continuing monitoring. Silvicultural practices that might change the time required to reach 4.5 feet will continue to be tested for cost effectiveness and effects on nontimber resources.

WATER QUALITY MANAGEMENT REQUIREMENTS

Source of the Water Quality Managements Requirements

The NFMA regulations require that: All management practices will ... protect streams, streambanks, shorelines, lakes, wetlands [36 CFR 219.27]. Special attention shall be given to land and vegetation for approximately 100 feet from the edges of all perennial streams, lakes and other bodies of water. This area shall correspond to at least the recognizable area dominated by the riparian vegetation. No management practices causing detrimental changes in water temperature or chemical composition, blockages of water courses, or deposits of sediment shall be permitted within these areas which seriously and adversely affect water conditions or fish habitat [36 CFR 219.27(e)].

The Forest is also required to comply with the Clean Water Act (CWA), including section 208, which addresses nonpoint source pollution. In accordance with this Act the State of Oregon has established Water Quality Standards (OAR 340-41) for several water parameters, including water temperature, turbidity, and dissolved oxygen. The primary mechanisms to meet water quality standards are Best Management Practices (BMPs).

This appendix discusses the effects of meeting the NFMA management requirement to maintain streambank stability and the effects of meeting State Water Temperature standards. Practices used to meet these requirements constrain outputs of timber and PNV levels. Practices used to meet water quality standards such as turbidity do not constrain timber management practices and are not considered here.

Specifications for Streambank Stability and Water Temperature Management Requirements

The primary approach to maintaining streambank stability is to limit or prohibit timber harvesting on certain unstable streambanks. Specifications used to maintain streambank stability are included in BMPs which require that site specific conditions be assessed to determine the action needed. Field inventories indicate that 21.5 % of streambank areas are either too steep or too unstable to harvest timber without unacceptable adverse consequences.

Water Temperature specifications in OAR 340-41 state that:

No measurable increases shall be allowed ... when stream temperatures are 58 degrees Fahrenheit or greater ... or more than two degrees Fahrenheit increase due to all sources combined when stream temperatures are 56 degrees Fahrenheit or less ...

Alternative Ways of Meeting the Management Requirements for Water Temperature and Streambank Stability

Alternative ways for the meeting specifications shown above could be modeled in FORPLAN to simulate the required end conditions. These become alternative constraints in the model that set limits on how FORPLAN schedules timber harvest to maximize PNV. (FORPLAN constraints are discussed in the FEIS, Appendix B, "Development of Management Requirements.") The following alternatives were considered:

WATER QUALITY

Alternatives Considered in Detail

Alternative 1: Set-aside Shade Producing Streamside vegetation and all streambanks from scheduled timber harvest. - This alternative is designed to minimize vegetation disturbance and schedules no timber harvest in riparian areas. No shade providing vegetation would be removed by timber harvest from streambanks.

Alternative 2: Selective Harvest of Shade Producing Streamside vegetation (scheduled timber harvest) and no harvest of potentially unstable streambanks. - This alternative allows a moderate level of removal of shade producing vegetation from the riparian area. A maximum removal of 5% per decade in Class I and II and 7% per decade in Class III is allowed. Widths used for modeling purposes were 400 feet for Class I streams and 200 feet for Class II and III streams. The harvest rates are designed to maintain existing water temperatures in streams within a planning basin as regrowth of shade producing vegetation (previously removed as a result of past activities) balances removal associated with new projects. These prescriptions are applied to a basin as a whole and the expected results are viewed as a net change over time. This riparian management option is designed to produce zero net change over time. To maintain streambank stability, 21.5% of the riparian areas are removed from timber harvest scheduling. This amount was determined from field surveys of Class I, II and III streams.

Evaluation of Implementation Methods to Meet Water Quality Management Requirements

Either of the alternative means or implementation methods noted above would meet management requirements and warranted more detailed analysis.

Opportunity Costs

Table G-4 compares the PNV and ASQ opportunity costs of the alternative implementation methods for water quality protection.

Consequences of Alternative Ways or Means of Meeting Water Quality

The opportunity costs of the option of removing no vegetation from the riparian areas is approximately 2% greater than the moderate removal alternative. This alternative would go beyond meeting the requirement of protecting stream temperatures; over time, the temperature would be improved (lowered) as more shade would be provided. In those basins where past activities have removed substantial shade producing vegetation along streams, the no vegetative removal alternative could enhance fish habitat.

Table G-4. Opportunity Costs Associated with Alternative Means for Meeting the Management Requirements.

	First Decade ASQ MMCF/Year (MMBF/Year)	Change in ASQ ¹ Percent	PNV MM \$	Change in PNV Percent
PNV Benchmark without Riparian Protection (Baseline)	121.2 (692.5)	--	3,907	--
PNV Benchmark with MR Protection Measures (Partial Vegetative Removal, Alternative 2)	117.3 (666.8)	-3	3,788	-3
PNV Benchmark with Alternate Protection Measures (No Vegetative Removal, Alternative 1)	114.9 (653.2)	-5	3,696	-5

¹Percent change calculated on cubic foot basis

Rationale for the Selected Implementation Means

The selected method of meeting the MR is Alternative 2 because it is less constraining on timber harvests while still providing for the minimum resource protections. By implementing Alternative 2 the Forest would meet state water quality standards throughout the planning period while minimizing PNV and ASQ opportunity costs.

Implications for Forest Plan Alternatives

FEIS Chapter II and Appendix B discuss the effects of this alternative way of meeting water quality requirements in FEIS alternatives. The analysis of opportunity costs of selected means of water quality protection shown in Table G-4 shows the maximum PNV and ASQ effects. Actual Plan alternatives will have somewhat less opportunity costs as overlaps from lands withdrawn for wildlife, scenery, recreation or other nontimber objectives will help to provide shade producing vegetation and streambank stability.

Role of Monitoring and Research

Continued monitoring will be done on water temperature fluctuations due to removal and growth of stream shade producing vegetation. See the Forest Plan monitoring program.

MANAGEMENT REQUIREMENT FOR VIABLE POPULATIONS OF EXISTING NATIVE VERTEBRATE SPECIES

Source of the Management Requirement

The NFMA regulations require that:

"Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired nonnative vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure continued existence in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area." (36 CFR 219.19).

Description of the Management Requirement

All vertebrate species in Region Six were assessed with regard to population numbers and/or distribution that could result in either Forest or Regional extinction during the next five decades. Management requirements were developed for species whose viability would be at risk if no management actions were taken to protect their habitats.

The focus was on habitats that were likely to be limiting in the future (in short supply either in total acreage or in distribution) and on identification of particular species that could be used to represent all species dependent on those habitats. This identification was done on a subregional basis, recognizing the variability of situations within the Region. Once these species were identified, the Region defined their habitat requirements and biological characteristics. The species are included in the list of Management Indicator Species (MIS) that the Forests address in forest planning and subsequent monitoring.

Table G-5 displays current Regional management requirement direction regarding limited habitats and wildlife species by sub-regional zones. The Forest is in Zone II (mountain goat not included).

Northern spotted owl, pileated woodpecker and marten (*Martes americana*) are the only species for which alternative ways of meeting management requirements are evaluated. Management requirements for threatened and endangered species, sensitive species (except spotted owl), special habitats, and dead and defective tree habitat are not addressed in this analysis because opportunity costs associated with providing sufficient habitat to maintain viable populations are less than 2%. The management requirements for fish are met with the same management practices which provide the requirements for water quality and riparian area management, therefore further analysis is not provided.

Table G-5. Species Matrix for Addressing Management Requirements for Wildlife and Threatened and Endangered Species.

Zone Habitat	Zone 1 North Coastal	Zone 2 Westside Cascades	Zone 3 Eastside Cascades	Zone 4 Blue Mountains
Mature and Old Growth (Seral Stages V and VI)	Northern Spotted Owl ¹ Marten Pileated Woodpecker	Northern Spotted Owl ¹ Marten Pileated Woodpecker	Northern Spotted Owl ¹ Marten Pileated Woodpecker Northern three-toed Woodpecker	Marten Pileated Woodpecker Northern three-toed Woodpecker
¹ The Final Supplemental Environmental Impact Statement and subsequent Record of Decision provide direction for management of spotted owl habitat in Region Six.				
Dead and Defective	Primary Cavity Excavators	Primary Cavity Excavators	Primary Cavity Excavators	Primary Cavity Excavators
Riparian	The Forest determined and documented as part of the planning records, whether it needed to address wildlife in addition to fish, and if so which wildlife species would represent the riparian habitat. Coordination of this process with adjacent Forests was necessary to determine consistency.			
Big Game		Mountain Goat	Mountain Goat (Wenatchee)	
Threatened and Endangered Species	Bald Eagle Peregrine Falcon Brown Pelican Aleutian Canada Goose	Bald Eagle Peregrine Falcon	Bald Eagle Peregrine Falcon Grizzly Bear Woodland Caribou (Colville)	Bald Eagle Peregrine Falcon

Habitat Needs

Once the species needing management requirements were identified, the Region defined habitat requirements and biological characteristics. These are the basis for providing habitat and also for deciding how best to represent the species' needs in the planning process and in the FORPLAN Model.

Habitat needs were defined using information from existing research whenever possible (see bibliography). This information was used to define the habitat conditions, habitat dispersal, and habitat size necessary to meet the management requirement. When information was available, but did not fit exactly the management requirement context, professional judgement was used to apply the information in estimating habitat needs. When information was not available, habitat needs were developed using professional judgment of a number of knowledgeable biologists on the subject.

Specific information on habitat needs, specifications for meeting habitat requirements, and alternative ways of meeting the management requirements for marten, pileated woodpecker, and spotted owls are presented in the following sections. For each species, information is provided for the following three habitat factors:

Principal Habitats Used

Information about the seral stages and Kuchler vegetation types which are used by the various species is documented in many research papers for individual species. Information as to which Kuchler type and/or seral stage are primary or secondary habitat, and the amount of dependency upon each habitat, is based mostly on professional judgment (Guenther and Kucera 1978, Phillips and others 1981).

VERTEBRATE SPECIES

Dispersal Distance Between Habitats

Usually no research information is available for optimum dispersal distance between habitats. As a result, dispersal distance is often determined on the basis of observations, experience, and professional judgment. Dispersal distance is based on the ability of an individual species to travel to the next habitat often enough to prevent isolation of sub-populations. Distances are adjusted to consider other network connections for the targeted species and overlap of habitat provided for other indicator species.

Size of Habitat Areas

The size of individual habitat areas provided for each wildlife species is based on the habitat acreage needed to support the basic social or reproductive unit of the species, i.e., breeding pairs. Both home range and species density information was used to estimate the needed size of habitat area. Professional judgement was used where no data were available for the specific habitat types being managed.

Specifications for Meeting Habitat Requirements for Pileated Woodpecker and Marten

Approximately 40-50 wildlife species are known to depend on or prefer mature conifer habitat during some part of their life cycle on the Forest. By providing a dispersion of mature conifer habitat sites for the pileated woodpecker and marten, we are assuming that the other species preferring mature conifer habitats will have adequate habitat to maintain viable populations throughout the planning period.

Regional specifications for pileated woodpecker and marten are summarized from "A Report on Minimum Management Requirements for Forest Planning on the National Forests of the Pacific Northwest Region, USDA Forest Service" (USDA Forest Service, June 1986). In developing the report, various habitat sizes and dispersal distances were considered. Based on that analysis, minimum habitat sizes and maximum dispersal distances were identified for each species. This information is based on the best available data. Alternatives which addressed changes to size or distribution were not considered in developing the Forest Plan for the Forest.

Habitat specifications for pileated woodpecker and marten are summarized in Tables G-6 and G-7.

Pileated Woodpecker Specifications

Principal Habitats Used - Pileated woodpeckers need mature or old growth forest stands for nesting, roosting, and feeding. Habitats were identified in Bull and Meslow (1977), Guenther and others (1978), and Thomas (1979).

Dispersal Distance Between Habitats - An initial five-mile maximum dispersal distance between habitats resulted from professional judgment documented in Phillips and Roberts (1985). In June of 1986, the distance between habitats was modified to one habitat area for every 12,000 to 13,000 acres (about five miles apart) to allow greater flexibility in application.

Size of Habitat Areas - The size of nesting areas in Region Six for the pileated woodpecker has been identified as a range of 100 to 540 acres. To meet the needs of pileated woodpeckers both east and west of the Cascades, 300 acres of old growth or mature timber for nesting area, plus 300 acres of feeding area was defined as a Region-wide requirement. Three hundred acres of nesting area appears to be an average for different habitats. As more data specific to westside and eastside habitats (eastside

may be further subdivided) become available, the size of the nesting area may be adjusted (Bull and Meslow 1977; Bull 1975; Mannan 1982; Mellen 1986). A 1,000 acre unit was established as the minimum size territory that a pair of woodpeckers would defend. This was determined from research data. Snag size and density were taken from Thomas (1979), and acreage figures from Bull (1975), and Bull and Meslow (1977). See Table G-6 for summary of habitat specifications.

Table G-6. Pileated Woodpecker Habitat Requirements.

Principal Habitats Used	Dispersal Distance Between Habitats	Size of Area to which Wildlife Prescriptions Apply	Habitat Requirements to be Used in Analyses
Zone II (West Cascades)	One habitat area for every 12,000 to 13,000 acres.	600 acres/pair	Within a 1,000-acre unit:
A. Reproducing			Maintain 300 acres of conifers in seral stages VI and/or V, per pair for reproducing.
Seral Stages V and VI of Kuchler types K2, K5, K6, K29, and riparian.			Maintain a minimum average of two hard snags per acre greater than or equal to 12 inches dbh within the 300 acre reproductive area.
B. Feeding			Forty-five of these 600 snags should be greater than or equal to 20 inches dbh.
All seral stages of Kuchler types listed for reproducing habitat, provided snags are present.			When possible, maintain reproductive area in 300 contiguous acres. If not possible, habitat may be arranged in blocks no less than 50 acres and no more than 1/4 mile apart. Maintain a minimum average of two hard snags per acre greater than or equal to 10 inches dbh on an additional 300 acres for feeding.

Marten Specifications

Principal Habitats Used - The marten (*Martes americana*) uses seral stages III-VI--closed sapling-pole, large mature, and old growth (Thomas 1979; Guenther and Kucera 1978; Phillips and others 1981). The Kuchler types used are from Guenther and Kucera (1978). The principal habitat for the marten is seral stages V and VI (mature and old growth).

Dispersal Distance Between Habitats - Burke (1982) recommends that the maximum dispersal distance between habitat areas for marten should be two miles. In 1984 the Regional Forester changed the dispersal distance from two miles to three miles because it was felt where more than one adjacent habitat is available for dispersal, the dispersal distance can be extended to three miles for marten. This change has been reviewed by a number of biologists within and outside the Forest Service and most agree that it would appear not to create a population viability problem for represented species.

VERTEBRATE SPECIES

In June of 1986, the dispersal distance specification for marten habitat was changed to one habitat for every 4,000 to 5,000 acres (about three miles apart) to allow greater flexibility in application.

Size of Habitat Areas - In the professional judgment of the biologists listed in Phillips and Roberts (1985), a breeding female marten can be supported on 160 acres of quality habitat. Research is variable as to the size of area needed, but the female marten home range is estimated to be 160 acres (Campbell 1979). The biologists listed in Phillips and Roberts (1985) judged that this area should be contiguous to ensure that there would be enough habitat within the home range of the female. They also judged that crown closure should equal or exceed 50%. Research papers indicate that areas with a low percent crown closure receive little or no use by marten. Therefore, to ensure an adequate crown closure, a minimum requirement of 50% closure was selected.

Table G-7. Marten Habitat Requirements.

Principal Habitats Used	Dispersal Distance Between Habitats	Size of Area to which Wildlife Prescriptions Apply	Habitat Requirements to be Used in Analyses
Zone II (West Cascades)	One habitat area for every 4,000 to 5,000 acres.	160 acres per habitat area. (This figure represents the territory of one female and part of the territory for a male)	Maintain 160 contiguous acres of conifer in seral stages V or VI with a crown closure 59% or greater.
A. Reproducing			Within the 160 acre unit: Maintain an average of two hard snags per acre greater than or equal to 12 inches dbh.
Seral stages V and VI of Kuchler types K2, K5, K6, K29.			
B. Feeding			Twenty-four of these 320 snags should be greater than or equal to 20 inches dbh.
Seral stages III-IV of Kuchler types listed for reproducing habitat.			Maintain a minimum average of six down logs per acre at least 12 inches dbh and 20 feet long.

Research shows that the marten requires dead and down material for foraging, cover, and denning. Six down logs/acre (Burke 1982) was selected as the minimum down material requirement. The number and size of snags required was selected to ensure that the amount of down material was achieved over time. The specifications for marten habitat are summarized in Table G-7.

Alternative Ways of Meeting the Management Requirement for Pileated Woodpecker and Marten

Habitat areas for marten and pileated woodpeckers were mapped using Regional spacing, size, and habitat suitability criteria. Marten sites are to be located every 4,000 to 5,000 acres and pileated woodpecker sites every 12,000 to 13,000 acres.

All potentially suitable forest stands located with "reserved lands" were evaluated for marten and pileated woodpecker habitat capability. Lands unsuited for timber production or allocated to meet other Management Requirements were evaluated for contributions to marten or pileated woodpecker

All potentially suitable forest stands located with "reserved lands" were evaluated for marten and pileated woodpecker habitat capability. Lands unsuited for timber production or allocated to meet other Management Requirements were evaluated for contributions to marten or pileated woodpecker habitat. Marten habitat areas and pileated habitat areas were overlapped with these resource allocations wherever possible. Designation of habitat areas specifically for marten or pileated woodpeckers occurred when habitat quality, quantity, or distribution became limiting.

Table G-8 summarizes the number of mature conifer sites for pileated woodpecker and marten. The percent unsuitable and tentatively suitable timber land is also displayed. The total habitat areas for marten include taking credit for marten habitat in pileated woodpecker, and spotted owl areas; the total for pileated woodpecker habitat areas also counts the pileated habitat in the owl areas.

Table G-8. Mature Conifer Habitat Sites.

Species	Every M Acres	Sites	
	Distribution Requirements	Non-Wilderness Sites	Percent Suitable Timber Land ¹
Marten	4-5	100	1.3
Pileated Woodpecker	12-13	38	0.8

¹Based on 1.032 million acres of land tentatively suitable for timber production.

Once the minimum number of habitat sites was determined using Regional spacing and habitat suitability specifications, the Forest considered two options for providing mature conifer habitat. One was to dedicate the required number of acres of suitable habitat in each site. These areas would not be managed for timber production and would be expected to remain in suitable habitat condition for several decades. The second option was to manage timber stands on a larger area in order to harvest timber and produce replacement stands over time.

Alternative 1: Dedicated Sites - Under a dedicated mature conifer strategy, the required amount of mature conifer is withdrawn from timber production. Dedication of mature conifer sites has the advantage that the location of the stand does not change over time, making implementation less complicated. Dedication also assures that desired structural characteristics will be available for wildlife. There may be some risk of loss of individual stands through catastrophe.

Alternative 2: Managed Sites - This option involves the projection of long rotations on enough acres to maintain the necessary habitat through time, with all areas being rotated. The "normal" rotation age for stands in General Forest is projected to be about 75 years. Production of suitable habitat is expected to take at least 80-100 years (depending on timber type); rotations of 150 years are used to model a managed regime providing mature. This means that for every acre of suitable habitat, an additional 3-4 acres would need to be in various stages of development to provide replacement habitat.

Management of mature conifer sites assumes that existing stands can be harvested as other stands grow into a mature conifer condition to replace them. If replacement stands fail to develop desired structural characteristics (i.e., large diameter snags and down material) as predicted, mature conifer habitat would either be lost for a period of time or further delay in harvesting the existing mature conifer stands would occur.

VERTEBRATE SPECIES

Analysis of Opportunity Costs - The opportunity costs of designating the habitat areas (selected method) are displayed in Table G-3. The examination of opportunity costs and efficiency of the option for providing mature forest habitat through managed rotated stands is accomplished through an evaluation of per-acre timber production and economic efficiency of the possible regimes. The analysis is based on a Forest-wide evaluation, however, specific FORPLAN runs were not used to make a comparison (Forest-wide ASQ and PNV effects are not computed). This analysis has been explained in detail in Appendix B, Development of Management Requirements, and is summarized briefly here.

Consequences of the Different Ways of Meeting the Management Requirements - Populations of pileated woodpeckers and marten would not be expected to differ significantly under either alternative. Both would maintain the same amount and distribution of habitat. There are also little differences in the opportunity costs. Dedication of habitat areas would have the least impact on operational feasibility at the project level.

Rationale for the Selected Method - The Forest chose to provide mature conifer habitat by using a combination of managed and dedicated strategies on tentatively suitable timber land. This alternative achieves the desired habitat with the least effect on timber outputs. It provides opportunities to use management options where compatible with resource objectives. Both strategies are similar in their economic efficiency in meeting the management requirement. Modeling these areas as designated for this planning period does not preclude future planners from designating replacement areas as substitution opportunities can be identified (i.e., some existing pole stands could be substituted for Plan designated areas by the 5th decade). Whether areas are modeled as designated or managed, there would be little difference in implementation for the first planning period.

Implications for Forest Plan Alternatives - Plan alternatives were designed to address public issues. As a result most alternatives, including the preferred, incorporate objectives for retention of mature and old growth timber for a variety of reasons, such as wildlife, scenery, and recreation. Marten and pileated woodpecker areas overlap with areas selected for other purposes (such as unroaded recreation areas and special interest areas) wherever these sites meet habitat suitability and distribution requirements. Methods resulting in the opportunity cost shown in Table G-3 would benefit other resource uses as well.

Role of Monitoring and Research - The Forest Monitoring Plan (Forest Plan Chapter V) calls for monitoring populations and habitats of pileated woodpeckers and marten. During scheduled plan reviews, monitoring data will be considered in determining the suitability and effectiveness of the selected method for meeting the management requirement for viable populations. This will be an important test of the appropriateness of the selected modeling assumptions.

Information needs for both marten and pileated woodpecker include:

1. Dispersal distances:
 - a. How far can juveniles successfully disperse?
 - b. As habitat becomes increasingly fragmented, what is the ability of dispersing individuals to locate habitat islands?
 - c. What effect does the size of habitat areas have on the ability of dispersing individuals to locate these sites?

2. Size of mature conifer habitat sites:
 - a. Occupancy and use of habitat sites, particularly as the sites become more isolated.
 - b. Reproductive success within habitat sites.
 - c. Home range size in fragmented forests.
3. Utilization and reproductive success of marten and pileated woodpeckers in mature conifer sites managed on a 150 to 200 year rotations (i.e., are managed sites meeting habitat needs as compared to natural stands).
4. Population density, home range size and distribution of marten on the west slope of the Cascades in Oregon.

Specifications for Meeting the Habitat Requirements for Northern Spotted Owl

Specific Regional direction for the northern spotted owl is found in the Final Supplement to the Environmental Impact Statement (FSEIS) for an Amendment to the Pacific Northwest Regional Guide released in August 1988. In response to an appeal of the R-6 Regional Guide, the Supplement was prepared to address planning direction for spotted owl habitat management. Standards and guidelines adopted as a result of the Supplement will be used by National Forests in the Region to meet the management requirement to maintain viable populations of spotted owls.

The Final SEIS was prepared after a series of public meetings and study of the nearly 42,000 comments received on the Draft Supplement issued in the summer of 1986. A summary of the analysis of public comments, substantive comments, and copies of letters received from government agencies and elected officials can be found in Appendix I of the FSEIS.

The Forest Service Preferred Alternative (F) directs that the amount of suitable habitat at each designated SOHA will vary by physiographic province. Specific criteria were followed in locating designated SOHAs on the Willamette. Current distribution of owl habitat on lands unsuitable for timber production was evaluated for adequacy of distribution. SOHAs were designated on lands suitable for timber production only where necessary to meet distribution standards. Standards and Guidelines for the Forest Service Preferred Alternative (F) are briefly summarized in the following discussion. Chapter II of the Final Supplement should be reviewed for a detailed description of the direction. These Regional Standards and Guidelines provide specifications or standards for achievement of management requirements for northern spotted owls:

1. **Amount of suitable habitat in designated habitat areas:** Designated habitat areas shall contain the following amount of suitable habitat in the Cascade Mountain physiographic province: 1500 acres within 1.5 miles of the nest site. Habitat shall occur as one contiguous stand if possible or, as a 300 acre stand containing the known or suspected nest site with the remaining habitat as contiguous as possible. Each stand shall be larger than 60 acres.
2. **Spacing of Designated Habitat Areas:** Designate habitat areas where: greater than six miles separates areas which occur in reserved lands or in lands unsuited for timber production, and which are capable of supporting less than three breeding pairs of spotted owls; or where greater than 12 miles separates such areas capable of supporting three or more pairs.

VERTEBRATE SPECIES

3. **Threatened and Endangered Species:** No spotted owl habitat management activities shall adversely effect Federally listed threatened or endangered species or their habitat.
4. **Identification of Suitable Habitat:** Suitable habitat shall be identified in Forest Plans according to the general definition in the spotted owl Final Supplement and with concurrence by the Regional Forester.
5. **Management of Habitat:** Spotted owl habitat can be provided through prescriptions using even-aged or uneven-aged silvicultural systems, or no scheduled harvest. Prescriptions to be used and where they will apply shall be specified in the Forest Plans.
6. **Location of designated Habitat Areas:** Designate habitat areas only on lands suitable for timber production as needed to meet spacing standards.
7. **Priority for Locating Designated Areas:** Priority for locating designated areas follows status of occupancy by spotted owls. The highest priority is given to locations with verified occupancy by spotted owl pairs; next highest to locations with confirmed sightings of owls; lowest priority to locations where the presence or absence of owls is unknown.

The Final Supplemental Environmental Impact Statement (FSEIS) to the Regional Guide (for spotted owl habitat management guidelines) does not include the number of designated habitat areas as part of any alternative. The number of habitat areas are not specified in the Regional Guide, but will be a consequence of applying standards and guidelines in Forest Plans.

Alternative Ways of Meeting the Management requirements for Northern Spotted Owl

The Forest considered two methods for providing spotted owl habitat. One was to dedicate the required number of acres of suitable habitat in each site. These areas would not be managed for timber production and would be expected to remain in suitable spotted owl habitat over time. The second method was to manage timber stands through long rotations in order to produce replacement stands over time. The Forest chose to provide spotted owl habitat by dedicating the required amount of habitat.

Alternative 1: Dedicated Sites - Under a dedicated habitat strategy, each acre of spotted owl habitat is withdrawn from timber production. Dedication of existing stands assures that desired structural characteristics will be available, but may risk loss of individual stands through catastrophe or decay. Recent literature on old-growth suggests this risk is much less than once thought.

Alternative 2: Managed Sites - Management of sites assumes that existing old growth stands can be harvested as they are replaced by other stands that grow into an old growth condition. Delay in harvesting the existing old growth stands would occur if replacement stands fail to develop desired structural characteristics on schedule. Management of old growth on a harvest basis and replacing it removes structural characteristics important to old growth and may hasten the decline of the residual stand (Franklin 1981).

Analysis of Opportunity Costs - The opportunity costs of designating the habitat areas (selected method) are displayed in Table G-3. The examination of opportunity costs and efficiency of the option for providing mature forest habitat through managed (rotated) stands is accomplished through an evaluation of the per-acre timber production and economic efficiency of the possible regimes. The analysis summarized briefly here is similar to that described for mature forest habitat above and is explained in detail in Appendix B, Development of Management Requirements.

In general, due to the larger areas of habitat needed for spotted owls, and the longer period of time required to provide it (rotations about 200 years), it proved to be more efficient to dedicate areas for habitat. Dedicating the habitat minimizes the opportunity costs of ASQ and PNV.

The dedicated approach has the disadvantage of not managing for the vegetation characteristics needed to develop replacement habitat (composition and structure) in harvest units. As stands surrounding dedicated habitat areas become fragmented and harvested, few opportunities to replace habitat areas lost to catastrophic event would be present in the managed landscape.

Consequences of the Different Ways of Meeting the Management Requirements - Populations of spotted owls would not be expected to differ significantly under any of the options available to meet the management requirement. There are, however, differences in the opportunity costs.

Rationale for the Selected Method - The Forest chose to provide spotted owl habitat by dedicating habitat sites. This alternative maintains necessary habitat, and has the least effect on timber outputs; it is an economically efficient way of meeting the management requirement with the least opportunity costs.

The dedicated habitat approach has the advantage that the location of the habitat site does not change over time, making implementation less complicated than continuously relocating the habitat site as the stands are harvested and replaced.

Implications for Forest Plan Alternatives - Plan alternatives were designed to address public issues. As a result most alternatives, including the preferred, incorporate objectives for retention of old-growth and mature timber for a variety of reasons, such as wildlife, visual, and recreation. To the extent possible, spotted owl habitat areas overlap with areas dedicated for other purposes (such as Wilderness, unroaded recreation areas, special interest areas and other lands determined as not appropriate or unsuited for timber production), wherever these meet habitat suitability and distribution requirements. The opportunity costs shown in Table G-3 would benefit other resource uses as well. The costs do not take into account any overlap that may occur among implementation methods where lands selected for spotted owl habitat may also meet other wildlife, scenery or recreation objectives on lands suitable for timber harvest.

Role of Monitoring and Research - The Forest Monitoring Plan (Forest Plan Chapter V) calls for monitoring populations and habitats of spotted owls.

The Final Supplemental Environmental Impact Statement to the Regional Guide (Appendix D) identifies specific monitoring and research needs and describes how the information will be obtained. Intensive inventory, monitoring, and research being conducted by the Spotted Owl Research, Development, and Application Program will provide new information. This should allow an opportunity to re-evaluate and possibly adjust management direction within five years.

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REFERENCES

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APPENDIX H

BEST MANAGEMENT PRACTICES

DEFINITIONS

Nonpoint sources refers to diffuse or unconfined sources of pollution where wastes can either enter into, or be conveyed by the movement of water to, public waters (Oregon Water Quality Standards, 340-41-007(17)). Silvicultural sources, such as erosion from a harvest unit or surface erosion from a road, are considered nonpoint sources.

Best Management Practices are defined as "methods, measures, or practices selected by an agency to meet its nonpoint source control needs. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters." (40 CFR 130.2, EPA Water Quality Standards Regulation.)

Usually BMPs are applied as a **system** of practices rather than as a single practice. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility. (EPA Interagency Nonpoint Task Force, 1985.)

BMPs are basically a preventative rather than an enforcement system. BMPs are a whole management and planning system in relation to sound water quality goals, including both broad policy and site-specific prescriptions.

INTRODUCTION

Best Management Practices are the primary mechanism to enable the achievement of water quality standards. (Environmental Protection Agency, 1987.) BMPs will be selected and tailored for site-specific conditions to arrive at the project-level BMPs for the protection of water quality. The process for determining appropriate BMPs, and for ensuring their implementation at both the Forest Plan and Project level, is described. Following is a description of the methods and procedures that will be used to control or prevent nonpoint sources of pollution from resource management activities and to ensure compliance with the:

Clean Water Act of 1972, as amended (1977 and 1987)

Section 319 of the Clean Water Act Amendments of 1987 requires that the States determine those waters that will not meet the goals of the Act, to determine those nonpoint source activities that are contributing pollution, and to develop a process of determining BMPs to reduce such pollution to the "maximum extent practicable." This Appendix is designed to fulfill the intent of the requirements of Section 319.

BMP IMPLEMENTATION PROCESS

Oregon Administrative Rules (Chapter 340-41-001-975)

Department of Environmental Quality (DEQ). Oregon's Administrative Rules contain water requirements for the protection of identified beneficial uses of water.

Memorandum of Understanding

The Oregon Department of Environmental Quality and U.S. Department of Agriculture Forest Service (2/12/79 and 12/7/82), and "Attachments A and B" referred to in this MOU (Implementation Plan for Water Quality Planning on National Forest Lands in the Pacific Northwest 12/78, and Best Management Practices for Range and Grazing Activities on Federal Lands, respectively).

The EPA has certified the Oregon Forest Practices Act as BMPs. The State of Oregon compared Forest Service practices with these State practices and concluded that Forest Service practices meet or exceed State requirements. As State practices change, comparisons are made to ascertain that Forest Service practices meet or exceed these changes. Monitoring and evaluation will determine the need for changes in BMPs and/or State standards.

Forest Service management practices will meet, as a minimum, the substantive State BMP requirements, and other considerations required by the National Forest Management Act (NFMA) and other authorities, for the protection of the soil and water resources.

The general BMPs described herein are action-initiating mechanisms which call for the development of detailed, site-specific BMP prescriptions to protect beneficial uses and meet water quality objectives. They are developed as part of the NEPA process, with interdisciplinary involvement by a team of individuals that represent several areas of professional knowledge, learning, and/or skill appropriate for the issues and concerns identified. BMPs also include such requirements as Forest Service manual direction, contract provisions, environmental documents, and Forest Plan Standards and Guidelines. Inherent in prescribing project-level management requirements is recognition of specific water quality objectives which BMPs are designed to achieve.

BMP IMPLEMENTATION PROCESS

In cooperation with the State, the primary strategy for the prevention and control of nonpoint sources is based on the implementation of BMPs determined necessary for the protection of the identified beneficial uses.

The objective is to identify the most practical means of attaining water quality objectives. Water quality objectives include water quality measures that adequately reflect the needs of identified beneficial uses.

The Forest Service Nonpoint Source Management System consists of:

1. Selection and design of BMPs based on site-specific conditions, technical, economic and institutional feasibility, and the water quality standards of those waters potentially impacted.
2. Implementation and enforcement of BMPs.
3. Monitoring to ensure that practices are correctly applied as designed.

4. Monitoring to determine the effectiveness of practices in meeting design expectations and in attaining water quality standards.
5. Evaluation of monitoring results and mitigation where necessary to minimize impacts from activities where BMPs do not perform as expected.
6. Adjustment of BMP design standards and application when it is found that beneficial uses are not being protected and water quality standards are not being achieved to the desired level. Evaluation of the appropriateness of water quality criteria to reasonably assure protection of beneficial uses. Consideration of recommending adjustment of water quality standards.

BMP Selection and Design - Step 1

Scoping

Potential concerns are identified, e.g., water quality, as part of the NEPA process for environmental analysis. Public notices are dispersed inviting comment and participation in the process. Alternatives are developed to address potential problems and to accomplish project objectives.

Environmental Analysis

Each alternative is evaluated for its potential effect on different resources, including water. From this analysis, a preferred alternative is identified, along with the measures (BMPs) needed to reduce risk and increase the potential for success.

Documentation

An Environmental Assessment (EA) or Environmental Impact Statement (EIS) is developed with a decision notice and includes required measures (BMPs).

Water quality standards are used as objectives toward which practices are designed to protect beneficial uses.

Appropriate BMPs are selected for each project by an interdisciplinary team. BMP selection and design are dictated by water quality objectives, soils, topography, geology, vegetation, climate, economics, institutional constraints, etc. Environmental effects and water quality protection options are evaluated and a range of practices is considered. A final set of practices are selected that not only protect beneficial uses, but meet other resource needs. These final selected practices constitute the BMPs.

The selected BMPs, an estimate of their effectiveness, and a plan for monitoring them is included in the project EA or EIS. The site-specific BMP prescriptions are normally included in project implementation plans, but may also be included in the body or appendix of a project environmental document.

BMP Implementation and Enforcement - Steps 2 and 3

The site-specific BMP prescriptions are taken from plan-to-ground by a combination of project layout and resource specialists (hydrologists, fish biologists, soil scientists, foresters, geologists, etc.). Final adjustments to fit the BMP prescriptions to the site are made before implementing the resource activity.

BMP IMPLEMENTATION PROCESS

When the resource activity (e.g., timber harvest or road construction) begins, timber sale administrators, engineering representatives, resource specialists, and others ensure that the BMPs are implemented according to plan. A similar implementation process is used for other resource activities (range management, mining, etc.) on National Forests.

BMP implementation monitoring is done before, during, and after resource activity implementation. This monitoring answers the question: Did we do what we said we were going to do? Some examples of implementation monitoring for a streamside management unit BMP prescription may be:

1. **Before Project** - Check riparian areas along streams to see if layout meets the objectives of the BMP prescription, or if proposed road crossings of streams are properly located and designed per estimates made during the environmental analysis.
2. **During Project**: check to see that timber fallers understand marking prescription for timber to be felled in the riparian area. The timber sale administrator also observes on-going harvest operations to see if the activity meets the objectives defined in the project plan.
3. **After Project** - Measure canopy stream shading to see if the amount specified in the BMP prescription was retained. Monitor a beneficial use of the water to determine a change or trend in use.

Enforcement is carried out primarily through informal project reviews and contractual enforcement e.g., timber sale contract, grazing or special use permit, etc.

Contract enforcement is a more formal method used to achieve desired results. Normally, each project is assigned a person as a contracting officer. For timber sales, that person is called a timber sale administrator. The project is routinely monitored to ensure that practices are being carried out in the manner and method prescribed in the contract, permit, etc. When a contractor or permittee is not in compliance, they can be held in breach with penalties (e.g., bond forfeiture) until remedies are implemented.

Often during the course of an activity, adjustments in project methods are made if unsatisfactory results are occurring or may occur. This can often result in a contract modification (as in the case of a timber sale).

BMP Monitoring - Step 4

Once BMPs have been implemented, further monitoring is done to evaluate their effectiveness. BMP "effectiveness monitoring" answers the question: Are BMPs effectively meeting management objectives for protection of water quality?

Water quality standards are the "yardstick" against which the effectiveness is tested. If, through objective monitoring, BMPs do not meet prescribed objectives, then information is available to modify either the BMPs for future management, or the objectives, or both.

The natural variability of water quality under unmanaged conditions is an important factor that will be considered during the monitoring and evaluation. Additionally, effectiveness monitoring will include measurement against land management objectives as well as water quality objectives.

Some examples of the types of BMP effectiveness monitoring to be conducted include:

1. Measurement of stream temperatures to see if the riparian prescriptions in a watershed are maintaining water temperature.
2. Storm period surveillance monitoring of a road system to see if road rocking is effectively preventing road surface erosion.

The monitoring and evaluation section of the Forest Plan (Chapter 5) describes how monitoring of BMPs will ensure an appropriate sample size. Once a specific project is designed, a site-specific monitoring plan may be developed. Results of monitoring should be shared with State and local agencies and be made available to the public. Monitoring design, sampling, and laboratory analyses will be coordinated to ensure they are compatible.

BMP Evaluation and Adjustment - Steps 5 and 6

The technical evaluation/monitoring described above will determine how effectively BMPs protect water quality. If the evaluation indicates that water quality objectives are not being met and/or beneficial uses do not appear to be receiving adequate protection, corrective action will consider the following three components:

1. **The BMP** - Is it technically sound? Is it really best, or is there a better practice which is technically sound and feasible to implement?
2. **The Implementation Program or Processes** - Was the BMP applied entirely as designed? Was it only partially implemented? Were personnel, equipment, funds, or training lacking which resulted in inadequate or incomplete implementation?
3. **The Water Quality Standards** - Are the water quality standards realistic? They include numeric and narrative criteria that, when exceeded, are assumed to indicate detrimental impacts on beneficial uses. They are intended to provide a benchmark for evaluating harm to beneficial uses.

Assessing the applicability of the standards is a responsibility of the State. The Forest Service will provide information to the State to address the following types of questions.

- Do the standards describe the conditions necessary for protecting beneficial uses?
- Are standards higher or lower than that necessary for protecting beneficial uses?
- Do the standards reflect the natural variability occurring within the natural and human-affected ecosystem?
- Do the parameters and criteria that constitute water quality standards adequately reflect (are they sensitive enough) human-induced changes to water quality and beneficial uses?

"Validation" monitoring may be needed to make this assessment. The purpose of validation monitoring is to answer the question whether standards, coefficients, requirements, and guidelines are appropriate to meet objectives, e.g., protect beneficial uses.

GENERAL BEST MANAGEMENT PRACTICES

Examples

1. Did the change in sedimentation impact the fish population?
2. Did the soil compaction effect tree growth?

Validation Monitoring will need to be closely coordinated with or, in some cases, conducted by research. It may require the establishment of permanent research plots or administrative studies. This kind of monitoring will be very limited and will require coordination to select projects with broad application and to prevent duplication. Only those coefficients and standards that are not reasonably validated by existing research or documentation should be candidates for this monitoring.

Corrective action may be initiated once the reason for failing to achieve the management objectives is determined. The management practice may have to be changed, the water quality objectives modified, or both.

Training

National Forest personnel involved with project location, design, layout, administration, and maintenance activities will receive BMP training. The training will consist of BMP definition and intent, as well as on the more technical aspects of planning, implementation, monitoring, and evaluation.

GENERAL BEST MANAGEMENT PRACTICES

Individual, general Best Management Practices are described in *General Water Quality Best Management Practices*, Pacific Northwest Region, 11/88. This provides guidance, but is not a direction document. Also included in this document is a description of the process, and limitations and use of these BMPs. Each BMP listed includes the Title, Objectives, Explanation, Implementation and Responsibility, and Monitoring. Evaluations of ability to implement and estimated effectiveness are made at the project level.

Example:

General BMP T-5.

Title - Limiting the Operating Period of Timber Sale Activities.

Objective - To ensure that the Purchaser conducts operations in a timely manner, within the time period specified in the Timber Sale Contract (TSC).

Explanation - The TSC specifies a Normal Operating Season, during which, operations may generally proceed without resource damage. Operations are permitted outside the Normal Operating Season only when they can be conducted without damage to soil, water, and other resources. Where determined to be necessary through the environmental analysis, the TSC will limit operations to specific periods or weather conditions. Operations are not permitted to continue if damage will occur.

Implementation & Responsibility - Limited operating periods are identified and recommended during the Timber Sale Planning Process by the interdisciplinary team and followed through the life of the timber sale primarily by the Sale Administrator.

Ability to implement - Add at project level.

Effectiveness - Add at project level.

Monitoring - During implementation of timber sale activities by the Sale Administrator, Forest Service Representative (FSR), engineers, and watershed specialists. Also see Forest Plan monitoring plan, Chapter 5, monitoring plan item: Water Resource Monitoring.

SPECIFIC BEST MANAGEMENT PRACTICES

Not all of the general BMPs listed will normally apply to a given project, and there may be specific BMPs which are not represented by a general BMP in this document. These specific BMPs are the Standards and Guidelines listed in Chapter IV of the Forest Plan and Appendix D of the FEIS.

The sensitivity of the project determines the need for the specific BMP prescriptions in the EA/EIS or in the sale/project plan, or in the analysis files.