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Forest Service

Pacific
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Region

Roaring River Watershed Analysis

1996

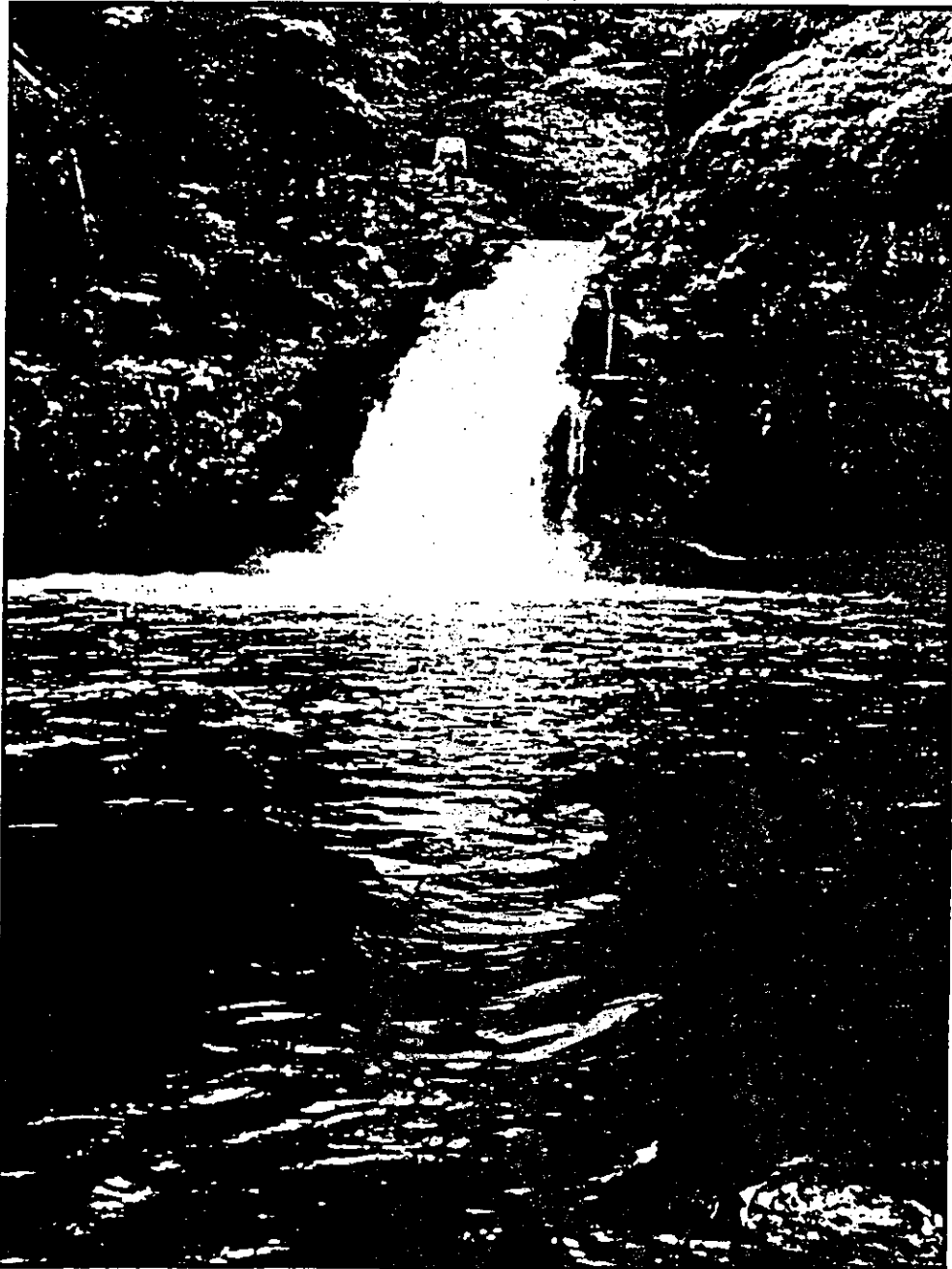


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Chapter 1 - Introduction and Setting

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Purpose For Watershed Analysis

The purpose of watershed analysis is to develop and document a scientifically-based understanding of the ecological structures, functions, processes and interactions occurring within a watershed, and to identify desired trends, conditions, and restoration opportunities. The understanding gained through watershed analysis is critical to sustaining the health and productivity of natural resources and in understanding the consequences of management actions before implementation.

Watershed analysis is essentially *ecosystem analysis at the watershed scale*. Federal agencies are conducting watershed analyses to shift their focus from species and site to the ecosystems that support them. As one of the principal analyses for implementing the Aquatic Conservation Strategy (ACS) set forth in the Northwest Forest Plan (Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (ROD) (USDA, USDI 1994) it provides the watershed context for fishery protection, restoration, and enhancement efforts.

Watershed analysis is not a decision making process. Rather it is a stage-setting process. The results of watershed analyses establish the context for subsequent decision making processes, including planning, project development, and regulatory compliance. Watershed analysis is an ongoing, iterative process. This report is a dynamic document, and is intended to be revised and updated as new information becomes available.

The Process Used

The six core topics were reviewed and analyzed by an interdisciplinary team. It was determined at that time the topics that were the most applicable to the Roaring River sub-basin were Vegetation, Species and Habitat, and Human Issues. The other three areas (Erosion Processes, Hydrology and Stream Channel) seem to be secondary in nature due to the undeveloped and unimpacted nature of the watershed. As a result, they were not directly addressed.

Approximately 200 letters were sent out to the general public, the Confederated Warm Springs Tribes and interested State and Federal Agencies. A public meeting was held on January 26, 1996 which about forty interested individuals attended. Additional input was received from the public in the form of letters and phone calls. The recurring themes of input received center around the following topics:

Recreation

Camping, hiking, fishing, hunting, off-highway vehicles and equestrian uses.

Resources Values

Late successional vegetation, wild and scenic river status, fisheries, wildlife habitat, vistas, huckleberry gathering, just knowing that an area like this is just "there".

Special Interest Areas

Squaw Meadows, Frazier Turnaround, Serene Lake, Rock Lakes Basin, other high mountain lakes.

Based upon the input from the public and team discussions, three Key Questions were identified:

- How do conditions of the watershed contribute to habitat needs for species associated with riparian, aquatic, terrestrial and special habitats?
- How do habitat conditions of the watershed influence species associated with late seral forests?
- Which critical components are key to the balance of recreational opportunities while protecting resources specifically: fish, wildlife, water quality, special habitat and heritage resources?

Other Questions

- In what ways does the watershed serve the local community?
- What role have natural disturbances played in the present watershed conditions?
- How do the conditions of the watershed affect the availability of natural resources for American Indian traditional uses?

Watershed Setting

The Roaring River watershed is located on the Estacada Ranger District in Clackamas County, Oregon. It is 30 miles southeast of Portland and 15 miles southeast of Estacada (Fig 1). The watershed is approximately 27,250 acres or 43 square miles. The mainstem Roaring River is 14.4 miles. The Salmon-Huckleberry Wilderness borders the drainage to the north. Steep, rugged terrain and the few roads and trails limits access to this drainage. It is accessible to the north and east by the historic Abbott Road (Forest Service road 4610), to the south by Road 4635 and Highway 224 and to the west by Road 4611 (Fig 2).

The Roaring River drainage is a steep river drainage flowing in a southwesterly direction to the Clackamas River. Smaller side drainages dissect the area and include Cougar Creek, Splintercat Creek, Squaw Creek, and the South Fork of the Roaring River. The lower section of the Roaring River is a spectacular narrow gorge, lined with basalt cliffs and talus slopes. Further upstream the canyon widens to steep, heavily-timbered slopes. Elevations in the drainage range from 996 feet at the confluence with the Clackamas River to 5,195 feet along the upper ridges and basins which form the headwaters. Prominent peaks and ridges around the drainage include Squaw Mountain (4,711 ft), Signal Buttes (5,159 and 5,195 ft), Indian Ridge (4,308 ft. at its high point), and Grouse Point (4,554 ft).

Glaciation has modified the upper portion of Roaring River and its tributary drainages into broad "U" shaped valleys. Extensive erosion during interglacial periods has been primarily responsible for development of the large earth-flows in the lower portion of the drainage. Outwash from the glaciers oversteepened the Columbia River Basalt deposits causing the overlying, weaker Rhododendron Formation to fail, creating mud flows and exposing basalt cliffs. The upper drainage topography is dominated by a relatively broad glacial valley with forested slopes and talus sweeping up to sharp ridges interspersed with small basins, many of which contain lakes. Upper ridgelines are composed primarily of igneous rock outcrops. Large blocks of basalt and andesite rock are exposed. A mosaic of talus and forested slopes fall steeply from these ridgelines.

VICINITY MAP

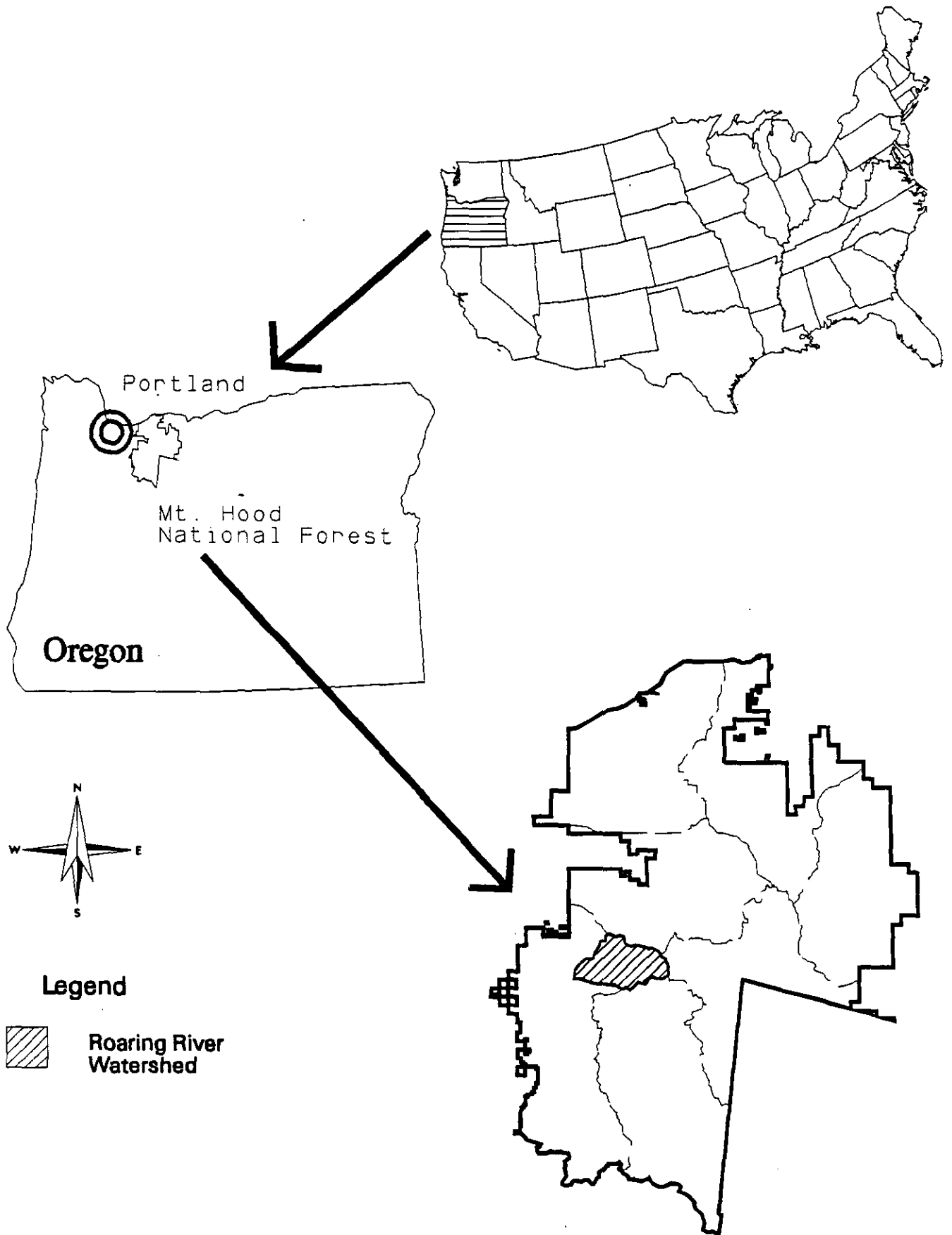


FIG. 1

ROARING RIVER WATERSHED

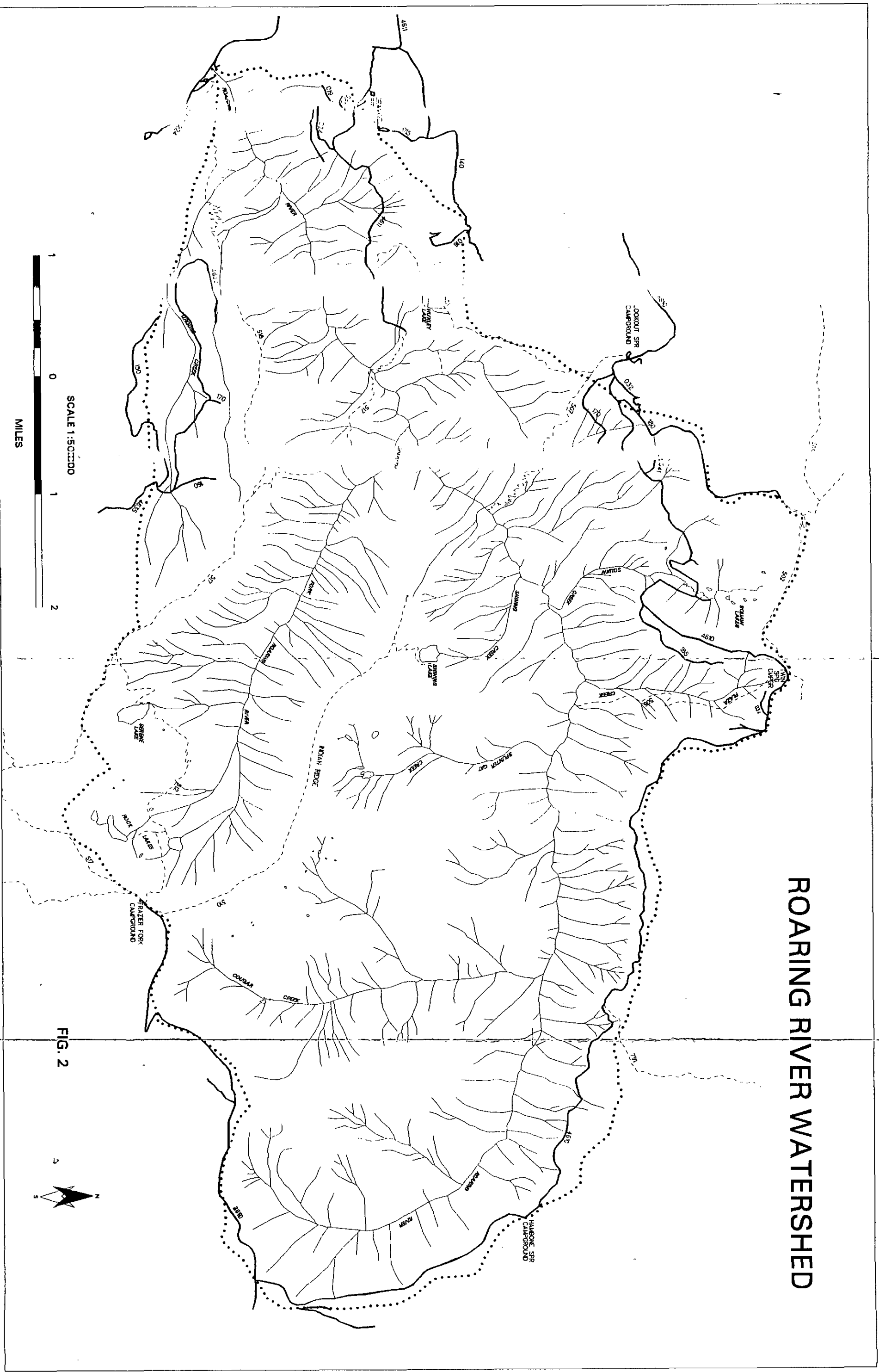


FIG. 2



SCALE 1:50,000
MILES

Aquatic

The lower four miles of the river corridor is a narrow gorge with steep basalt cliffs and talus. Some of the drainages which are tributary to the lower Roaring River are extremely steep with unstable soils. Active landslides and debris flows are not uncommon in these steep drainages. Along the upper part of the river, valley bottoms are nearly flat or gently sloping and are mantled by soils derived from deep glacial tills.

Lakes dot the drainage, forming the headwaters for many of the Roaring River's tributary streams. Large, named lakes within the drainage include Huxley Lake, Rock Lakes, Squaw Lakes, Shining Lake and Serene Lake. They range in size from 1/2 acre to 25 acres. There are also numerous small, unnamed lakes in the drainage. Some of these small lakes are strung along wet meadow areas. Squaw Meadows in the northern portion of the drainage is the most important example of such a lake/meadow complex. This is an unusually extensive and high quality wetland for this intermediate elevation. Squaw Meadows is identified as a special interest area in the Mt. Hood National Forest Land Management and Resource Plan (1990).

Most of the drainage is covered with snowpack for five to seven months of the year. At the high elevations, the snowpacks melt off in late June and July, and the area generally remains snow-free until early November.

The drainage is characterized by a variety of stream complexes including large log jams present in the upper river, large and small landslides, and small waterfalls alternating with large pools. Daily streamflow (discharge) records are available for the period from January 1966 to September 1968 as measured by the U.S. Geological Survey approximately 400 feet upstream from the mouth. The lowest streamflow on record during this time was 39 cubic feet per second (cfs), while the largest streamflow was 1,240 cfs.

Relatively stable, cool temperatures are noted for the river compared to other watersheds, including wilderness drainages. There are very low fluctuations in daily temperatures.

The Roaring River supports populations of coho, steelhead, spring chinook, cutthroat trout and rainbow trout. The late run coho salmon, late run winter steelhead and cutthroat trout are considered native to the river. It is these three fish populations for which the fisheries resources was found to be outstandingly remarkable in the Roaring National Wild and Scenic River Management Plan and Resource Assessment (USDA, 1993c). Region-wide, populations of these species have declined over the last few decades (Nehlsen et al. 1991). The late run coho is listed as "sensitive" on both the State and Region 6 Sensitive Species Lists. In August of 1996 the National Marine Fisheries Service proposed listing the lower Columbia River Steelhead as "threatened" under the Endangered Species Act. The native cutthroat trout population is present in the mainstem and its major tributaries above the first falls at river mile 3.3. Populations of the late-run coho salmon and late-run winter steelhead are present only within the lower 3.3 miles below the falls. This particular stock of late-run coho salmon, also common to other parts of the Clackamas River, is considered to be the last self-sustaining run of native coho salmon in the entire Columbia River Basin.

The native cutthroat trout population in the Roaring River is particularly important because this species is becoming increasingly scarce in Oregon. The remote and relatively pristine conditions of the Roaring River drainage are ideal for this population. About 11 river miles of excellent trout habitat exists along the mainstem of Roaring River.

Terrestrial

Roaring River watershed provides exceptionally high quality habitat for the spotted owl (*Strix occidentalis*), a threatened species. Spotted owl use of the old growth habitat contained within the Roaring River drainage has been confirmed. Three spotted owl pairs have been located within the river corridor and one resident single is located immediately adjacent to the corridor. Spotted owls have successfully reproduced in this area.

This area supports an unusually diverse array of habitats. The diversity of plant communities in the drainage, forms a mosaic of riparian and upland species from the headwaters to the confluence. In the Roaring National Wild and Scenic River Management Plan (1993), botanical and ecological values along the river met the criteria for outstandingly remarkable values. This was attributed to the unique combination of plant communities found in association with the rock outcrops and talus habitat along the more xerophytic ridgetops above the river and in association with numerous braided streams and side channels in the river's headwaters. Individual old growth trees and old growth stands can be found along the mainstem and South Fork Roaring River. The side slopes and ridges are comprised of a mosaic of different successional stages of coniferous forest, hardwood and shrub communities, rock outcrops and talus habitats, and meadow communities. Clackamas iris (*Iris tenuis*) was located within the drainage during the Roaring River study and documented in the Oregon Museum of Science and Industry report (Miller 1971). This iris has a very limited range and is of particular interest.

VEGETATION - CURRENT SERAL STAGES

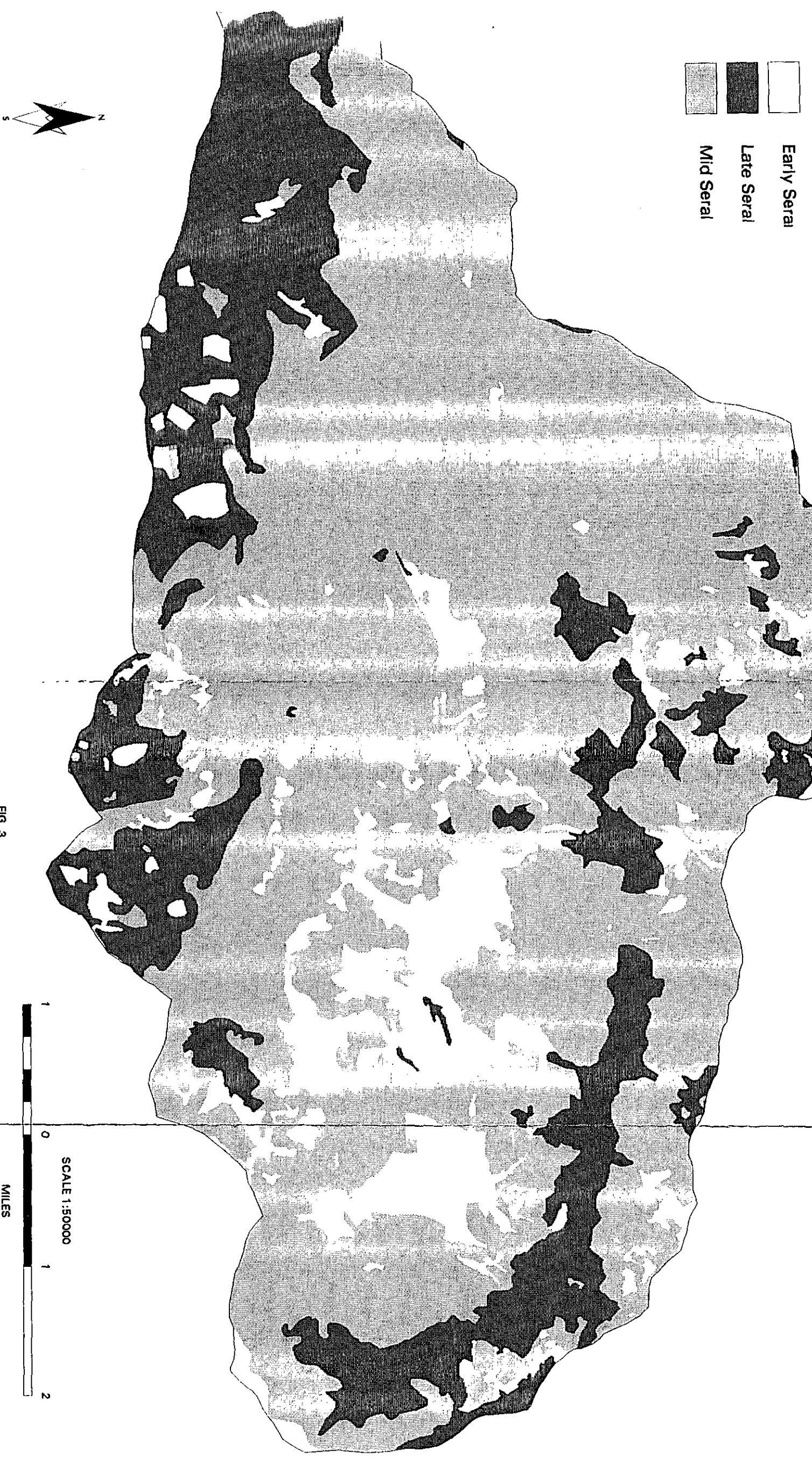


FIG. 3

The lower Roaring River valley is important deer and elk winter range. In general, as with other resources, the Roaring River watershed has outstanding potential for comparing big game habitat and populations in an unroaded area with habitat and populations in roaded drainages.

Vegetation, Landscape pattern and Disturbance History

The landscape of the Roaring River drainage is comprised of a mosaic of stands and plant communities including a variety of successional stages and stand structures. Its diversity reflects the physical character of the drainage (topography, soils, geology, climate) and its past fire history. Successive fires during the late 1800s and early 1900s removed many of the mature trees leaving residual stands or trees along Roaring River and its tributaries.

There are three forest series found within the Roaring River drainage: western hemlock (*Tsuga heterophylla*), Pacific silver fir (*Abies amabilis*), and mountain hemlock (*Tsuga mertensiana*) (Halverson et al., 1986, Hemstrom et al., 1982). The western hemlock zone occurs at the lower elevations where western hemlock and Douglas-fir (*Pseudotsuga menziesii*) tree species dominate. Pacific silver fir and mountain hemlock zones occupy the higher elevational tributaries and headwaters of the Roaring River where Pacific silver fir, noble fir (*Abies procera*) and some Douglas-fir and mountain hemlock (*Tsuga mertensiana*) are more dominant. The area surrounding the Roaring River drainage is comprised of a mixture of Douglas-fir, western hemlock and true fir second-growth.

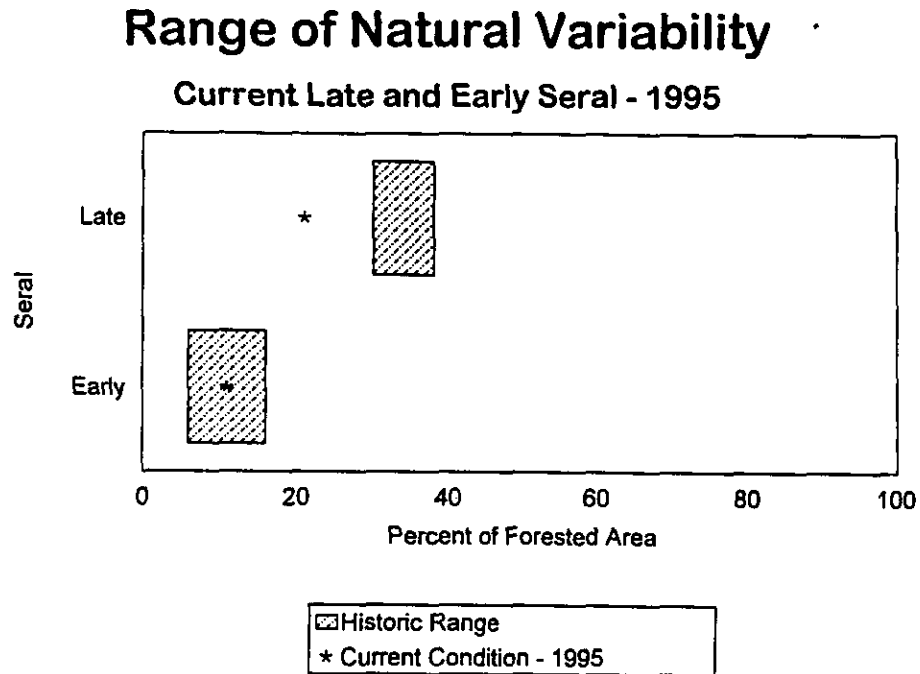
Twenty-one percent of the drainage is in late seral forest (mature forest generally greater than 120 years old and expected to have some structural features indicative of old growth, such as tree diameters >24", snags and/or down logs) (Fig. 3 & Fig. 3a)¹. Eleven percent is in early seral forest (young stands or openings which include grass, forbs, shrubs and rock/talus plant communities with open canopies and/or small diameter trees)², sixty-eight percent is in mid seral forest (young stocked stands, generally 20 to 120 years old and expected to have low structural diversity indicative of second-growth stands: closed canopied, even-aged, single layer stands with tree diameters generally less than 20 inches, and few large trees, snags, and down logs)³. The current distribution of seral stages within the drainage reflects its physical character and past fire history. Most of the late seral forest is found within the river corridor, the mouth of Roaring River, South Fork Roaring River, and along Grouse Flats. Most of the early seral forest is found along the high elevation ridges, where it is thought that in the past, local people used fire to maintain huckleberry fields, and in clearcuts. Mid seral forests are found throughout the drainage. The Roaring River drainage is primarily unfragmented. The distribution of the seral stages and mosaic of plant communities provide for diverse array of habitats.

¹ The late seral category is somewhat below the range of natural conditions as defined by the Regional Ecosystem Assessment Process (REAP, USDA 1993 b).

² Within the range of natural conditions.

³ This figure is above the range of natural conditions.

Figure 3a. Range of Natural Variability



Fire was the dominant landscape pattern-forming disturbance in Roaring River until fire suppression began in the early 1900s. Past fire history indicates large stand replacement fires occurred every 250-350 years with smaller, low intensity fires occurring at about 75-125 year intervals. Successive fires during the late 1800s and early 1900s removed a large proportion of the mature and old growth trees. The most recent fires took place during the 1929 and 1939 in the Ladee Flats area on the western edge of the drainage. Historical records indicate that approximately 1,000-1,500 acres in the Cougar Creek drainage may have been seeded with coastal Douglas-fir after the 1911 fires.

The effects of other disturbance agents have become apparent in the recent past, although of minor influence compared to fire. The most prevalent of these disturbances have been from insect, timber harvest, and road building. The stands in the upper Roaring River drainage have been experiencing an infestation of western spruce budworm (*Choristoneura occidentalis*) from 1985 to 1993. Today, these stands have numerous snags over a few thousand acres. To date there has been little timber management within the Roaring River drainage compared to neighboring areas. Approximately 155 acres of timber has been removed using regeneration and intermediate harvest methods starting in the 1980s. Approximately 29 miles of roads exist within the drainage.

Social

This area has had human influences since prehistoric times. The early users of the land, the American Indians, were hunters, gatherers and fishermen. They also used the area for ceremonial purposes. Then came the explorers looking for routes between the eastern and western sides of the Cascades. Forest Service administrative use began shortly after the turn of the century with the building of guard stations and fire lookouts connected by trails and phone lines. Road building took place later along these trails and phone routes.

The unmodified scenery of the drainage is unique in the region (outside designated wilderness areas), and would become increasingly valuable as surrounding lands are more intensely managed and the Portland metro area population increases. Views into and across the Roaring River valley are provided along Forest Road 4610, and the trails along Grouse Point and Indian Ridge. Under the Mt. Hood Land and Resource Management Plan, this area was assigned as A4-Special Interest to manage for scenic values.

Unique Values

Several distinct characteristics of Roaring River watershed stood out from neighboring watersheds or in the river basin:

- Roaring River is largely an unimpacted watershed which allows it to be used as a comparison watershed for various resources (i.e., roaded versus unroaded, long term water quality, and other resource monitoring)
- Roaring River is one of the only areas outside of wilderness areas that has been inventoried as providing a primitive recreational experience of which the Forest Plan (Mt. Hood National Forest Plan) identifies a shortage in this type of recreation
- Roaring River supports populations of native cutthroat trout (important due to increasing scarcity in Oregon), late-run coho salmon (considered to be the last self-sustaining run of native coho salmon in the entire Columbia River Basin), and late-run winter steelhead (Roaring River is an important spawning ground, Oregon stock of concern). It is these three populations for which the fisheries resource was found to be outstandingly remarkable in the Roaring National Wild and Scenic River Environmental Assessment and Management Plan (1993).
- Roaring River is the only watershed within the Clackamas River basin that falls almost totally within a late successional reserve (LSR).
- Ethnohistorically, the Roaring River/Salmon-Huckleberry Wilderness constitutes about 40% of traditional use or visits on the Forest by Native Americans.

Management Direction

The Mt. Hood National Forest Land and Resource Management Plan (1990), as amended by the Northwest Forest Plan (1994), provides management direction for National Forest System lands within Roaring River watershed. Roaring River is 100% under federal (Forest Service) ownership. Both plans provide management direction in the form of goals, desired future conditions, land allocation and standards and guidelines. The following excerpt from the Northwest Forest Plan ROD, page 12, provides clarity for meshing management direction from the two plans:

“The existing land management plans contain many standards and guidelines that are not amended by this decision. Only those existing plan standards and guideline in conflict with this decision are replaced. Where existing plans are more restrictive or provide greater benefits to late-successional forest related species than Attachment A (ROD Standards and Guidelines), the existing plans standards and guidelines will continue.”

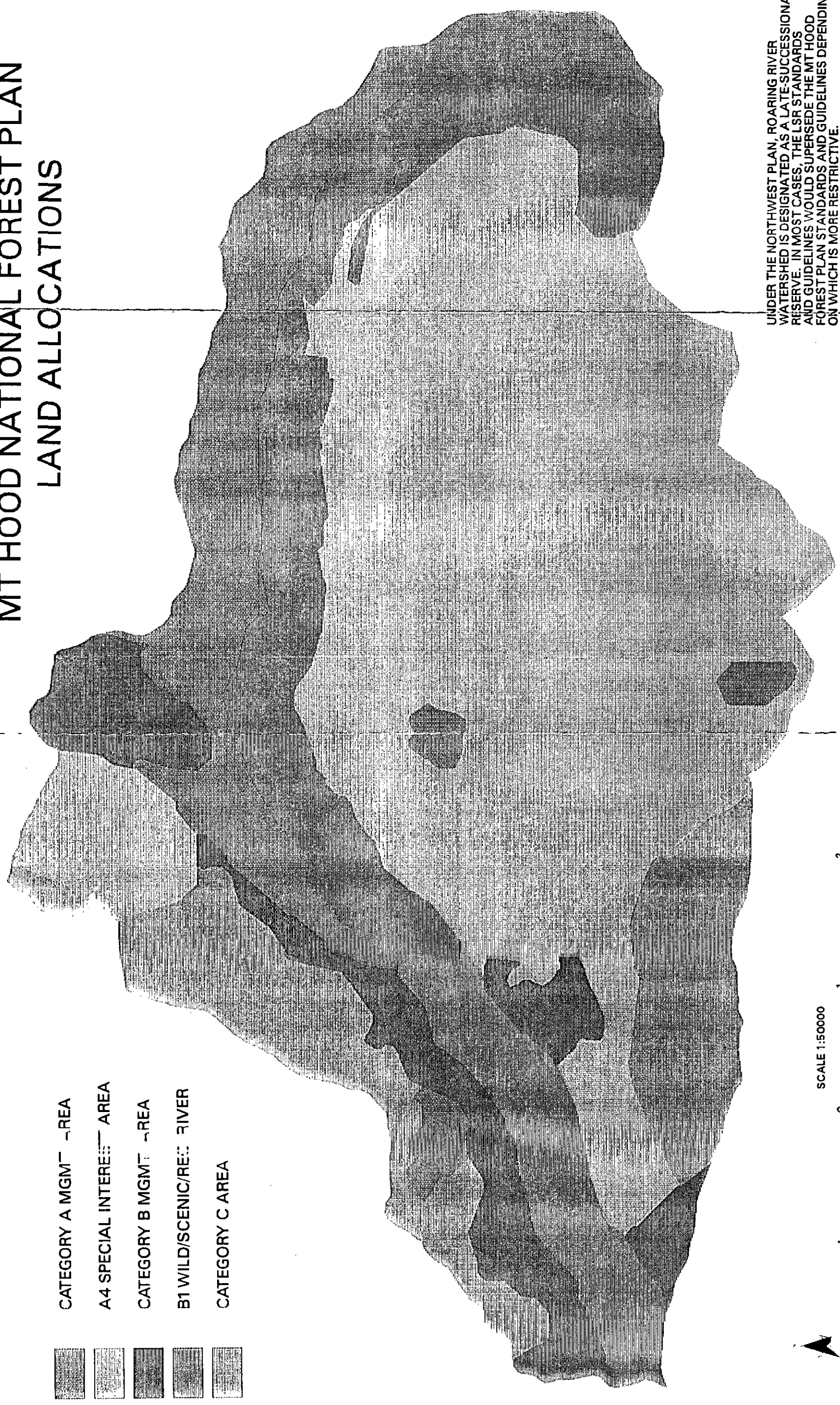
Four major land allocations influence management objectives in the Roaring River:

- Late Successional Reserve under the Northwest Plan has the most and overriding influence in the Roaring River drainage providing for management for species dependent on late successional forests.
- B1 - National Wild & Scenic River designation on the Roaring River influences activities within the river corridor. The River Management Plan recommends amendment of specific standards and guidelines for the river corridor.
- A4 - Special Interest Area under the Mt. Hood Plan provides standards and guidelines to manage most of the area south of Roaring River for scenic values and Squaw Lakes for botanic values.

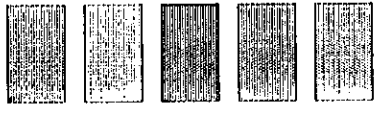
Detailed management direction for each land allocation is available in the respective plans (Fig. 4).

During the 1970s, areas on the Mt. Hood National Forest that were in an unroaded and essentially undeveloped condition were examined in a process called Roadless Area Review and Evaluation (RARE I). This led to a further refined process named RARE II. The Roaring River roadless area was not included in RARE II and was eliminated from further consideration as a formal wilderness area. Preferred Alternative Q of the Mt. Hood National Forest Land Management and Resource Plan calls for maintaining 79% to 89% of the unroaded character of the area through a combination of Special Interest Areas, Unroaded Recreation and Wild, Scenic and Recreational River allocations.

MT HOOD NATIONAL FOREST PLAN LAND ALLOCATIONS



- CATEGORY A MGMT AREA
- A4 SPECIAL INTEREST AREA
- CATEGORY B MGMT AREA
- B1 WILD/SCENIC/RECREATION RIVER
- CATEGORY C AREA



UNDER THE NORTHWEST PLAN, ROARING RIVER WATERSHED IS DESIGNATED AS A LATE-SUCCESSIONAL RESERVE. IN MOST CASES, THE LSR STANDARDS AND GUIDELINES WOULD SUPERSEDE THE MT HOOD FOREST PLAN STANDARDS AND GUIDELINES DEPENDING ON WHICH IS MORE RESTRICTIVE.

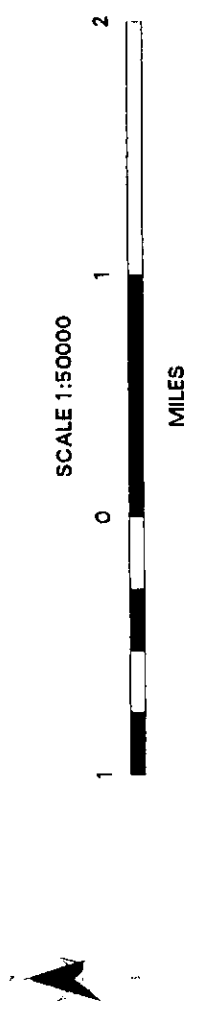


FIG. 4

Reference Conditions

The idea of the range of natural variability (RNV) is based upon the concept that ecosystems are not static and that they vary over time and space. The dynamic nature of ecosystems exemplifies the need for us to consider ranges of conditions under natural disturbance regimes rather than points in time. A key assumption of this concept is that when systems are "pushed" outside the range of natural variability, maintenance of biological diversity and ecological function are at a substantial risk.

In 1993, the Pacific Northwest Region undertook an assessment of the range of natural variability for a number key ecosystem elements believed to be key to ecosystem health and sustainability. The Regional Ecosystem Assessment Process (REAP, USDA 1993b) analysis was done at a sub-basin scale and addressed only Forest Service lands.

Previous Planning Documents

Roaring National Wild and Scenic River, Environmental Assessment and Management Plan, Mt. Hood National Forest, Estacada Ranger District, 1993.

Roaring River Final Environmental Statement, 1974.

Roaring River Planning Unit, Management Alternative, Mt. Hood National Forest, 1972.

Roaring River/Roaring Flat Development Plan, Mt. Hood National Forest, Estacada Ranger District, 1967.

Chapter 2 - Key Question A

Chapter 2 - Key Question A

How do present conditions of the watershed contribute to habitat needs for species associated with riparian, aquatic, terrestrial and special habitats?

Aquatic System

Streamflow

Streamflow information for Roaring River is very limited. Daily streamflow records from January 1966 to September 1968 were taken from a gauging station approximately 400 feet upstream from the mouth. The lowest streamflow on record during this period was 39 cubic feet per second (cfs), while the largest streamflow was 1,240 cfs.

The best documented flood event in the recent past was occurred in 1964. This flood approached the estimated 100 year frequency in the Clackamas drainage. Damage to Roaring River was documented in a survey done by the Fish Commission in 1965; however, more extensive damage was seen in nearby watersheds such as Fish Creek.

Since 1964 the most recent major flood was in February 1996. Flood frequency numbers were not finalized at the time of this publication, but initial estimates were of a 50-100 year frequency on the Clackamas drainage. Instantaneous peak flows at the gauging station on the Clackamas near Estacada were 86,900 cfs in 1964 and 80,000 cfs in February 1996. This recent event has likely triggered many channel changes and sediment input in the Clackamas drainage. Damages and changes have not yet been documented. An update of stream surveys and other baseline monitoring will be critical in determining changes in the Roaring River stream system following this large flood event.

Peakflow events occur during the rainy season, following a rapid and substantial depletion of the snowpack during a prolonged rain-on-snow period in the "transient snow zone". The Roaring River transient snow zone is estimated to occur between 1500 feet and 4000 feet elevation (Christner and Harr, 1982). These elevations may vary locally, however local verification of the transient snow zone for Roaring River was not available. Approximately 76 % of Roaring River lies within this zone.

Created openings from clearcuts, roads, fires and windthrow areas are areas typically accumulate more snow. During rain-on-snow events runoff from these created openings is more rapid. The rapid runoff from these areas increases the magnitude of peakflows and may scour, downcut or widen the stream channel.

In Roaring River approximately 1.5% of the area has been harvested. The Mt. Hood Forest Plan employed an analysis tool to assess hydrologic recovery, referred to as the aggregate recovery percentage (ARP) methodology (USDA, 1990). ARP values for the Roaring River were calculated at about 98%, which indicates a high likelihood that hydrologic processes are not adversely affected by timber cutting or road building. Threshold values of concern for ARP have not been validated; however, values below 75% are used as cause for further investigation of stream characteristics and sensitivities. Due to minimal management activities, further analysis of peakflow and baseflow changes was not warranted.

Lakes, Wetlands, Ponds

Roaring River watershed contains 39 ponds and lakes which accounts for approximately 87 acres. Some of the small ponds are probably temporary ponds. The larger lakes include Serene (22 acres), Shining (13 acres), and Middle Rock (11 Acres). They were all formed from glacial activity with the exception of Squaw Lakes which were manmade by dam installation along Squaw Creek.

Recent lake surveys were done in 1991 and 1994 by the Forest Service. Table 1 displays some characteristics of the larger lakes. Trophic state is an indicator of productivity. Oligotrophic indicates very low productivity and low nutrient levels. Mesotrophic is more productive with higher nutrients. The lake surveys indicate there appears to be a reduction of diversity in zoo plankton in Serene, Shining and Middle Rock lakes where single species of rotifers dominate. A reduction in diversity may effect fish population in the long term.

Riparian areas for the larger lakes are generally intact with the exception of Squaw Lakes A. A road encroaches on the marsh habitat along the south shore.

Table 1. Lakes in Roaring River Watershed

Lakes	Types	Acres	Trophic State	Max. Depth Ft.
Serene	glacial	22	Oligo/Meso	46
Shining	glacial	13	Mesotrophic	26
Middle Rock	glacial	11	Oligotrophic	35
Upper Rock	glacial	3	unknown	22
Lower Rock	glacial	8	unknown	13
Squaw A	artificial	.5	Mesotrophic	5
Squaw B	artificial	.5	Oligotrophic	5
Huxley		6	unknown	2 - 5

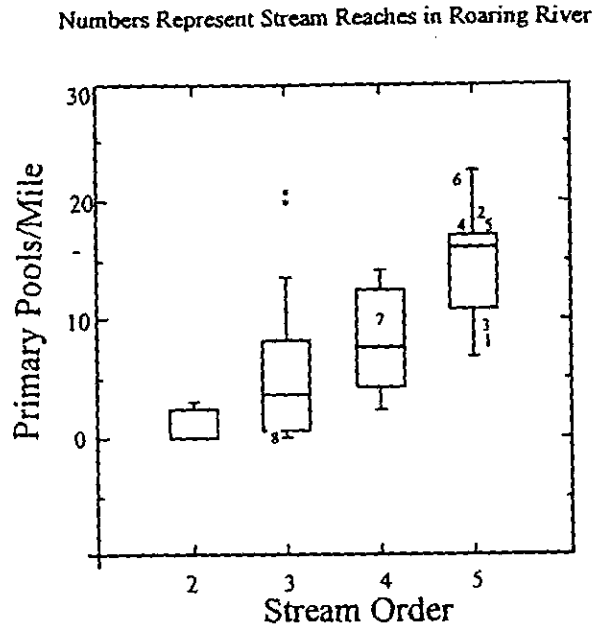
Streams

A survey by the Fish Commission of Oregon in 1965 indicated that damage to Roaring River from the 1964-1965 floods caused the greatest reduction in rearing area habitat for fish. The loss of rearing area was characterized by loss of deeper water, overhanging cut banks or cover vegetation to provide feeding, resting and protection for juvenile fish. Reduction of this type of habitat went from an estimated 29 percent in 1959 to 7 percent in 1965. There was little effect to the spawning area habitat which was characterized by minimal changes in water depth, velocity and bottom gravel composition.

Current habitat conditions are measured by primary pools (pools \geq to 3 feet deep) per mile, large woody debris per mile and small woody debris (SWD) per mile. Estimated range of natural variability (RNVs) for these features were derived from streams within the Willamette basin that have no history of management activities. Roaring River makes up part of this wilderness stream data set. Effects of fire suppression or fire history were not evaluated for these wilderness streams.

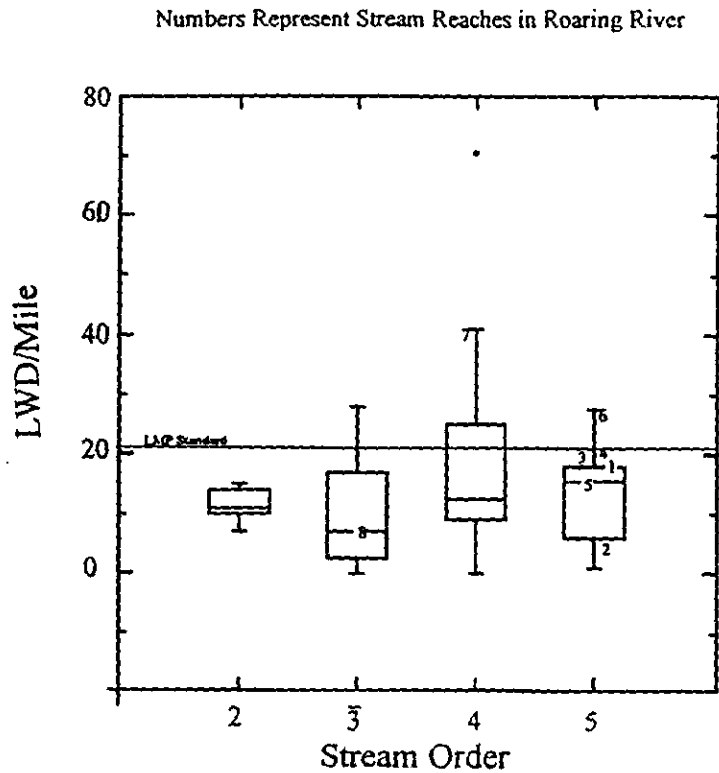
Figures 5, 6, and 7 display the range of natural variability by stream order. The box and whisker plots provide information about the center, spread, skewness of data and outlying values. The box is drawn with a horizontal line inside the box representing the median of the data set or 50% of the data points. The upper and lower lines of the box correlates with 75% and 25% of the data points respectively. The whiskers represent extreme data values within the range of natural variability. Roaring River stream reaches are numbered on the graphs. Pools provide resting habitat for adult salmonids on their spawning migrations, baseflow thermal refugia, protective cover and slow water rearing and overwintering habitat for juvenile steelhead and salmon, resident fishes and amphibians.

Figure 5. Range of Natural Variability for Primary Pools/Mile in Roaring River



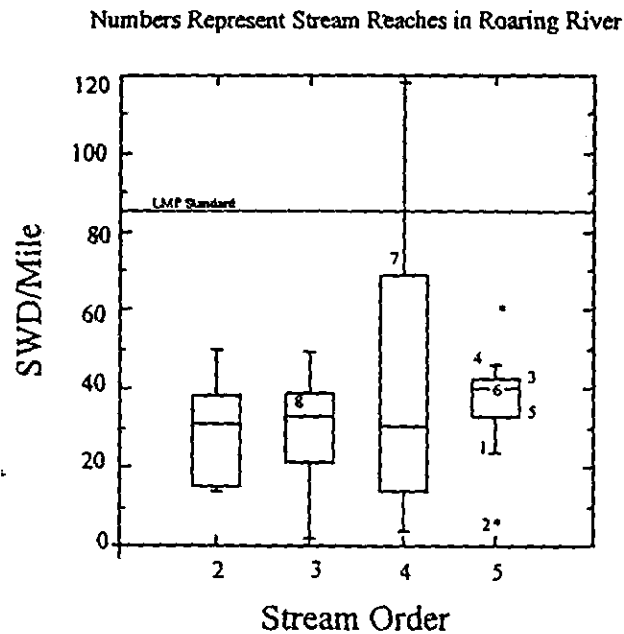
note: * represent outlier

Figure 6. Range of Natural Variability for LWD/Mile in Roaring River



note: * represent outlier

Figure 7. Range of Natural Variability for SWD/Mile in Roaring River



The range of natural variability of pools per mile is highly variable and dependent on gradient, confinement and stream width. Figure 5 displays the reaches for Roaring River within the natural variability for primary pools. The primary pools frequency for Roaring River appears to be what is expected in a natural system. The Forest Plan standard and Columbia River Policy Implementation Guide (PIG) standard are displayed in Table 2. Roaring River falls short of these standards for primary pools. These standards may be unrealistic when applied to a variety of natural systems because they exceed the range of natural variability for streams within the Willamette basin that have no history of management (Figure 5 and Table 2).

Table 2. Primary Pool Frequencies

Roaring River	River Mile	Primary Pools/Mile	LMP DFC*	PIG
Reach 1	0 - 3.3	7	20 -28	26
Reach 2	3.3 - 3.7	19	25 -35	26
Reach 3	3.7 - 5.0	9	25 -31	26
Reach 4	5.0 - 5.9	17	25 -31	26
Reach 5	5.9 - 8.6	17	27 -38	26
Reach 6	8.6 - 9.4	23	32 -45	47
Reach 7	9.4 - 12.3	9	46 -64	56
Reach 8	12.3 - 12.9	0	76 -107	96

*Desired Future Conditions - Standards are dependent on average stream widths..

Large woody debris provides nutrient storage, low velocity areas, microhabitat, cover and structure to scour pools. Large and small woody debris are displayed in Figures 6 and 7. The amount of large and small wood appears to be what is expected in a natural system. The Forest Plan and PIG standards are also noted on the Figures. Reaches 6 and 7 are at or above the Forest Plan standards, however all reaches are well below the PIG standards for large woody debris. None of the reaches meet the Forest Plan standards for small woody debris. It appears PIG and some Forest Plan standards may not be achievable even in historically unmanaged streams.

Stream surveys were conducted in 1982 and 1991, in addition to the ones described earlier by the Oregon Fish Commission. Two major tributaries enter from the south, South Fork and Cougar Creek (Fig. 8), each contributing approximately 40% flow at their confluences. The average gradient for the river is approximately four percent and remains relatively constant throughout the river with the exception of reach 8 which averages two percent.

Reach 1 (River mile 0 - 3.3) begins at the Clackamas River confluence and is a moderately entrenched U shaped canyon (Fig. 8). It ends at a 25 foot falls which acts as a fish barrier to anadromous fish. Reach 2 (River mile 3.3 - 3.7) is a deeply entrenched bedrock gorge. Reach 4 and 5 have had historic fires through the riparian area. Reach 5 (River mile 5.9 - 8.6) broadens into a wide alluvial plain. There is limited potential for large woody debris recruitment because of the absence of large, mature timber. Reach 8 is the most dissimilar of all the reaches in the survey. It has a low gradient and high sinuosity, with a valley floor over 900 feet wide with frequent marshes, bogs and wetlands. Oxbows and channel migrations are frequent in this reach. It also exhibits an open canopy.

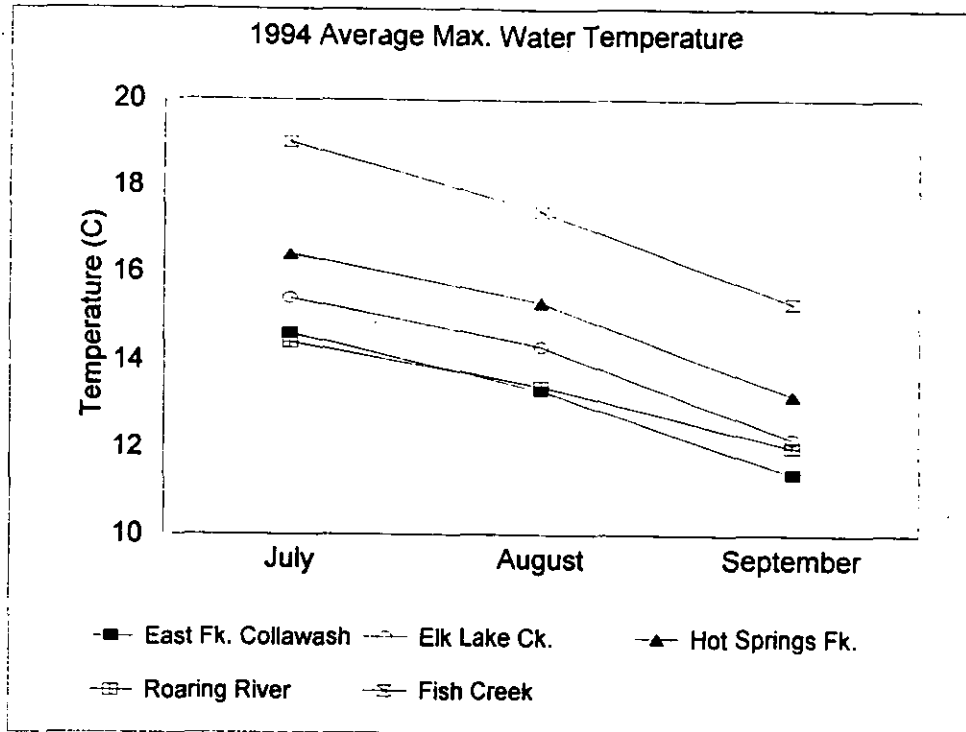
The system on the whole appears capable of transporting large wood and substrates and exhibits a potential for scouring and channel migration.

Channel Type

Rosgen stream types were delineated for Roaring River based on stream survey information on bankful width, bankful depth, dominant substrate and channel gradient. Based on this information the mainstem of the Roaring River is channel type B with the exception of Reach 2 (River mile 3.3 - 3.7) which is channel type A.

General characteristics of channel type A are steep, entrenched, cascading, step/pool streams. They are high energy and debris transport systems. Type B channels are characterized as moderately entrenched, moderate gradient and riffle dominated channels with frequently spaced pools. There does not appear to be any type C channels which are characterized as low gradient, meandering, point-bar riffle dominated channels with broad well defined floodplains. These usually represent the major depositional reaches in a stream.

Figure 10. Average Maximum Water Temperature

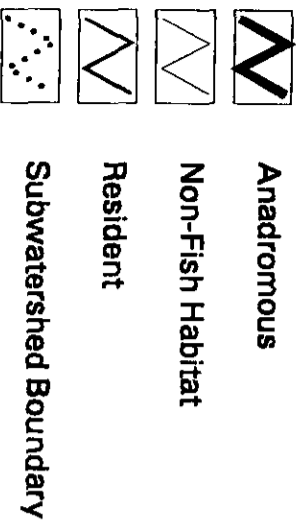


Riparian Condition and Large Woody Debris

Natural disturbances such as fire, windthrow and landslides can indirectly affect stream temperatures by changing the quantity and quality of riparian vegetation and stream shading. Human caused activities such as timber harvest, road building and recreational use also influences the riparian vegetation and channel form. In order to assess the effect management activities or natural disturbances have had on riparian condition, the riparian seral stage was determined. Figure 11 displays seral stage distribution in Riparian Reserves. Riparian Reserves are one of the components of the Aquatic Conservation Strategy in the Northwest Forest Plan (USDA, USDI 1994). They are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply.

The majority of the riparian reserves is in mid seral stage (67%), with very little in early (7%) and the remainder in late (26%) (Fig. 12). The Range of Natural Variability (RNV) was determined during REAP analysis (USDA, 1993a) for Riparian Reserves. The RNV for early seral is 5 to 15 % and late is 35 to 80 %. The current seral stage is out of the RNV for late seral due to a history of fire disturbance. The large amount of current mid seral stage is likely due to a combination of fire history and poor growing conditions in forested talus slopes. The amount of early seral stage in Riparian Reserves is also due to the above factors, as well as, riparian meadows and a small portion of timber harvesting in the Grouse Creek subwatershed.

FISH DISTRIBUTION BY SUBWATERSHED AND STREAM REACH



Reach number indicates where approximate reach begins.

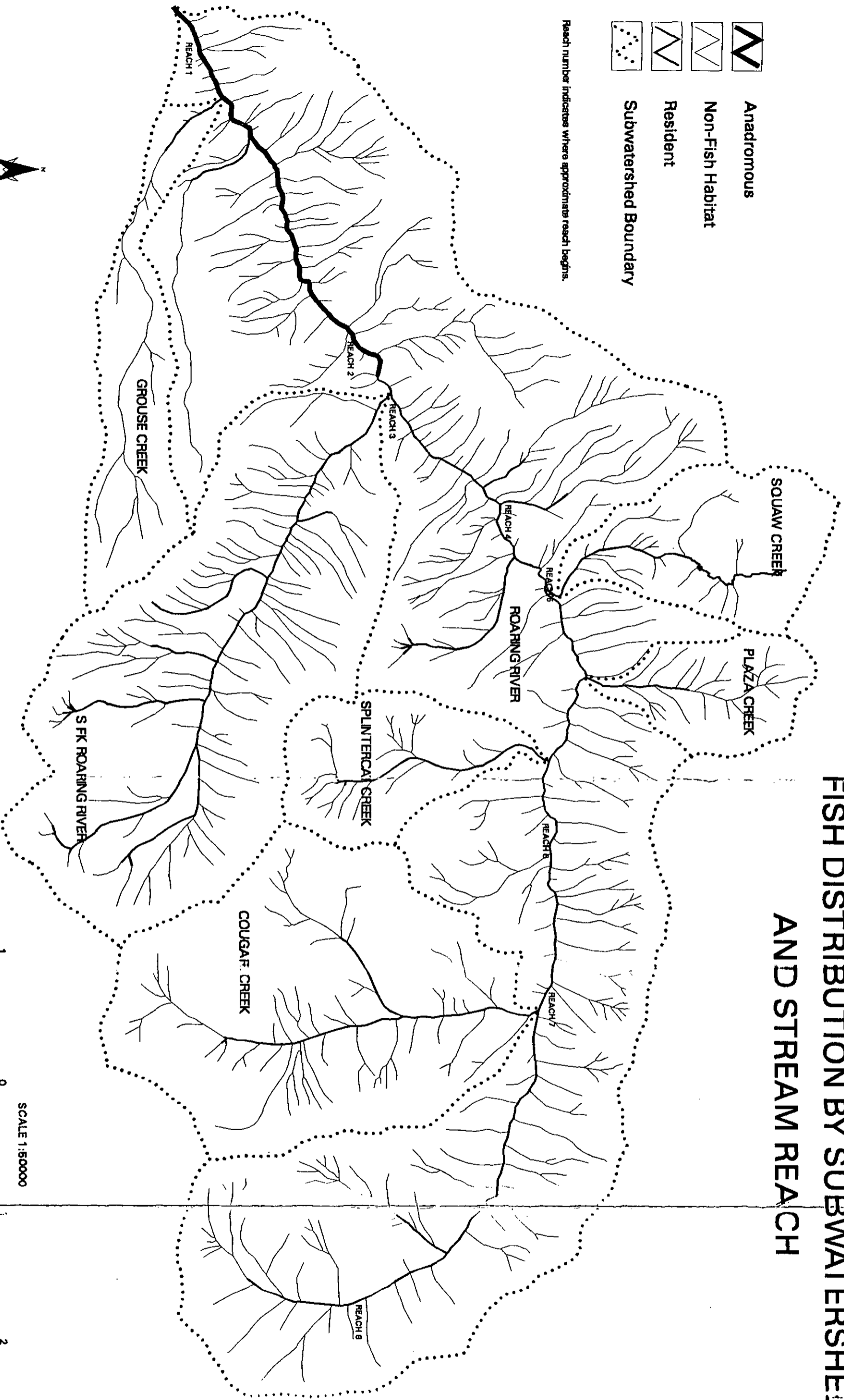
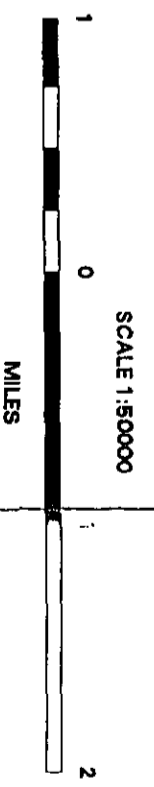


FIG. 8

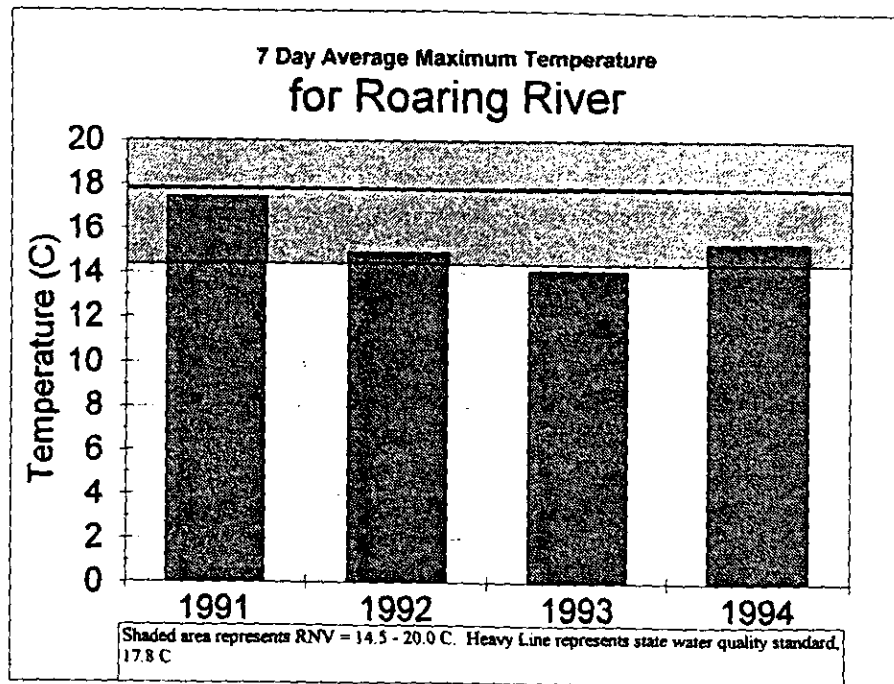


Stream Temperature

Stream temperatures are affected by direct solar radiation which depends on the quality and quantity of shade, vegetative and/or topography. Natural disturbances and human activities have the potential to influence stream temperature by altering vegetation and channel form. Stream temperatures are directly related to the health and productivity of fish and other aquatic organisms. Water temperatures in salmonid streams vary daily, seasonally, and spatially.

The Roaring River watershed because of its relatively undisturbed condition is an important control drainage for long term water quality and other resource monitoring. Low flow, summer stream temperatures were measured from 1991-1994 during the months of June through September near the mouth of Roaring River (data on file Estacada Ranger District). The seven day maximum stream temperatures were within the range of natural variability for the Clackamas River 14.5 - 20.0 C (USDA, 1993a) for all years with the exception of 1993 (Fig. 9). These stream temperatures were also below the state water quality standard of 17.8 C (Fig. 9). The upper lethal limits for salmonids range from cutthroat trout at 22.8 C to rainbow trout at 29.4 C. The other anadromous salmonids that occupy Roaring River fall between this range (Bjorn and Reiser, 1991). Roaring River is well below lethal limits for salmonids. Roaring River has relatively cool temperatures as compared with other Clackamas River tributaries (Fig. 10).

Figure 9. Seven Day Maximum Stream Temperature



RIPARIAN RESERVE BY SERAL STAGE

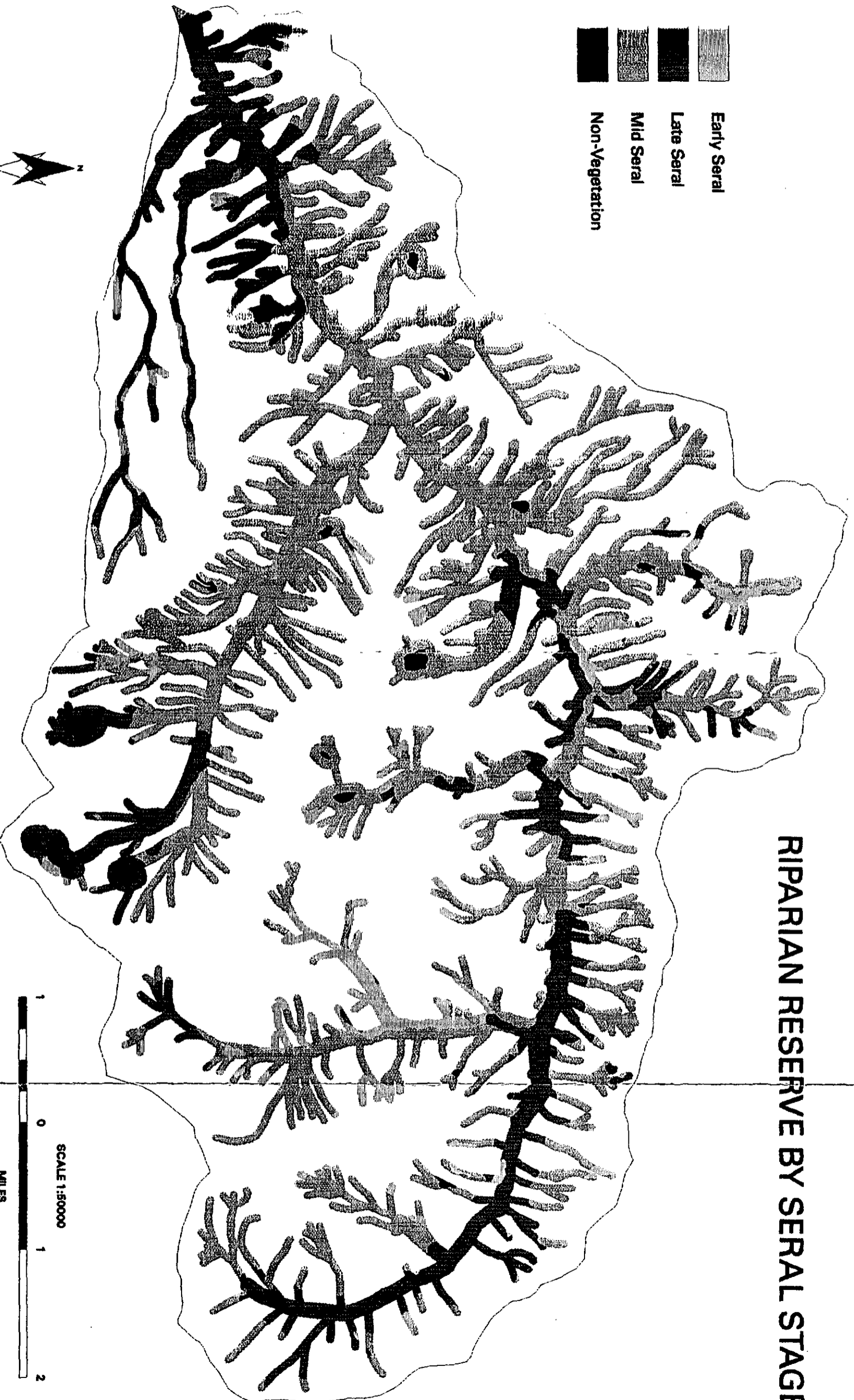
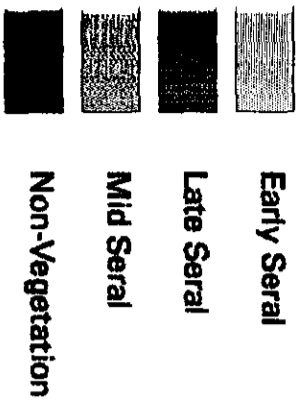
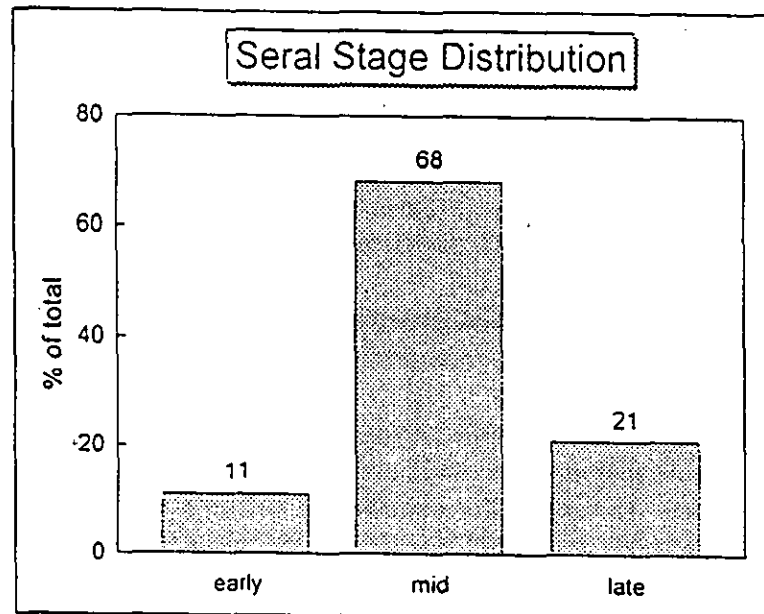


FIG. 11

SCALE 1:50000



Figure 12. Seral Stage Distribution Percentages



The low amount of late seral stage riparian reserve may suggest the reason for the lower amounts of LWD than the Forest Plan standards. However, other factors include:

- stream characteristics which do not allow accumulation of debris, and
- PIG and LMP standards not reflecting range of natural variability for natural disturbances.

Evidence of slope failures and debris torrent tracks are common throughout the stream survey and up the smaller tributaries. Debris flows have been an important contributor to the large woody debris that exists in channel. This is especially true for the upper watershed and in the smaller tributaries. The basins large size and potential for large winter flows suggest that the channel may never retain large quantities of wood and may be the reason for low quantities in this unmanaged watershed.

Aquatic Organisms

Fish Distribution

Fish present in Roaring River are late winter and summer steelhead, late-run winter coho, spring chinook salmon, resident cutthroat trout, resident rainbow trout and brook trout. Other fish occupying the watershed are mountain whitefish, dace, large scale suckers and sculpin (USFS, 1993c).

A 25 foot falls at river mile 3.3 serves as a migration barrier for anadromous fish, and whitefish (Bio Surveys, 1991). Native populations of cutthroat and rainbow trout occupy the mainstem and its major tributaries of South Fork and Cougar Creek above the falls (Fig. 8). Total miles of resident fish bearing streams is 33 miles and non-fish bearing streams is 182 miles.

Little historical information exists on the distribution and population of fish which occupy the Roaring River drainage. However estimates of historic numbers of anadromous fish have been made for the entire Clackamas River Subbasin (ODFW, 1992). Table 3 displays status of fish species and stocks above North Fork Dam. The status of the native late run coho and winter steelhead are declining. Possible reasons for these declines are a combination of fish harvest, impacts of hatchery stocks, reduced habitat quality and effects of hydroelectric facilities.

Table 3. Fish Species and Stock Status

Common Name	Scientific Name	Stock Origin*	Status
coho salmon	<i>Oncorhynchus kisutch</i>	early run -H late run - W	increasing declining
spring chinook salmon	<i>Oncorhynchus tshawytscha</i>	W/H	increasing
winter steelhead	<i>Oncorhynchus mykiss</i>	H W	declining declining
summer steelhead	<i>Oncorhynchus mykiss</i>	H	stable
cutthroat trout	<i>Oncorhynchus clarki</i>	W	unknown
rainbow trout	<i>Oncorhynchus mykiss</i>	W	unknown
brook trout	<i>Salvelinus confluentus</i>	H	unknown
mountain whitefish	<i>Prosopium williamsoni</i>	W	unknown
sculpin	<i>Cottus sp.</i>	W	unknown

*Stock Origin (H = hatchery origin, W = wild).

Anadromous Fish

Steelhead

In 1991 Nehlsen et al. identified the Clackamas River native late-run winter steelhead as “moderate” risk of extinction. The Oregon Dept. of Fish and Wildlife recognizes the late run winter steelhead as a “stock of concern”. In 1994 all native stocks of steelhead from Alaska to southern California were petitioned for listing under the Endangered Species Act (ESA). In August of 1996 the National Marine Fisheries Service proposed listing the Lower Columbia River steelhead which includes the Clackamas River as “threatened” under the ESA.

Roaring River is a primary spawning and rearing area for winter steelhead. The rivers high gradient, high stream velocity and pocket pools are ideal steelhead habitat. Steelhead juveniles, adults and redds are present below the barrier falls at river mile 3.3 (Uebel and Godbout, 1982); (Bio Surveys, 1991); (Beyer, 1992).

Coho

The Clackamas subbasin has a native run of late-winter coho. Genetic testing is underway to determine the ecological significance of the run. It is believed to be the last self-sustaining wild run of coho salmon in the lower Columbia River (Cramer and Cramer 1994).

In 1991 Nehlsen et al. designated the Clackamas River native late run coho as “moderate” risk for extinction. This stock is also listed as “sensitive” on both the state Sensitive Species List (ODFW, 1992) and the Region 6 Sensitive Species List. The early run coho derived from hatchery stock also occupies the Clackamas River.

Coho prefer streams that have low water velocities, low gradient and side channels (Reeves et al., 1989). Roaring River is typically not a preferred coho stream because of high gradient and fast water. Adult coho have been seen occupying the lower .75 miles of Roaring River. A small number of coho juveniles were found near the mouth during a 1991 snorkeling survey (Shively, personal communication).

Spring Chinook

Historically the Clackamas River was considered one of the largest producers of spring chinook salmon (ODFW 1992). In the mid 1800’s commercial harvest in the Columbia River for chinook drastically reduced the indigenous stocks from the Clackamas River. Today the spring chinook run in the Clackamas and Roaring Rivers consists of both native and hatchery fish. It is believed by local fisheries biologists that historic native spring chinook are nonexistent. It is thought that spring chinook in the wild have interbred with hatchery strays and that little, if any, wild genes are left in the gene pool (Shively, personal communication). Chinook juveniles, adults and redds were present below river mile 3.3 (Bio Surveys, 1991); (Beyer, 1992).

Resident Fish

Resident Trout

Native cutthroat and rainbow trout populations are present in the mainstem Roaring River and its major tributaries above river mile 3.3. The remote and relatively pristine conditions of this drainage are ideal for these resident fish. These fish are isolated and have maintained their genetic integrity. The upper Roaring River is not stocked with hatchery trout which might compete with native fish. Other potentially competing native or hatchery fish are blocked from entering much of the river by the barrier falls at river mile 3.3.

Brook Trout

Brook trout are exotic fish that have been introduced to the Roaring River drainage through stocking that has taken place in some of the high lakes such as: Serene, Upper and Lower Rock lakes and Squaw Lakes (Wall, 1995).

Other Fish

Mountain whitefish, dace, large scale suckers and sculpin are known to occupy the lower Roaring River below the barrier falls at river mile 3.3.

Smolt Production

The Smolt Capability Model was used to estimate the smolt production in mainstem Roaring River below the barrier falls at river mile 3.3. This model incorporates stream survey data such as stream width, LWD/mile, SWD/mile and total pools/mile to determine a habitat category of poor, fair or good (USDA, 1992). The habitat for spring chinook and steelhead was categorized as fair and good respectively. Coho was categorized as poor because Roaring River with its high gradient and high stream velocity is not a typical coho stream. Table 4 summarizes Roaring River's maximum potential smolt production at 100% seeding and current smolt production at 15% seeding due to low escapement levels. These smolt numbers can then be compared to other tributaries of the Clackamas Subbasin.

Table 4. Smolt Habitat Capability Estimates for Potential and Current Seeding Values

Stock	Potential (# of Smolts)	Current (# of Smolts)
Spring Chinook	28,304	4,246
Winter Steelhead	5,353	803
Summer Steelhead	5,353	803
Coho	1,049	157

Lakes

The Roaring River watershed has seven main lakes:

- Shining
- Serene
- Upper Rock Lake
- Middle Rock Lake
- Lower Rock Lake
- Huxley Lake
- Squaw Lakes.

All of these lakes except Huxley support recreational fishing and have been stocked by the state with brook trout and/or rainbow trout.

Brook trout are exotic fish that have been introduced to the high lakes. The habitat conditions in Serene and Squaw Lakes have allowed natural reproduction of brook trout to occur (Wall, 1995). It is possible that brook trout have escaped the lakes through tributary outlets that feed Roaring River. Because these fish are exotic to the region, they may pose a threat to the native populations of cutthroat and rainbow trout that occupy the mainstem and tributaries of Roaring River through competition for available food, and habitat if they expand their distribution.

Rainbow trout have been stocked in Shining and Middle Rock lakes. Shining lake is considered a trophy lake with rainbow reaching 12-18 inches long (Wall, 1995). Rainbow trout, like brook trout, may escape through tributary outlets that feed into Roaring River. Rainbow are not exotic to the region but they can interbreed and dilute the gene pool of the native trout.

Amphibians

With its unique wetland complex (Squaw meadows), several lakes, and variety of terrestrial habitats, Roaring River Watershed provides habitat for amphibians such as Rough-skinned newt (*Taricha granulosa*), Northwestern salamander (*Ambystoma gracile*), Long-toed salamander (*Ambystoma macrodactylum*), and Red-legged frog (*Rana aurora*). Water quality and temperatures throughout the drainage are thought to be favorable for aquatic amphibians and scattered rocky areas may provide for terrestrial species as well. Accessibility into the drainage has limited surveys so little information is available.

Terrestrial

Vegetation

The present amount of early seral vegetation in the western hemlock, mountain hemlock and Pacific silver fir series falls within the Range of Natural Variability (Fig. 3a). Most of the early seral conditions are due to past fire disturbances. Some areas will remain in early seral conditions because they are rocky talus slopes. Approximately 155 acres was created by timber harvest. Fire suppression and reforestation practices has shortened the amount of time spent in the early seral stage. These management activities, although small for Roaring River, may influence how early seral stands function on the landscape in providing for habitat needs for species requiring early seral habitat. Creation of new openings are not expected to occur except through minor disturbance events that create canopy gaps.

The present level of late seral forests are below RNV. However, analysis done for this document indicate that the watershed may actually be within the natural range of variability based upon it's natural fire history and when this area last burned. It is estimated that the watershed should be well within the RNV in less that 50 years, barring a large natural catastrophic event.

The majority of the watershed is in mid seral forest (68%). Recent large-scale fire events (late 1800s & early 1900s) account for most of this condition. However, due to poor site conditions, some areas will remain in mid seral conditions, never achieving the structural criteria for late seral forests.

Big Game

The Roaring River watershed encompasses approximately 27,250 acres of land which provides a varied and important environment for Blacktail deer (*Odocoileus hemionus*) and/or Roosevelt elk (*cervus elaphus roosevelti*). The variety of vegetation, coupled with limited access, provides big game with the forage, cover, and security needed to survive. Reports from hunters, historic data, aerial photos, and district biologists, indicate that that the drainage is suitable and preferred habitat for big game; data reflect that the area contains important winter range. Winter range is separated into two categories, "normal" and "severe". Normal winter range generally falls below 2800 feet elevation, severe winter range lies below 2300 feet. In the Roaring River Watershed, there are 2,936 acres of normal winter range, no severe winter range exists. Overall, the most commonly used winter ranges are those in and along the lower Roaring River valley (Fig. 13).

DEER/ELK WINTER RANGE



Normal Winter Range

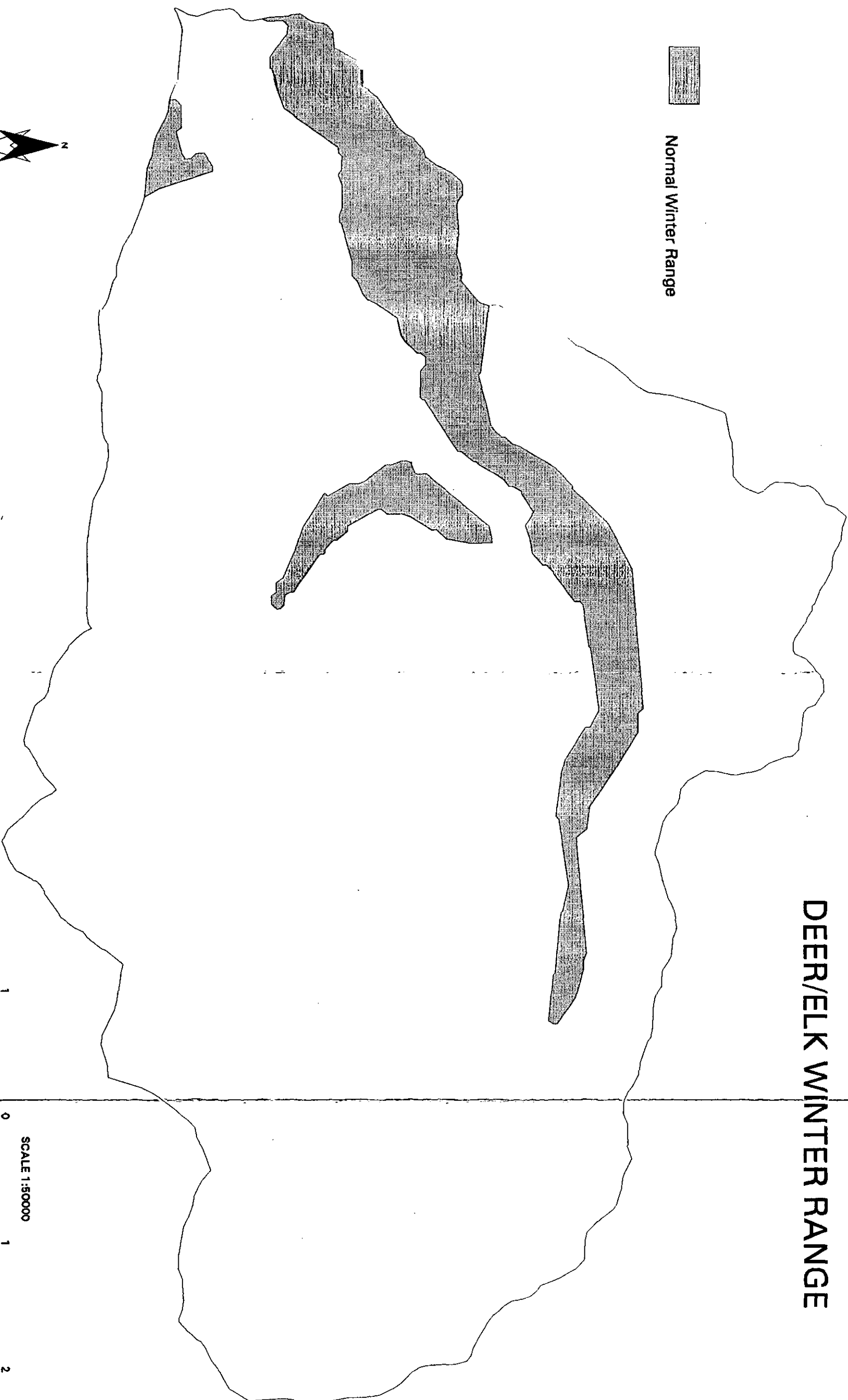


FIG. 13



In addition to normal and severe winter range designations, values of range have been placed on the habitat. These values, crucial, high, moderate, and low, are for determining type and duration of restrictions placed on harvest operations occurring in winter range. A description of these values can be found in the analysis file located at the Clackamas River Ranger District, Estacada Office. Within the Roaring River drainage, values of crucial and high exist, mainly along the Roaring River itself. Since the watershed is an LSR, harvest activities will most likely not occur so these restrictions are not of great significance.

Limited road access also plays a critical role in herd survival (Fiedler, 1992). Currently, only 29 miles of road exist within the drainage and of those miles, 4.65 miles may be found within winter range. The Mt. Hood Forest Plan states that road densities within winter range should not exceed 2.0 mi/sq. mi. The drainage currently falls well below that standard with 0.68 mi/sq. mi. The Roaring River drainage is unique in that it allows large herds (average size ~ 25 animals) to maintain themselves within fairly small home ranges; this may be attributed to low road densities (Fiedler, 1992).

With its limited road access and rugged terrain, Roaring River does not experience high hunting pressure. Hunting tends to be popular along the Cougar Creek area and along road 4610 (Appendix D). Migration patterns indicate that the watershed is an important one for big game travel. Six routes cross through the drainage and range in elevation from 1000 feet to 4000 feet (Fig. 18 - Ch. 5). All routes appear to be associated with some type of water and several meander throughout various habitat types. This may indicate that the animals prefer to utilize vegetation in all stages, especially those which contain a water source. Two possible calving areas exist NW of the watershed and one lies just south near Bedford Point; again these areas are associated with water.

Other Species

Many other species of animals potentially exist in the Roaring River Watershed; a complete list of these species can be found in the Analysis file. The diverse vegetation and habitat types within the watershed play a key role in the survival of species. Little historical information exists on a species by species basis for the drainage. However, vegetative data indicates there is little reason to doubt that species occurring in the drainage did so historically (i.e., they were not introduced).

Beaver (Castor canadensis) dams and beaver sign are present in several wetland locations throughout the drainage. The shrub and meadow habitats support a small mammal population that lends itself to the prey base as well. Small mammals such as Townsend chipmunk (Tamias townsendii), brush rabbit (Sylvilagus bachmani), golden mantled ground squirrel (Spermophilus lateralis), Douglas squirrel (Tamiasciurus douglasii), and porcupine (Erethizon dorsatum) all may be found in abundance within the watershed. Common predator species within Roaring River include: coyote (Canis latrans), and black bear (Ursus americanus) (Miller, 1971). Mink (Mustela vison), weasel (Mustela frenata), and mountain lion (Felis concolor) are also present, although there is no reliable assessment of how common they are in the area.

Bats

Some species of bats are associated with special habitats such as caves, mines, wooden buildings, and bridges but they also rely on snags and large trees for survival. The Watershed contains the vegetative habitat needed to support bats but structures of any kind are very limited. Although outside of the watershed boundary, it is important to mention that surveys conducted on the Roaring River bridge on Highway 224 resulted in observation of fringed bat (Myotis thysanodes), Townsend's Big-eared bat (Plecotus townsendii), and Little Brown Myotis (Myotis lucifugus). The Townsend's Big-eared bat is considered a sensitive species and is discussed in the Threatened, Endangered, and Sensitive species section of this document.

Threatened, Endangered and Sensitive Species (T, E & S)

A complete listing of the TE&S species potentially occurring within the Roaring River Watershed can be found in the Analysis file. Of those potential species, 4 are known to occur within the drainage and only the spotted owl has confirmed reproduction. Habitat exists for several other species, but confirmation of their presence is unknown at this time (Table 5). Known species include: Northern spotted owl (Strix occidentalis caurina), Northern bald eagle (Haliaeetus leucocephalus), Peregrine falcon (Falco peregrinus), Townsends big-eared bat (Plecotus townsendii), and Red-legged frog (Rana aurora).

Spotted Owl

Refer to Key Question B

Northern Bald Eagle

Documented sightings have occurred in the drainage. It is thought that habitat does exist within the drainage but no confirmation of nesting has been confirmed. It is possible that the eagle uses this area for foraging as the Roaring River would provide its primary prey species of fish.

Peregrine Falcon

Documented sightings have occurred in the drainage although little potential habitat has been identified. Approximately 6 acres of cliff/ledge (peregrine nesting habitat) exist within the watershed.

Townsend's Big-Eared Bat

Documented sightings have occurred in the drainage although "structural habitat" (i.e. nesting, roosting) such as bridges, mines, and caves are virtually absent in the watershed. However, "vegetative habitat" (i.e. foraging) does exist in the form of mid and late -seral stands with snags and down woody debris. Presence may be attributed to ample riparian and wet meadow areas.

Table 5. Threatened, Endangered and Sensitive Species

Species	Status By Agency			Habitat in Roaring River?	Known occurrence in Roaring River?
	USFWS*	State (Oregon)	USFS**		
Spotted owl	Threatened	Threatened	Threatened	Yes	Yes
Bald eagle	Threatened	Threatened	Threatened	Yes	Yes
Peregrine falcon	Endangered	Endangered	Sensitive	No	Yes
Harlequin duck	-----	Sensitive	Sensitive	Yes	No
Sandhill crane	-----	Sensitive	Sensitive	Yes	No
Townsend's big-eared bat	Former C-2	Sensitive	Sensitive	Yes	No
Wolverine	Former C-2	Sensitive	Sensitive	Yes	No
White-footed vole	Former C-2	Sensitive	Sensitive	No	No
Red-legged frog	Former C-2	Sensitive	Sensitive	Yes	No
Western pond turtle	-----	-----	Sensitive	Yes	No
Painted turtle	-----	-----	Sensitive	Yes	No
Cope's giant salamander	-----	Sensitive	Sensitive	Yes	No
Larch*** Mountain Salamander	-----	Sensitive	Sensitive	Yes	No

*United States Fish & Wildlife Service

**United States Forest Service

***C3 -Survey & Manage Species

Red-legged Frog

Documented sightings have occurred in the watershed and breeding habitat may occur in the many high quality lakes, meadows, and ponds throughout the drainage. Outside of the breeding season they may be found at considerable distances from water using down logs (Nussbaum et al. 1983).

Survey and Manage Animal Species

Survey and Manage species, also referred to as C-3 species, are species which require protection through survey and management standards and guidelines as outlined in the ROD. Two species, one mammal and one amphibian are of concern to the terrestrial portion of this analysis. Direction from the ROD requires that each of these species be managed under survey strategy #2, "survey prior to activities and manage sites."

Red Tree Vole

Currently, there are 1147 ac of primary habitat within the watershed. Primary habitat consists of stands classified as Large Conifer¹ greater than 300 acres, which occur at less than 3000 feet in elevation, and are in the western hemlock or Pacific silver fir vegetation zones (Mellen, 1995). Primary habitat within Roaring River basically runs along the north banks of Roaring River from Splintercat Creek to Cougar Creek. Secondary habitat, described as stands classified as Large Conifer¹ between 75 and 300 acres, which occur at less than 3000 feet elevation, and are in the western hemlock or Pacific silver fir vegetation zones, may be found mainly from Shining Creek to Squaw Creek as well as along a portion of the Roaring River. Marginal habitat, classified as Closed Small Conifer² greater than 75 acres, which occur at less than 3000 feet elevation, and are in the western hemlock or Pacific silver fir vegetation zones, is present near Huxley Lake, Squaw Creek, and in limited areas along the Roaring River.

¹ *Large Conifer* - stands with at least 30% canopy closure attributed to trees greater than 21 inches diameter breast height (DBH).

² *Closed Small Conifer* - stands with at least 60% canopy closure and trees between 8 and 21 inches DBH.

Larch Mountain Salamander

This species (*Plethodon larselli*), also listed as Sensitive by the Forest Service, is associated with steep, wooded talus slopes where the rock are of small size and there are relatively large amounts of decaying plant material and small quantities of soil. They have been found in various kinds of talus areas, including some with little or no moss or other vegetative cover on the rocks. They have also been observed in woody, over-grown areas where talus is not readily visible unless ground surface is disturbed (personal communication, A. Young). Habitat exists within Roaring River Drainage and it is possible that the species may exist here. However, surveys have not been conducted as of yet but are required prior to any management activities. Because of the drainages status as an LSR, disturbance, such as gravel removal, road building, and overstory tree removal, are not expected to pose a risk.

Special Habitats

Special habitats are those which provide a unique niche for species associated with them. These species may not be dependent on these habitats but they so use them as primary breeding and/or non-breeding habitat. Species using special habitats within Roaring River can be found in the Analysis file and Table 6 lists special habitats information. A map of known special habitats within Roaring River can be found in Fig. 14.

At present, approximately 3,861 acres of special habitats exist within the watershed. It appears that rock areas with scattered conifers is the dominant special habitat in the drainage (2,569 ac) with ledge/cliff habitat as the least dominant special habitat (5.69 ac). Although no bridges, caves, or mines are present in the watershed, they too serve as important special habitats. Buildings may also provide habitat and 3 (outhouses) are located in the drainage.

Squaw meadows, located at the northern edge of the drainage, provides a unique habitat that contains a complex of open water with surrounding shrubs, grasses, and rock. Compositions such as this are uncommon to the Clackamas Drainage and have the ability to support a diverse array of species. Examples of species known to occur in the area are beaver, northwestern salamander, red-winged blackbird, and pine marten.

Several species thought to occur within Roaring River's special habitats warrant additional consideration/protection through policies and regulations found within the ROD, Federal law, and/or the Mt Hood Forest Plan. Such species include, but are not limited to: bald eagle, red-legged frog, pine marten, and townsend's big-eared bat; additional information on these species may be found the Threatened, Endangered, and Sensitive Species portion of this document.



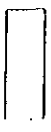
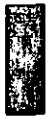




Table 6. Special Habitats Within Roaring River Watershed

Special Habitat	Eco Classes	Total Acres
Alder	HA, HACO, SW20	422.93
Moist Meadow	MM, MMCO	22.6
Wet Meadow	MW, MWCO	127.13
Rock Areas	NRCO, NRSO	2,569.68
Talus	NT, NTCO, NTS2	560.17
Ledge/Cliff	NRL2	5.69
Lake/Pond/Impoundment	WL, WL11, WL90, WX	85.63
Shrubland	SM, SW	67.93
Total		3,861.76

Eco Class Descriptions:

- HA - Red alder
- HACO - Alder with important associated conifers
- MM - Moist meadows
- MMCO - Moist meadows with scattered conifers
- MW - Wet meadow
- MWCO - Wet meadow with surface moisture, scattered conifers
- NRCO - Rock with scattered conifers
- NRL2 - Ledge/cliff smooth face, vertical distance more than 20 ft.
- NRSO - Rocky land with scattered shrubs/brush
- NT - Talus land with minimal vegetation potential
- NTCO - Talus land with scattered conifers
- NTS2 - Talus with Vine maple
- SM - Shrub meadows
- SW - Shrub wetlands, shrubs less than 16 feet tall
- SW20 - Alder wetlands
- WL - Lake, pond, impoundment, nonmoving water
- WL11 - Perennial, no ice cover, less than 5 acres
- WL90 - Intermittent lake, pond, impoundment
- WX - Water covered area, unspecified

Roaring River Watershed Special Habitats

- | | | | |
|---|--------------|---|---------------------|
|  | Ledge/Cliff |  | Shrubland |
|  | Wet Meadow |  | Sitka Alder |
|  | Rock |  | Sitka Alder/Conifer |
|  | Rock/Conifer |  | Lake/Pond |

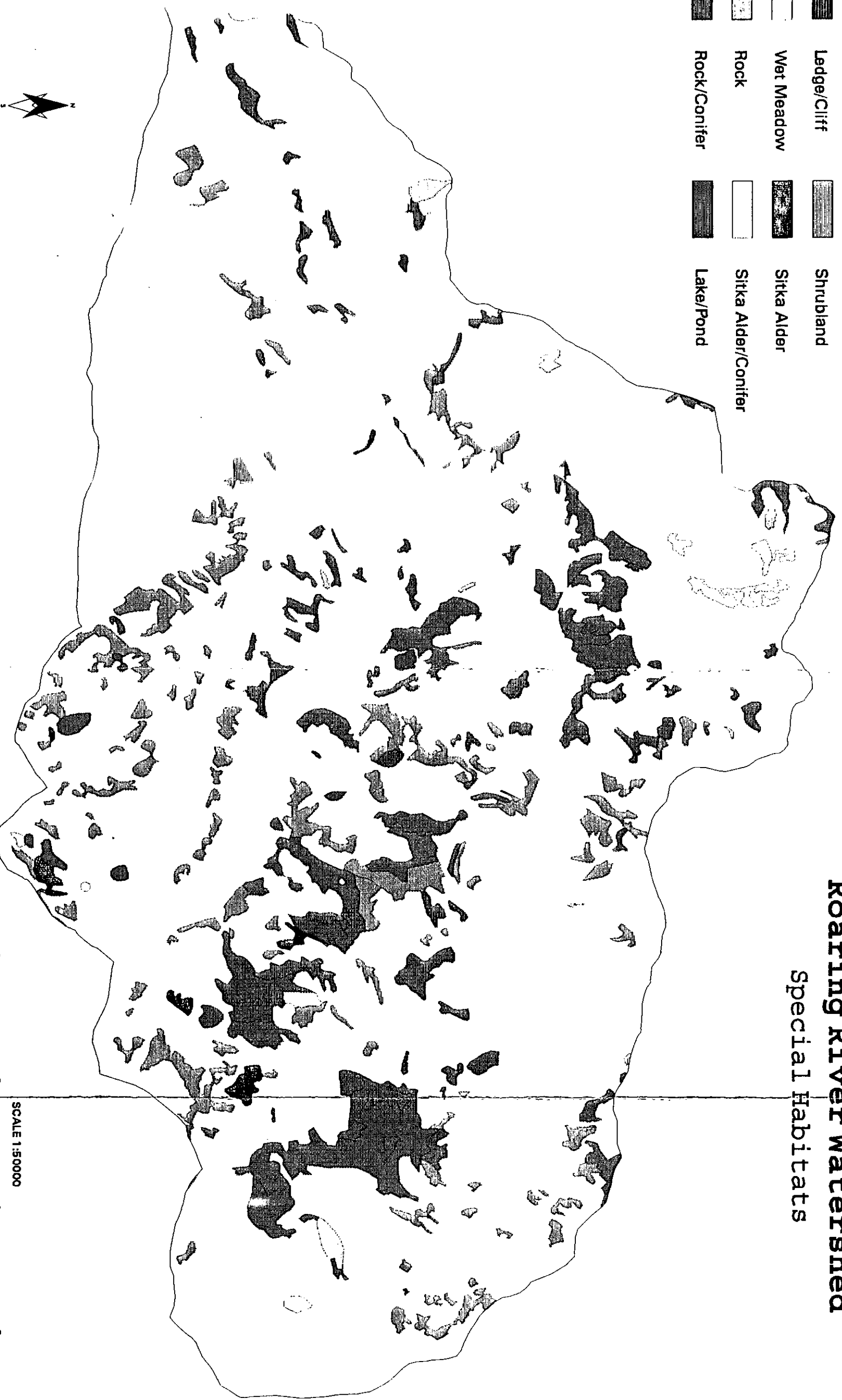


FIG. 14

SCALE 1:50000



Snags

The structural diversity that snags lend to the landscape provide places to nest, forage, den, and brood young. Pileated woodpecker, pine marten, and northern flicker are among the snag associated species found within the drainage.

The evolution of snags occurs through natural succession, windthrow, disease, and fire. Roaring River watershed has experienced outbreaks of insect infestations as recently as 1985-1993 and the last fire in the area occurred in 1911. These events, coupled with the lack of timber harvest activities (which generally decrease numbers of snags) should account for existing high levels of snags in the drainage.

Synthesis

The undeveloped character of the Roaring River watershed has produced outstandingly remarkable values pertaining to fisheries, water quality, wildlife, botanical, recreation, and scenic resources. Roaring River watershed has limited access by roads and trails. This access has resulted in minimal impacts to species associated with riparian, aquatic, terrestrial and special habitats.

The vegetation of the watershed is the result of the basin's fire history. The majority of the watershed is in mid seral stage and moving towards LSR conditions. In the next 50 years over half of the mid seral will become late seral. Existing early seral on the ridge tops may not be able to achieve late seral conditions because of repeated fires and poor growing conditions. At high elevations insect/disease and windthrow will continue to form small open patches or canopy gaps.

As the watershed begins to move toward LSR conditions, the vegetation will move away from a forage condition for deer and elk towards hiding and thermal cover. Future riparian conditions are expected to improve in channel habitat slightly due to increased large woody debris and pool frequency. This is due to changes in riparian vegetation from mid to late seral stages.

Roaring River and its tributaries will continue to offer excellent fish habitat for anadromous and resident native fish. The anadromous fish populations will continue to be influenced by factors outside the Roaring River drainage. Exotic brook trout introductions to the high lakes may pose a future threat to native populations of cutthroat and rainbow trout through competition for available food and habitat if they expand their distribution.

Water quality is not expected to change significantly. Any change in sediment, stream temperatures and stream channel conditions would result from natural disturbances such as landslides, debris flows and fire. These occurrences are the major causal factor for the existing conditions.

The altered natural processes in the watershed include the capability of the watershed to meet LSR conditions due to past fire history and the future loss of forage habitat for deer and elk due to succession and fire suppression. Restoration opportunities will help address these processes.

Chapter 3 - Key Question B

Chapter 3 - Key Question B

How do habitat conditions of the watershed influence species associated with late seral forests?

Terrestrial

Vegetation

Late-successional forests are those forest seral stages that include mature and old-growth age classes. The objective of Late-Successional Reserves is to maintain late-successional and old-growth forest ecosystems on federal lands and to maintain biological diversity associated with native species and ecosystems. Late-Successional Reserve guidelines are designed to maintain late-successional forest ecosystems and protect them from loss due to large-scale fire, insect and disease epidemics, and major human impacts. The intent is to maintain natural ecosystem processes such as gap dynamics, natural regeneration, pathogenic fungal activity, insect herbivory, and low-intensity fire. The guidelines also encourage the use of silvicultural practices to accelerate the development of overstocked young plantations into stands with late-successional and old-growth characteristics, and to reduce the risk to Late-Successional Reserves from severe impacts resulting from large-scale disturbances and unacceptable loss of habitat.

Four major structural attributes of old-growth Douglas-fir forests include:

- live old-growth trees,
- standing dead trees (snags),
- fallen trees or logs on the forest floor,
- logs in streams.

Additional important elements typically include multiple canopy layers, smaller understory trees, canopy gaps, and patchy understory. Ecological processes essential for the development and maintenance of the late-successional and old-growth attributes include:

- tree growth and maturation,
- death and decay of large trees,
- understory establishment,
- gap forming, low-to-moderate intensity disturbances.

Within the Roaring River Watershed, late seral forest comprise 21% of the drainage, falling below the range of natural variability (RNV) for western hemlock, Pacific silver fir, and mountain hemlock forest series. Historically, fire was the dominant landscape pattern-forming disturbance in Roaring River until fire suppression began in the early 1900s. The present distribution of seral stages within the drainage largely reflects this past landscape pattern created by fire: large, irregularly shaped patches with remnant live trees and snags. Recent large fire events in the late 1800s and early 1900s have left the majority of the watershed in mid-seral conditions.

Currently, the watershed contains much more unfragmented, closed canopy forest and contiguous forest than many of the watersheds in the Clackamas River subbasin. To a degree, it can be assumed that the LSR is functioning to support the habitat needs of some late seral species based on:

- the unfragmented landscape pattern of Roaring River (little high contrast edge)
- the contiguous, closed-canopied forest and large interior habitat providing connectivity through the drainage
- the linkage Roaring River drainage provides to the Salmon-Huckleberry Wilderness and the Clackamas River LSR corridor
- the presence and observations of pine marten and the northern spotted owl within Roaring River.

Species associated with these current landscape patterns include:

- spotted owl,
- pine marten,
- pileated woodpecker, and
- great grey owl.

Wildlife

Northern Spotted Owl

The Northern spotted owl is a federally listed threatened species that is closely associated with late-seral forest ecosystems. Nesting occurs in cavities of mature and/or over-mature trees, roosting normally takes place in dense multi-layered forests, and foraging ranges across many habitat types.

The Roaring River watershed is located within Critical Habitat Unit OR #10 (USFWS, 1992) and is capable of supporting spotted owls as surveys have confirmed locations on 4 pairs and one resident single; reproduction has been successful.

The drainage currently has 16,176 acres of suitable habitat (i.e., habitat available for nesting, roosting, and foraging), and 21,478 acres of dispersal habitat (i.e., habitat which satisfies needs for foraging, roosting, and protection from predators) (Fig. 15). None of the pairs are below levels of incidental "take" and the resident single is just slightly under (Fig. 16).

Due to its designation as an LSR, the watershed should continue to move toward a late-seral condition and remain capable of supporting spotted owls.

Figure 16. Suitable Habitat Acres and Take Occurrences for Spotted Owls Within the Roaring River Watershed

Owl #	Acres Suitable Habitat	Take Situation?*
Pr 5342	2,068	No
Pr 5339	3,141	No
Pr 5986	3,041	No
Pr 5992	1,838	No
RS 5300	1,104	Yes

Pr = Pair RS = Resident Single

** Take occurs when less than 1182 acres of suitable habitat is found within a 1.2 mile radius of the owl activity center.*

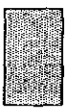
Pine Marten

Currently, B5 Marten Management Areas exist within the watershed. The Desired Future Condition for B5 areas as outlined in The Mt. Hood Plan, state that B5 areas are to contain characteristics such as high densities of quality den and nest snags and defective green trees, limited recreational and motorized vehicle access, and a healthy, older forest with mid-level canopy reaching maturity. Key habitat features for marten are large patches of late-successional forest, intact forests along riparian zones, and coarse woody debris of varying decay stages to support prey species.

According to Guild maps generated by Mt. Hood National Forest, Roaring River watershed contains areas of Primary Large Patch, Primary Dispersed Patch, Primary Contributing Patch, and Scattered Habitat (definitions in analysis file) for the pine marten (Mellen, 1995). Surveys conducted in the winter of 1995 resulted in the observation of marten in the Squaw Meadows area on three separate occasions. Guild maps depict this area as a Primary Dispersed Patch.

Roaring River Watershed is a designated LSR as mandated by the Northwest Forest Plan and an LSR Assessment must be completed prior to any management activities. All activities must contribute to the LSR objectives. These objectives, as related to the pine marten, include riparian protection for at-risk fish stocks. Because the ranges of the fish and the marten are largely coincidental, the protection of the fish is thought to be sufficient to achieve the desired objectives for the marten.

SPOTTED OWL DISPERSAL HABITAT



Dispersal Habitat

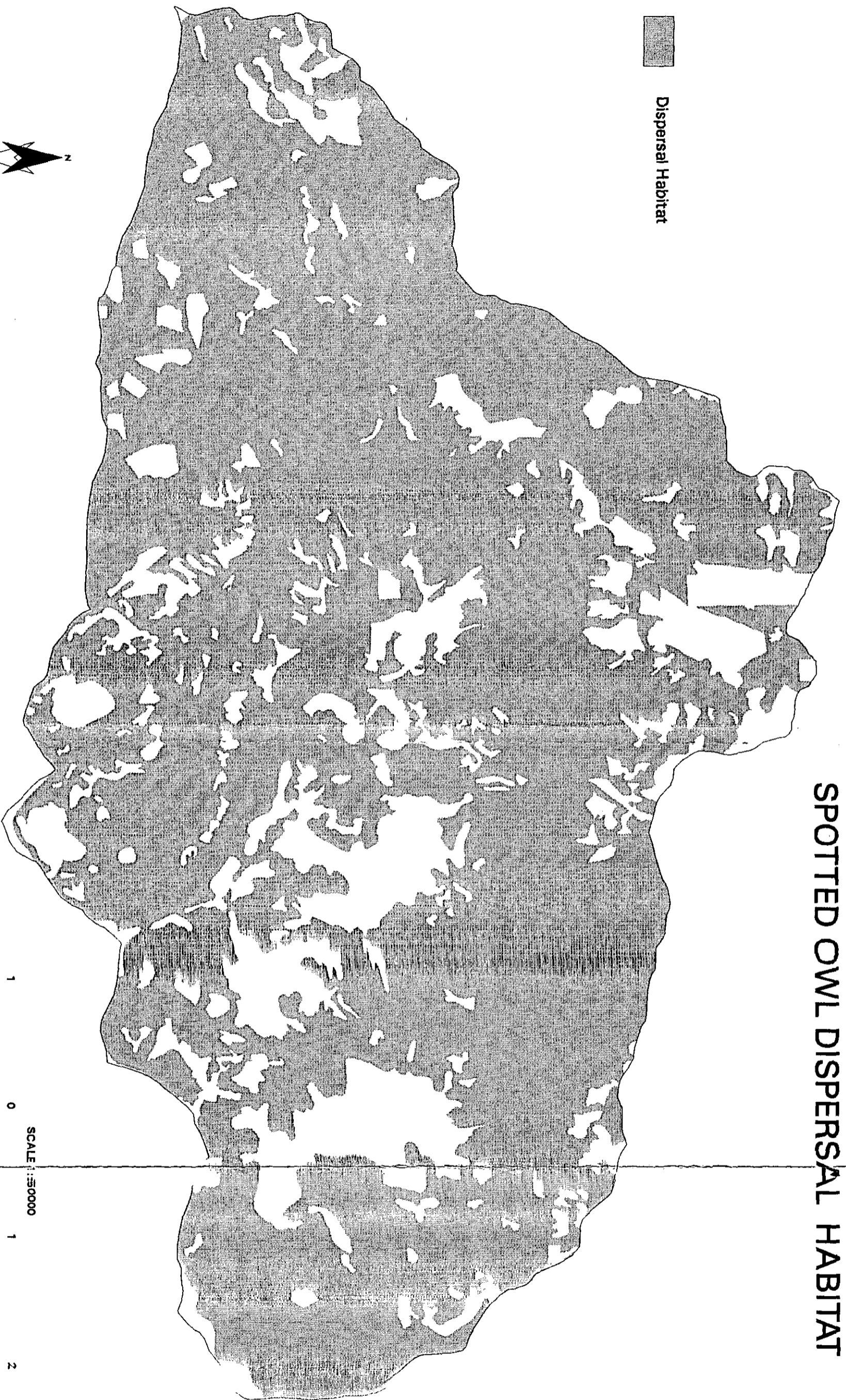


FIG. 15

Pileated Woodpeckers

Currently, three B5 areas exist for the pileated woodpecker and the Desired Future Conditions are the same as those stated for pine marten. Key habitat features for this species are similar to pine marten but pileateds are more closely associated with snags due to their feeding habits (primary excavators). The watershed is currently dominated by mid-seral stage vegetation (68%) and, according to sighting records, is supporting pileated woodpeckers. Areas of past insect infestation may contribute to their prey base.

Great Grey Owls

As stated in the ROD, great grey owls are species which warrant a protection buffer if outside of LSR's. Roaring River watershed is an LSR and therefore great grey owls should receive the protection they require to survive. Surveys conducted in the summer of 1995 failed to locate any owls within the drainage. However, approximately 84 acres of nesting habitat was located within/near the Squaw Meadows complex. Nesting habitat normally contains mixed conifers with an abundance of dead and down material with natural openings nearby.

Synthesis

With the exception of a catastrophic disturbance event, it is estimated that within the next fifty years, over 50% of the drainage will be in a late-seral condition. Slides, natural succession, dominance of overstory trees and minor disturbance events are expected to produce attributes essential to late successional stands. Riparian stands, especially within the mainstem corridor should progress even faster than the drainage itself in achieving late seral conditions. Some areas, such as forested talus slopes, may never approach late seral conditions or the area's capability to produce late seral conditions may have been impaired due to past fire history of repeated burns. However, these areas may be beneficial to lower organisms such as lichens and mosses.

Some of the stand development processes (such as tree growth and mortality, and understory establishment) and the structural/compositional features (such as multi-species and multi-layered canopies, large logs and snags, canopy closures and tree deformities) of late-successional forests could be accelerated through silvicultural manipulations in younger stands; especially in established plantations within Roaring River drainage. Silvicultural systems proposed for LSRs have two principal objectives:

- development of old-growth forest characteristics, and
- prevention of large-scale disturbances that would destroy or limit the ability of the reserves to sustain viable forest species populations.

Natural disturbance is an important process within late-successional forest ecosystems, but humans have altered the disturbance regimes. Fire suppression has resulted in significant increases in accumulated fuels within some forests. Within the Roaring River, it is estimated that disturbance risk by fuel accumulation is not significant at this time. Fire suppression efforts have been in effect since the early 1900s, approximately 80 years. Large stand replacement fires occur every 250-350 years with smaller, lower intensity fires every 75-125 year intervals. In the future, fire suppression will allow fuel loadings to increase and some of the habitat diversity created by low intensity or small fires would decrease.

Fine scale disturbances, such as insects, disease, and wind create small gaps in the overstory characterizing stages within the old-growth forest development. These types of disturbances are expected to continue within the drainage especially on the high elevation stands and stands on less productive sites.

Management outside the Roaring River drainage has an influence on the attainment of LSR objectives and possible disturbance risk. Landscape patterns outside of the Roaring River drainage are a combination of fragmented and continuous forest. Management activities, intensively managed and fragmented lands outside of Roaring River may increase risk for wind or fire disturbance within Roaring River. These lands tend to have more edge habitat and less connectivity of mature forests. The Salmon-Huckleberry Wilderness, bordering the Roaring River, provides an unfragmented continuation of the LSR. In the future, it is expected that matrix and LSR corridor connectivity to Roaring River will improve with stand development.

Existing road systems within the drainage easily meets the Mt Hood Forest Plan standard and guidelines for road densities. It is expected that future road construction or reconstruction will not occur within the Roaring River drainage due to the LSR designation. Existing roads are on the periphery of the drainage and are not generally impacting interior habitat for that reason. In addition, most of the roads are closed five to seven months of the year due to snow. Forest Service road 4610 is considered important for administrative access to the upper drainage and provides the main access for fire suppression efforts.

In summary, the Roaring River watershed has the capability of reaching late-seral conditions in most of the drainage and thereby will meet LSR objectives. Disturbance is recognized as playing a role in the ecological process that shape and maintain late-successional habitat. Current management outside the drainage can have an influence on the LSR by increasing or decreasing connectivity linkage and introducing large-scale disturbances which may threaten the LSR habitat and function. Silvicultural restoration can help to accelerate late seral structures and compositional features in those stands less than 80 years old. An LSR Assessment should be completed which addresses role of disturbance, management influences from outside the drainage and silvicultural restoration.

Chapter 4 - Key Question C

Chapter 4 - Key Question C

Which critical components are key to the balance of recreational opportunities while protecting resources specifically: fish, wildlife, water quality, special habitat and heritage resources?

Social

A range of recreation experiences from roaded natural, semi-primitive motorized, semi-primitive non-motorized to primitive are available in the Roaring River watershed. The Mt. Hood Forest Plan (1990) identifies a shortage in these types of primitive recreation experiences, especially in the semi-primitive motorized category. This category attracts recreationists who enjoy a variety of activities in an accessible setting. Activities in the area include hiking, fishing, hunting, gathering, off-road motorized travel, mountain biking, horseback riding and general exploration. The steep terrain makes access to many of the lakes and the river physically challenging. The Roaring River's primitive, remote environment and its native cutthroat, coho salmon, and steelhead populations provide a unique sport fishery. Area lakes, including Serene Lake, Rock Lakes, Shining Lake, and Squaw Lakes provide excellent trout fishing.

Camping occurs on the roaded periphery around the numerous lakes in the area and along trails. Steep terrain limits camping to certain areas. Hambone Springs, Lookout Springs, Twin Springs, Frazier Fork and Frazier Turn Around were original district developed campgrounds. They are no longer maintained due to lack of funding.

Three trail access routes are available into the wild segment of the river (Fig. 2). Connection from the northern rim of the drainage is provided by the Plaza Lake Trail #506 from Twin Springs Campground and the Corral Springs Trail #507 and the Huxley Lake Trail # 521 from Lookout Springs Campground. The Grouse Point Trail #517 provides access across the river to tie with the southern trails system. Dispersed campsites at the river are associated with these trails.

Trails in the drainage are generally in fair condition with some portions needing moderate to heavy maintenance. These trails have low to moderate usage. These include:

- Plaza Lake Trail #506
- Corral Springs Trail #507
- Grouse Point Trail #517
- Huxley Lake Trail #521
- Dry Ridge Trail #518

Approximately three to five miles of trail that access the drainage from Roaring River Campground are open year round. No Forest Service trails currently parallel the river, and access to the river is minimal. However, public created access routes, originating near the Roaring River Campground follow the river to popular fishing areas.

The Roaring River area has major trailheads in the Frazier Fork, Frazier Turn Around area and also in the Shell Rock Lake area. Serene Lake Trail #512 connects with Grouse Point Trail #517 to form a loop opportunity in the Rock Lakes Basin. This is a popular loop trail for angling, mountain bikers and general hiking. Indian Ridge Trail #510 is a closed road converted to a trail. When this closure occurred, passenger vehicle access to Shining Lake was supposed to cease. Currently the berms installed for closure are being used to create a 4x4 or trail bike experience to the trailhead. This roadway/trail to Shining Lake Trailhead is flat and has great scenic value for its panoramic views. Fish caught in Shining Lake are larger than average (approximately 14"). The Roaring National Wild and Scenic River Environmental Assessment and Management Plan recommended that no trails be constructed to access the river corridor in order to protect its unique qualities.

Motorized activity is increasing in the Roaring River Watershed. This is due to increasing demand for off-road motorized experiences in semi-primitive areas. Also, new Oregon State off-highway vehicle (OHV) regulations could increase trail and quad bike use on roadways (i.e. 4610, 4611) which were previously illegal for this use. The Huxley Lake Trail #521 is a popular motorized trail bike area. Steep, broken terrain limits use of the 4610 road as an access corridor, whereas 4611 is located on more gentle topography and there is more actual OHV use here.

Steps have been taken to record past usage of the Roaring River area. Within the last twenty years approximately 20 heritage resource sites have been field verified within and on the boundary of the watershed. Of the prehistoric sites there are 12 lithic scatters, two stacked rock features, and one berry gathering camp. The historic sites consist of cabin remains, guard stations, fire lookout locations, and a possible historic trail campsite. Additionally there are eleven sites located within a half mile of the boundary. Of these, the prehistoric sites are mainly peeled cedar sites along the Clackamas River (near the mouth of Roaring River) and the historic sites are associated with early administrative uses.

Huckleberries continue to be central to the seasonal subsistence and ritual round of activities for the Warm Springs community. Gathering of medicinal plants is still regarded as extremely important because some of these plants have no substitutes. However, fire suppression has led to unproductive huckleberry patches in some areas. Increased use of traditional areas by non-Native people has led to a sense of competition and increased management (i.e. road closures, permits, etc.) which the Indians find burdensome.

Terrestrial

When assessing impacts of wildlife/human interactions, it is important to consider not only the encounter itself, but the frequency, duration, and intensity of the interaction. Within the watershed, roaded access is confined to the perimeter of the drainage via road 4610. Because of its peripheral location and the fact that snow closes the road five to seven months out of the year, interior habitats and/or species have suffered limited negative impacts.

Human impacts to sensitive landscapes and special habitats within the drainage are concentrated in areas that allow access. The Squaw Meadows area, accessed by road 4610-044, shows sign of degradation due to both foot and vehicular traffic. The road itself is deeply rutted therefore users are tempted to venture out of the ruts and onto the meadowlands. Unregulated use of this type may lead to impacts such as:

- trampling of vegetation used for nesting, hiding, and foraging for species of birds, mammals, and amphibians
- harassment and/or disturbance to species in the area (noise, vandalism)
- disturbance to nest sites and brooding of young

Other special habitats within the drainage that receive use by wildlife are located in areas that are not easily accessed. Therefore the impacts to cliffs, rock outcrops, and other meadows are most likely unaffected or just slightly affected in localized areas.

With its rugged terrain and limited access, the watershed does not experience high hunting pressure. It is due to this lack of pressure that many hunters are drawn to the drainage to seek game such as deer, elk, bear, cougar, squirrel, and grouse. Hunting for all of these species tends to be popular along Road 4610 and within the riparian areas of Cougar and Splintercat Creeks (Appendix D).

As mentioned previously in the document (Key Question A), deer/elk migration routes traverse the watershed with several of them crossing road 4610. These migration routes have been tracked for several years and it appears that the road and the routes are compatible since big game travel is still occurring.

Aquatic

Water Quality

Water quality monitoring is limited in the Roaring River drainage. There is a concern for the potential fecal contamination from recreational uses at dispersed sites and trails in riparian areas of the drainage. There is evidence of unsanitary disposal of human fecal matter next to streams and lakes. However, because water monitoring is limited in the Roaring River drainage, no microbiological monitoring has been conducted and the extent and effects of biological contamination is unknown.

Water chemistry sampling (which did not include microbiological sampling) was conducted at the mouth of Roaring River in 1991. Grab samples were taken at four separate times in August and September. Water samples were analyzed for the full spectrum of organic and inorganic constituents. Results indicate a high level of water purity.

Roaring River is one of 8 drainages on the Clackamas River which conducted trend monitoring in 1993. It is one of three unimpacted drainages monitored. Parameters that are monitored are water temperature, macro-invertebrates, V Star (the proportion of fine sediments that occupy the scoured volume of a pool), Riffle Stability Index (the percent of sediment particles in a riffle that move at bankful flows), and D50's (the mean particle size in a riffle). Initial first year analysis was conducted (USDA, 1993b) for these parameters. Current sediment levels are low. Results from V Star concluded that fine sediment deposition did not contribute significantly to a reduction in available pool habitat for "B" Rosgen type channels.

Aquatic macro-invertebrate sampling was conducted at the mouth of Roaring River during the fall of 1991, 1993, and 1994 (data for 1993, and 1994 have not been analyzed). This type of sampling can provide important information to help evaluate watershed condition and water quality. Data analysis was done using a modified Environmental Protection Agency (EPA) Rapid Bio-assessment Protocol. Results indicate Roaring River to be a "slightly impaired" watershed (Aquatic Biology Associates, 1991). Slightly impaired, refers to a high percentage of sediment tolerant mayflies, a low percentage of intolerant mayflies, a very high percentage of taxa in the collector/gathers functional feeding group and a low percentage of taxa in the shredders functional feeding group. For a complete listing of macro invertebrates see Analysis File located at the Clackamas River Ranger District, Estacada Office. Due to limited information that has been currently analyzed the "slightly impaired" condition of Roaring River could be the result of the small sample size in the Ecoregion to compare to, the result of the basin's fire history, historic mass movements and/or the residual effects of the 1964 flood.

Most of the information in the baseline monitoring effort is useful in assessing trends and not as a site by site comparison.

A 1995 spawning gravel quality study looked at contribution of fine sediment below the streambed surface, in particular in spawning areas for salmon and trout (USDA, 1995). The study compared three controls (including Roaring River) with three managed watersheds for fine sediment compositions. The control sites did not differ statistically from the managed sites.

The Mt. Hood Forest Plan Standards indicates spawning gravels should contain no more than 20 percent fine sediments (particles less than 1.0 mm diameters) on an area weighted average. The majority of samples collected at each study site, throughout the Clackamas basin for both managed and control sites exceeded this fine sediment standard. Roaring River samples also exceeded the standard for the majority of the sites. The fine sediments were extremely variable ranging between 8 to 68 percent fine sediments for Roaring River sites.

Sediment Production

Soils in the Roaring River watershed are strongly related to geomorphology. It should be noted however, that the Roaring watershed is quite different than neighboring watersheds such as the Salmon River, Fish Creek and Oak Grove Fork; different in that the majority (approx. 2/3) of it has been sculpted by alpine glaciation. And because of that, much of the upper drainage, especially the sideslopes, is very rocky and mantled with shallow soils.

Inherent slope instability is present within the Roaring watershed, but to less of a degree than Fish Creek or Salmon River drainages. Once again this is due to glaciation which carved the upper drainage down to bedrock. Most of the mass wasting potential occurs in the lower drainage where unstable geologic conditions are prevalent. (See Analysis file for maps and more complete soil descriptions.)

Steep drainage ways ($\geq 35\%$) are subject to in-channel type of events such as debris avalanches, debris slides, debris flows, and debris torrents. These landform types are considered unstable and exist throughout the lower, mainstem drainage as well as it's steep north slope. Other steep drainage ways along the mouth of the south fork and it's north slope are also subject to these types of mass wasting events. The frequency and magnitude of these types of events is largely dependent on weather and precipitation occurrence.

Steep slopes ($\geq 35\%$) in the lower drainage below Squaw Creek are considered to be moderately unstable to unstable and are subject to translational type slides such as debris slides and debris flows. Frequency and magnitude of these types of slides is also largely dependent on weather and precipitation. But they also are closely related to the underlying geology in the lower drainage in which the stratigraphy chiefly consists of alternating layers of resistant rock (igneous rocks of basalt and andesite) and weak rock (pyroclastic rocks of breccia, tuffs, and conglomerates).

Reaches along the mainstem river can be unstable, especially below Squaw Creek where stream adjacent bank failures can occur frequently. Chronic sediment producers, these types of failures are common where steep sloped valley walls and outside corners of river meanders are continually undercut by the river.

Other mass wasting type events in the drainage are related to earthflows. There are two earthflow type landforms comprising about 830 acres in the northwest portion of the watershed.

Both of the earthflows are benched on top of the steep, northwest slopes of the lower drainage below the South Fork confluence. Steep drainage ways that originate from the toes of these earthflows are very unstable. Additionally, the toes themselves, which are perched atop the steep slopes of the area, can be very unstable. As with most earthflows in the Clackamas river region, the toes and heads of these earthflows exhibit the greatest rates of movement. Areas between the toe and head generally exhibit slower or imperceptible rates of movement, such as soil creep, and can be considered moderately stable.

The function of mass wasting events in the sediment regime of the watershed contribute to the upper range of natural sediment production variability. Events are the "pulses" of sediment delivery which are closely related to large precipitation events (such as rain-on-snow) of the winter and runoff events of the spring. Within the context of this watershed, sediment delivering slides transfer stored fines from up-slope locations to sites along the valley bottom and contribute to natural floodplain development. Other materials such as coarse and large cobbles and gravels, as well as large woody debris, provide aquatic and fluvial components in streams or the river channel. Present ranges of sediment delivering landslides in the watershed are not believed to be outside of the background or natural ranges.

The location and distribution of unstable slopes is such that planned trails could easily avoid these areas. Any planned timber harvest in the up-slope regions of the north and northwestern portions of the watershed would also be wise to consider slope instability and plan accordingly. Any harvest action on earthflow landforms and bench edges should be regarded very carefully so as to avoid inducing accelerated mass wasting.

Slope Stability Ratings and Acreage

Unstable
265 ac

Unstable to
Mod. Unstable
2,413 ac.

Mod. Stable
to Stable
24,035

Soil conditions in the Roaring River watershed have been relatively unaffected by human disturbances. Some road building and timber harvest activities have altered soil properties within the northwest portion of the drainage, but to an estimated minor extent, and relatively insignificant effect. Fire has likely played more of a key role in current soil conditions than forest management in the majority of the drainage.

Forest fire events throughout the watershed have been noted and recorded. These fires have likely decreased soil productivity to a significant effect and extent. Stand replacement type fires known to have occurred here, burned with high intensity, consuming organic layers on the forest floor and organic constituents within the topsoil. Both the biological and chemical components of the soil may have been drastically altered. In some cases these soils may have become hydrophobic, tending to shed water as opposed to storing it. Furthermore, with the removal of vegetation and the creation of hydrophobic conditions, unprotected soils would have been subjected to higher potential for erosion. These types of soil impacts occurring to soil types with marginal inherent productivity may in part be responsible for the unforested conditions existing in certain areas of the drainage today.

Soil productivity within the watershed, as measured by site class, is predominantly low (site class < 4). This is attributed to the abundance of steep, rocky, shallow, cold soils as well as the many talus and rubble slopes. Soil types exhibiting low productivity generally exist on the steeper sideslopes, on ridgetops, glacial cirque headwalls, and at the highest elevations. Soil types exhibiting moderate or higher degrees of productivity (site class 3-4) exist primarily in valley bottoms, on bench tops, toe slopes, and earthflow landforms. The predominance of low soil productivity in the watershed contributes to low regeneration potentials.

Soil Productivity Ratings (by site class)

Low = site class < 4 , Moderate = site class 3-4, High = site class > 3

<u>Low</u> 14,430 ac	<u>Low to Mod.</u> 4,186 ac	<u>Mod.</u> 7,307 ac	<u>Mod. to High</u> 768 ac
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Erosion potential of soils in the watershed is predominantly low to moderate. Again, this is due to the abundance of rocky slope conditions distributed throughout the drainage, as well as the high infiltration and permeability rates of most of the soil types. Yet many of the non-fragmental soil types are quite susceptible to erosion since their textures are comprised chiefly of silt size particles that are easily detached. Vegetation is key in providing protective cover for these types of soils.

Soil Erosion Potentials

<u>Low</u> 13,088 ac	<u>Moderate</u> 11,627 ac	<u>High</u> 1,997 ac
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Natural rates of erosion in the watershed contribute to it's sediment regime; regime that has been subject to peak sediment influxes from mass wasting events and post fire erosion. Currently it is conjectured that despite those kinds of events, erosion rates may be decreasing on the whole, since post-fire revegetation continues to establish protective cover and road building and timber harvest have not been widespread in the watershed.

Roads can affect many physical processes in the watershed. They can cause slope instability and mass failures, accelerate erosion and sedimentation to streams and affect flow characteristics of a watershed by interrupting surface and subsurface flows.

Roads in the drainage are few in number. There are 29 miles of existing road in the drainage. Road density is one of the lowest in the Clackamas basin at .68 mile per square mile. The majority are concentrated on the ridge tops. All the roads are native surface roads.

Proximity of roads to streams can affect sediment delivery and flow characteristics in the drainage. There are 14 stream crossings by roads in the Roaring River drainage. This compares to 270 crossings in Fish Creek, a watershed of comparable size with road densities of 3.1 miles per square mile.

Due to the small number and location, roads in the drainage are not a concern for chronic sedimentation, flow interceptions or slope instability except in a few localized situations.

Sediment production from trails, campgrounds and dispersed sites was evaluated based on proximity to streams and amount of bare soil. Due to the relative inaccessibility to Roaring River mainstem and many of its tributaries the amount of estimated sediment production from these sites is very low, especially when compared to the amounts introduced from natural disturbances such as landslides and debris flows.

Riparian areas for the recreational lakes are generally intact with the exception of Squaw Lakes, where a spur road and off road vehicle use encroaches on the wetland habitat. Road 4610-044 is a primitive road that runs adjacent to the wetland. Motorized traffic has caused a decrease in water quality by increasing sediment movement into the wetlands. This road may also be restricting natural drainage patterns in the wetland complex.

Recreational Fisheries

Roaring River offers a varied recreational experience for the angler. Although there are native winter steelhead, spring chinook and coho salmon which occupy the lower 3.3 miles of Roaring River, current regulations do not allow fishing. The sport fishery includes native rainbow and cutthroat trout, and hatchery summer steelhead and rainbow trout. Limited access by steep, strenuous trails helps protect the upper Roaring River's native trout from potentially increased angling pressure that could decrease populations levels, and alter age structure within these populations.

Roaring River Campground, located at the mouth of Roaring River has heavy recreational use and provides the public easy access to the first half mile of river. Fishing for hatchery stocked rainbow trout and summer steelhead is common here. The remaining three miles of lower Roaring River below the falls offers very limited access and only to the most adventurous of anglers. This primitive access helps to isolate and protect the fish from human harassment and increased angling pressure. This area serves as important spawning and rearing habitat for late-run coho, late-run winter steelhead, and spring chinook. This area acts as an important refuge from the Clackamas River where salmon can rest in pools.

The Roaring River's watershed supports recreational fishing in all its high lakes with the exception of Huxley lake. Limited access to these remote lakes by trail helps maintain the anglers primitive recreational experience. These lakes are stocked with hatchery brook and rainbow trout and are considered a "put and take" fishery. Shining Lake offers the angler a unique trophy trout experience. Squaw Lakes is a "Special Interest Area" in the Mt Hood Forest Plan. The primary objective is to preserve the areas unique resource values. These lakes provide habitat for natural fish production of brook trout. Road 4610 provides easy access to the lakes.

Synthesis

Human impacts in the Roaring River sub basin have been limited in comparison with the rest of the Clackamas River basin. This is due to the rugged terrain of the area and the lack of roads.

Human use of the area has gone from Native American utilization, to grazing and limited timber harvest and on to become a Late Successional Reserve with an emphasis in primitive recreational experiences. There are some differences between existing and reference conditions. About 29 miles of roads have been constructed in the area over the years. Trails that were built for administrative use have been either abandoned or converted to recreational use. Some minor sedimentation has occurred from the soil laid bare by these roads and trails. There have been some negative impacts on vegetation and habitats for amphibians and other sensitive species around lakes by dispersed recreation. Previously non-stocked high mountain lakes are now stocked with fish.

Due to its close proximity to the Portland metropolitan area and its expected growth, there is expected to be increased recreational use in the Roaring River watershed. Estacada, for example, has become a bedroom community for the urban area. With increased local growth comes heightened influence on use and greater demands on resources, especially those that are limited, leading to potential for conflict, i.e. off highway vehicle (OHV) use and heightened primitive recreational demands (including hiking, backpacking and dispersed camping). Equestrian use and pressures for loop trails are expected to be on the rise. Interest in fishing is also predicted to increase. The majority of the increased human impacts are anticipated to be mainly around the perimeter of the watershed where there is roaded access. There will, however, be increased use of the interior of the drainage by hikers and backpackers looking for primitive experiences.

Water quality in the future has the potential to be degraded in areas of concentrated human use where fecal matter is allowed to enter streams. With more people in the area, there are expected to be more conflicts between Native Americans who have utilized this area for centuries for traditional uses and others who encroach on their solitude. As a result of increased human presence, there is also expected to be a corresponding rise in crime that seems to be attendant with population centers.

Another consequence of heightened human presence is the impact on natural resources. Where recreational activities are concentrated, there is expected to be some degradation of habitat. Areas of concentrated use (i.e. trailhead parking, day use dispersed camping, etc.) can be expected to increase soil compaction and vegetative degradation, especially in sensitive and special habitat plant communities. The distribution of wildlife may change due to human pressures. There is also expected to be a continuing heightening of awareness by people concerned with the environment. This translates into an increasing importance for maintaining the naturalness of the area, especially where TES species and special habitats are concerned.

The Roaring River basin has been designated as a Late Successional Reserve (LSR). Because of past fire history, a large percentage of this area does not now meet LSR standards. However, within 50 years, this situation is anticipated to be reversed, allowing management objectives to be met. However, in the intervening time, some of the recreational public who would like to see the area as all old growth forests will be disappointed.

Several different kinds of impacts have been described in the previous paragraphs. However, analysis has determined that the watershed is in better condition than any of the other subbasins in the Clackamas River drainage. This is true for aquatic, terrestrial and vegetative components. Except for a few scattered areas of concentrated use, all natural processes appear to be functioning well. Even with anticipated increases of human use in the future, all aspects of the Roaring River watershed are expected to remain in good condition due to limited access to the interior portions of the watershed.

Roaring River watershed is anticipated to be able to meet LSR objectives in the future. It is also expected to be capable of meeting primitive and semi-primitive motorized use along with primitive and semi-primitive non-motorized management objectives by maintaining a balance of dispersed human use and avoiding the concentration of activities. Without the development of further roaded access into the Roaring River watershed, the present balance and integrity of the ecosystem is anticipated to remain relatively stable, even with the increase of people using specific areas of interest around the perimeter. Thus, the critical components that are key to achieving the balance between recreational opportunities and protecting resources are access to the watershed, especially to special habitat areas and intensity of use.

Chapter 5 - Recommendations

Chapter 5 - Recommendations

Recommendations for Monitoring

- ❖ **Question:** What is the availability and use of existing elk forage?

Parameters to Monitor: Herd forage use patterns in Roaring River.

- ❖ **Question:** Do brook trout escape from high lakes such as Serene Lake, Lower and Middle Rock Lakes, and Squaw Lakes into Roaring River? What is their population estimates?

- ❖ **Question:** What are the baseline trends in an unmanaged watershed for temperature, water chemistry and sediment loads in Roaring River?

Parameters to Monitor: Stream temperature, water chemistry, macro invertebrates, V star, D50's, Riffle Stability Index, spawning gravel surveys.

- ❖ **Question:** Is there a trend in microbiological levels and increasing recreational activities?

- ❖ **Question:** What are, changes in stream characteristics resulted from February 1996 storm?

Parameters to Monitor: Continue stream habitat survey for Roaring River mainstem and South Fork tributary.

- ❖ **Question:** What are the numbers, kinds and locations of recreational use in the Roaring River watershed?

- ❖ **Question:** What is the carrying capacity for Frazier Fork Campground?

- ❖ **Question:** What resources are affected by motorized use around Huxley Lake?

- ❖ **Question:** Is there an increase in noxious weeds in the Roaring River watershed as a result of equestrian use? If there is an increase, where is it located?

Recommendations for Information Needs

- Field verify Rosgen stream types.
- Assess the contribution of Squaw Meadows existing habitat to special habitat needs.
- Wetland botanical surveys.
- Revisit the LMP and PIG standards for pool frequency, LWD and percent fines to include conditions of wilderness streams.
- Presence, numbers and distribution of exotic fish species (Brook Trout).
- Survey and document C3 species locations.
- Develop baseline use information at dispersed sites to determine capacity and changes in patterns.
- Continue surveys for late seral indicator species (such as Northern Spotted owls & pine marten) within the drainage (i.e., validation monitoring for LSRs).
- Bacteriological monitoring to assess recreational influences.
- Complete historical aerial photos landslide inventory to determine natural landslide rates.

Recommendations for Management Planning

- Complete an LSR Assessment that addresses:
 - special forest products
 - comprehensive trail strategy
 - managing for dispersed human use to keep use intensity low and to avoid high intensity/concentrated use
 - development of a multi-watershed OHV management plan that includes Roaring River watershed
 - development of a fire management plan that considers the role of fire as an ecological process
 - conditions in which salvage of timber is warranted

- elk/deer migration patterns and OHV use on Forest Service Road 4611 and Huxley Lake Trail (#520).
 - silvicultural treatments of stands <80 years old for owl habitat enhancement and promotion of late seral structures.
- ❑ Remove the Mt Hood Forest Plan B5 designation within the Roaring River watershed. (Refer to Key Question B)
 - ❑ Maintain interim riparian reserve widths as refined during project level planning for recommended riparian reserve widths. (Conditions of the Roaring River watershed did not warrant increasing the size of reserve widths). Riparian Reserve widths displayed in Table 7 are based on estimated site potential tree heights using Forest riparian ecology plot information stratified by forest series (western hemlock, Pacific silver fir, mountain hemlock). Recommended Riparian Reserve widths should be based on site specific potential tree heights determined during project level planning.
 - ❑ Remove Roaring River acreage from Probable Sale Quantity (PSQ) calculations. The estimated PSQ generated by the Forplan model for the Northwest Forest Plan selected alternative established timber outputs of 19 MBF/year (Hagestedt 1996) based on 88 available acres. Mapping of Roaring River shows that the watershed is primarily LSR with a few acres on the northern edge that is mapped as wilderness.
 - ❑ Do not encourage Native American conflict over traditional use areas (i.e. huckleberry gathering). Consider educational opportunities to encourage understanding and importance of traditional use areas in Roaring River between the general public, Forest Service and Warm Springs Reservation.
 - ❑ In-stream fish structures for mainstem Roaring River should be a low priority and planned with caution. Large winter flows and slope gradients in some river reaches suggest that the channel may never retain large wood and the use of this drainage as an unmanaged control for monitoring would be jeopardized (Refer to Key Question A).

Table 7. Recommended Interim Riparian Reserve Widths

Category	Western Hemlock Series	Pacific Silver Fir and Mt. Hemlock Series
Fish Bearing Streams	420 feet slope distance from edge of channel.	320 feet slope distance from edge of channel.
Non-Fish Bearing Perennial Streams	210 feet slope distance from edge of channel.	160 feet slope distance from edge of channel.
Constructed Ponds, Reservoirs, and Wetlands Greater than 1 Acre	210 feet slope distance from the edge of the wetland or maximum pool elevation.	160 feet slope distance from edge of the wetland or maximum pool elevation.
Lakes and Natural Ponds	420 feet slope distance from edge of water.	The body of water plus 320 feet slope distance.
Intermittent Streams, Wetlands less than 1 acre and Unstable and Potentially Unstable Areas	210 feet slope distance from edge of channel.	160 feet slope distance from edge of channel.

Recommendations for Access and Travel Management Plan

Access and Travel Management (ATM) objectives were determined by identifying access needs for various forest management activities and then to help focus priorities for maintenance and restoration. The objectives of the access and travel management plan for Roaring River is to meet the goals of the Late-Successional Reserve designation while facilitating administrative, commodity and recreational uses. Key Question C addresses the critical components in balancing recreational opportunities with protection of resource values in Roaring River. Access was identified as one of those critical components in this balance. In addition, silvicultural treatments (precommercial & commercial thinning) and providing for special forest products are possible if confirmed by a LSR Assessment.

A majority of the roads in Roaring River were identified as maintenance level two and open to public traffic (high clearance vehicles recommended): Road 4610, 4610-240, 4635, and 4611. However, year round access on these roads are normally not possible due to snow for five to seven months out of the year. Additional restrictions may be identified at the project level and are not recommended here.

It is recommended that Forest Service Road 4610 remain open for administrative needs (fire access, search and rescue, and for management activities). This road is already closed up to seven months of the year by snow, has little impact drainage-wide to interior habitat, is the main access for fire suppression efforts, and has been identified for providing recreational access to the drainage.

Roads identified for potential decommissioning include:

- Forest Service Road 4610-044 in Squaw Meadows for hydrologic and habitat impacts to the Special Interest Area.
- Reclosure of Indian Ridge road to motorized access. This would minimize impacts and roaded access to recreational destination sites which are also special habitats (high elevation lakes).

Roads that are not identified above are needed for administrative and recreational access if consistent with LSR objectives and confirmed by the LSR Assessment. Decisions to keep open or close should be made at the project level after completion of the LSR Assessment.

Recommendations for Managing Long Term Landscape Patterns

A landscape analysis and design (LAD) process was completed for the Roaring River Watershed. The LAD process unites planning with the principles of landscape ecology in order to facilitate determination of a landscape pattern within which both general Mt. Hood Forest Plan and site-specific local objectives can be met. This "target" landscape pattern could then be used as the foundation for designing individual land management projects. Information about the LAD process is described in detail in the publication "Forest Landscape Analysis and Design -A process for developing and implementing land management objectives for landscape patterns" (Díaz and Apostol, 1992).

The landscape pattern design was arrived at by integrating the current management direction from the Northwest Forest Plan and the Mt. Hood National Forest Plan with an understanding of the local landscape for a spatial plan of vegetation patterns and forest structures. The LAD process for the Roaring River Watershed included an analysis of landscape structure, flow phenomena, disturbance regimes, management objectives, and opportunities and constraints. From this analysis, a Conceptual Landscape Design was developed.

The Opportunities and Constraints Map (Fig. 17) for management activities and vegetation patterns displays the social and landscape factors that become constraints or opportunities based upon landscape management objectives. Opportunities and constraints that drive a vegetation pattern in the Roaring River Watershed included:

- Late-Successional Reserve designation.
- Silvicultural treatment of forest stands less than 80 years old to promote desired late seral conditions.
- Habitat protection of selected high elevation meadows and lakes.

The Landscape Flows and Linkages Map (Fig. 18) identifies various flows within the watershed and those that cross the watershed boundaries. From this analysis step, landscape structures that foster continued function of important flows are identified for possible inclusion in the targeted landscape. During this step, possible conflicting use/flows of an area were identified in Roaring River:

- Elk/deer migration routes versus increasing recreational (vehicle and off-highway vehicle) use of Forest Service Road 4611 and the Huxley Lake trail (#520).

The Conceptual Landscape Design Map (Fig. 19) graphically displays an integration of existing seral stage patterns, landform analysis and desired landscape objectives providing management recommendations by design cell to reach the “target” landscape pattern. The Roaring River Watershed is designated as a Late-Successional Reserve under the Northwest Forest Plan. This overriding designation in Roaring River provides clear direction regarding “target” landscape patterns: retain and promote late seral forest structure. The landscape objectives are to provide habitat for Late Seral species, protection of aquatic resources, and connectivity.

The design cell types fall into the following categories:

Early Seral

Areas where opportunities exist to promote late seral structures through silvicultural treatments with LSR assessment concurrence.

Mid Seral < 80 Years

Areas where opportunities exist to promote late seral structures through silvicultural treatments with LSR assessment concurrence.

Mid Seral > 80 Years

Areas where silvicultural treatments would not be consistent with the Northwest Forest Plan. Vegetation management would be no management.






Late Seral

areas where existing forest structures meet desired landscape objectives and should be retained.

Patchy Mid Seral

Areas where early seral plantations are patches within a matrix of mid seral forest. Opportunities exist to promote late seral structures through silvicultural treatments of the plantations and with LSR assessment concurrence.

Roaring River Watershed Opportunities and Constraints

-  Connectivity Corridor
-  Late Seral
-  Silvicultural Treatment Opportunities
-  Existing Hiker/Equestrian Trails
-  Reclose Indian Ridge Road & Naturalize

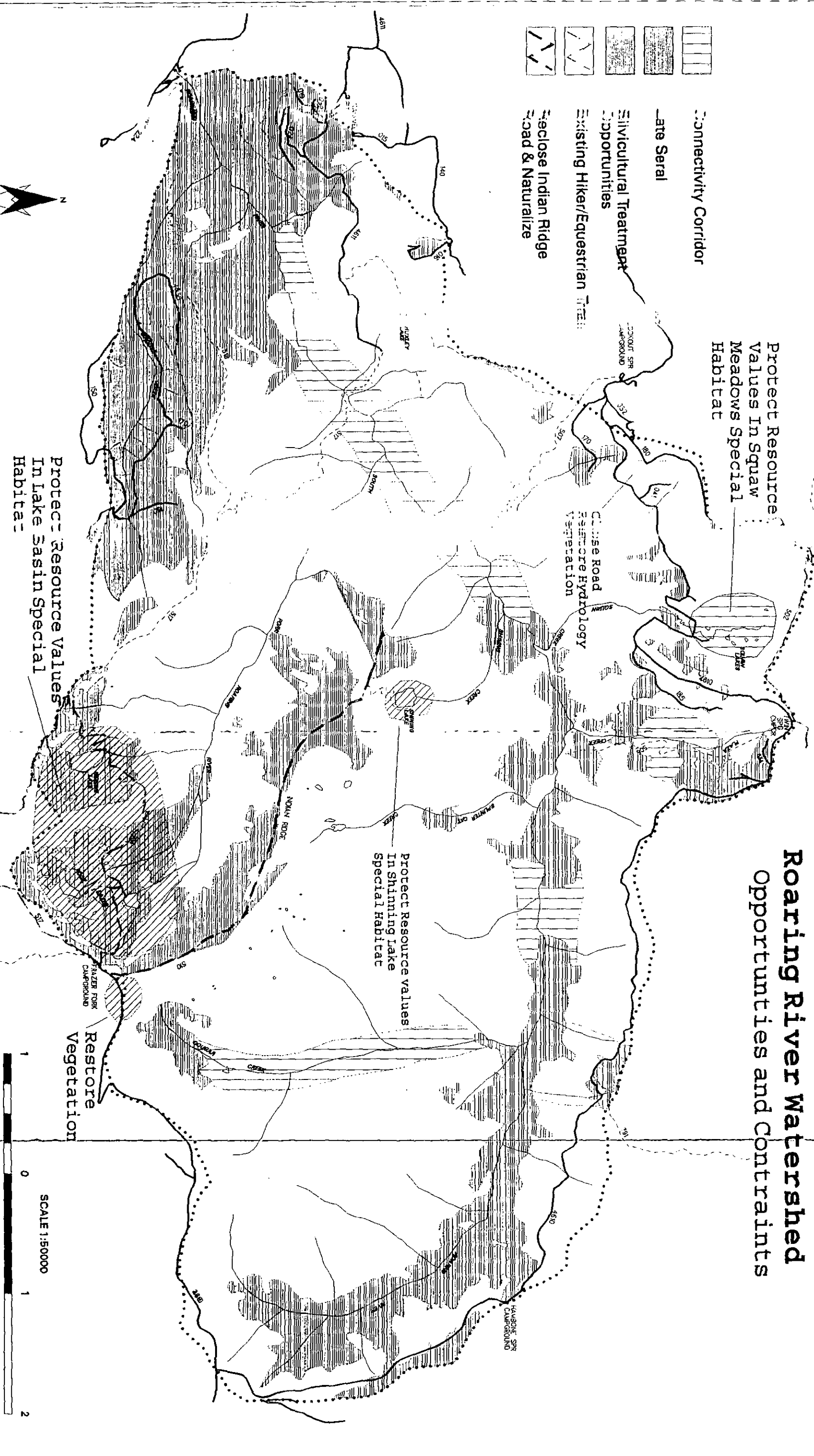












FIG. 17

SCALE 1:50000
MILES

Roaring River Watershed Landscape Flows and Linkages

-  Local Road
-  Human Use (Road)
-  Trails
-  Anadromous Fish
-  Non Fish Habitat
-  Resident Fish
-  Stocked Fish (Brook, Rainbow, Trout)
-  Deer/Elk Migration Patterns
-  Beargrass Gathering
-  Huckleberry Gathering

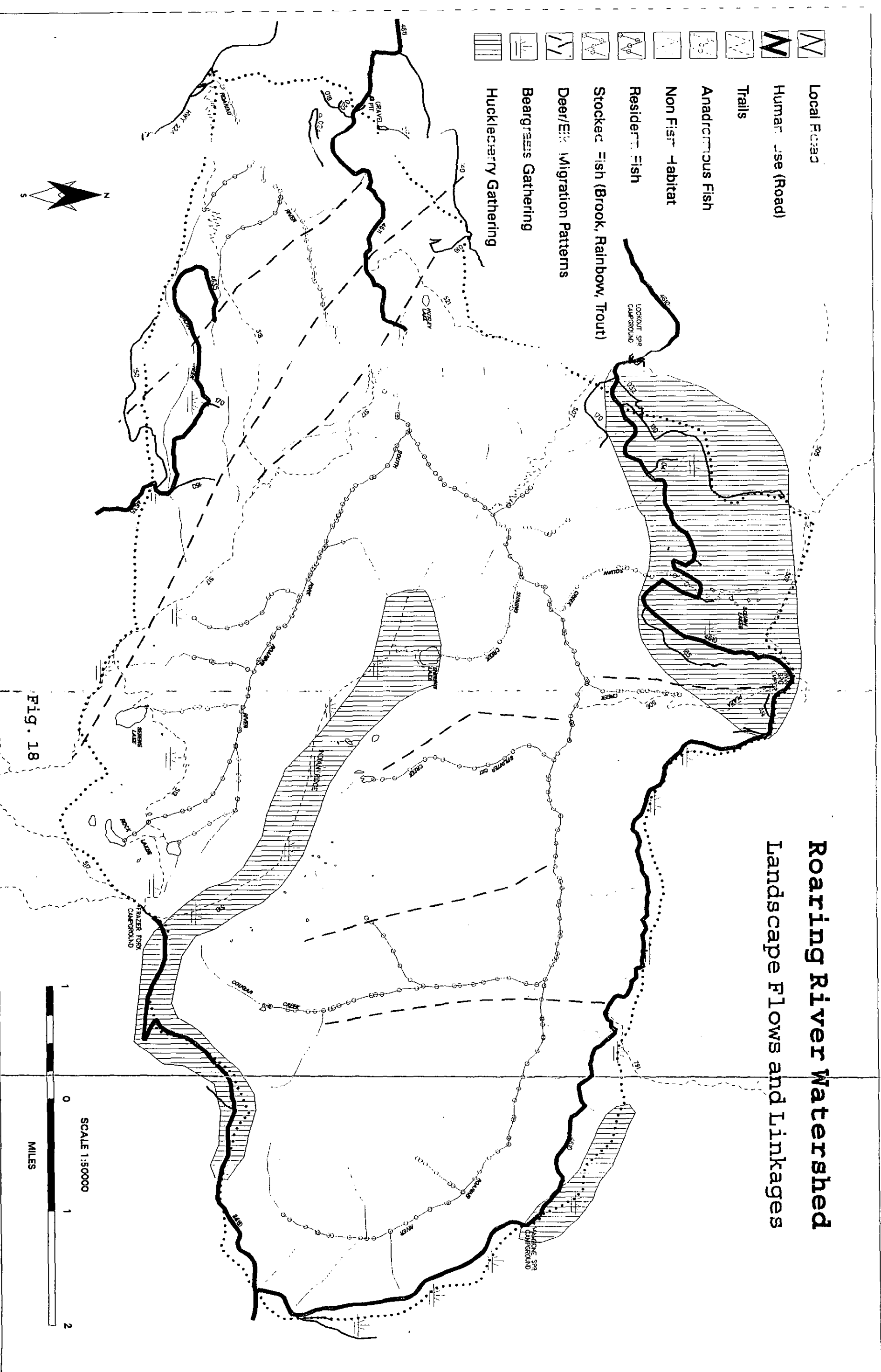
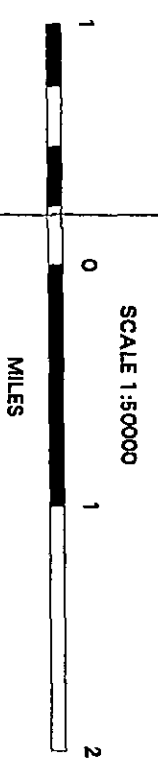


Fig. 18



Roaring River Watershed Conceptual Forest Design

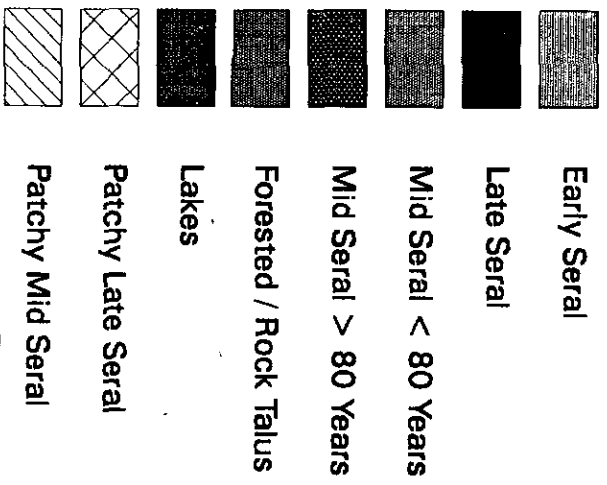
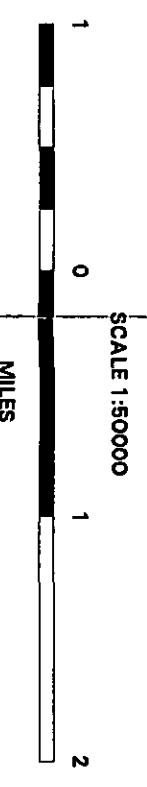


Fig. 19



Roaring River Watershed Landscape Pattern After 50 Years

- Early Seral Vegetation
- Late Seral Vegetation
- Mid Seral Vegetation
- Forested Rock Talus / Outcrops
- Lakes
- Wet Meadow

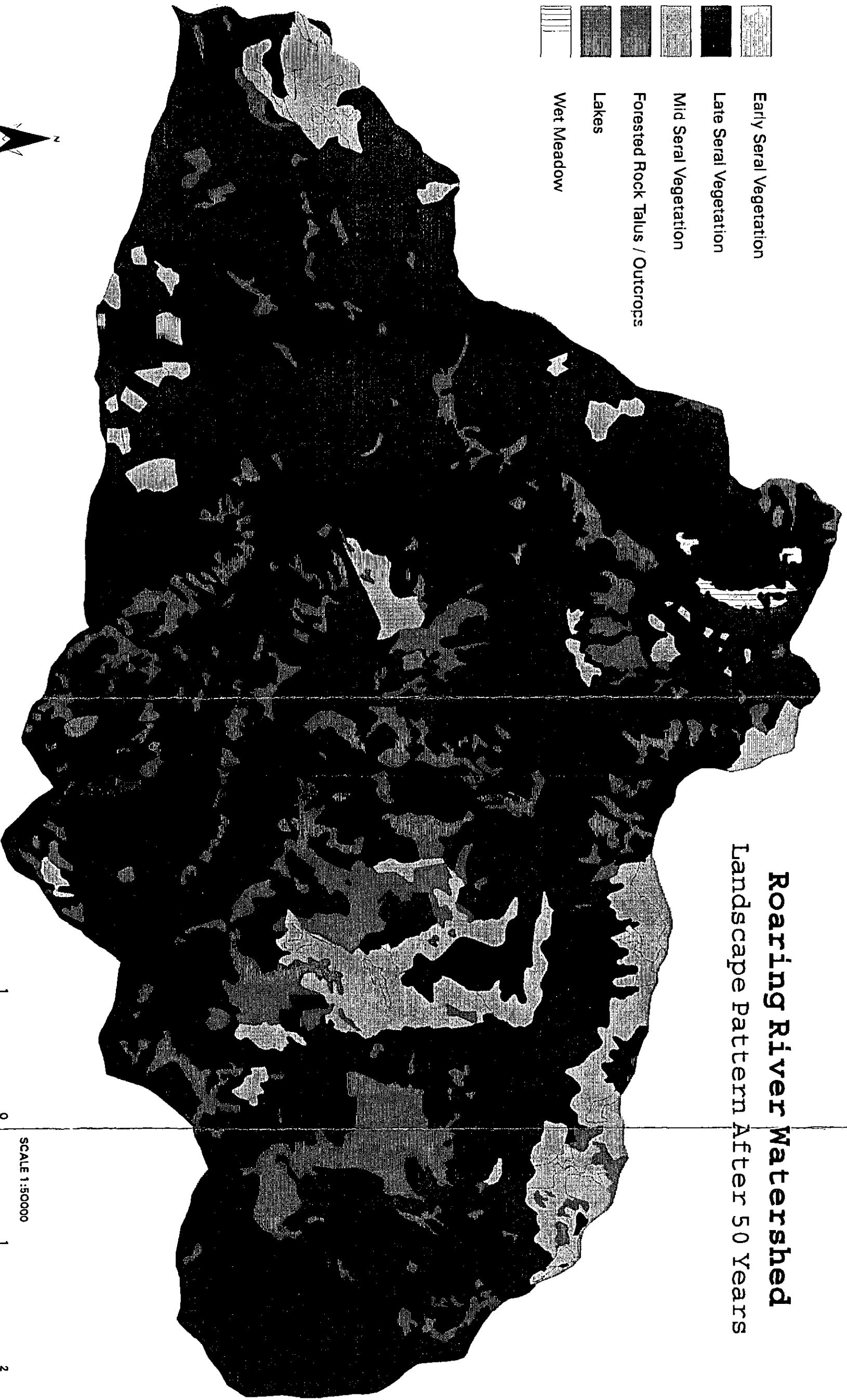


Fig. 20



Patchy Late Seral

Areas where early seral plantations are patches within a matrix of late seral forest. Opportunities exist to promote late seral structures and blend high contrast edges through silvicultural treatments of the plantations and with LSR assessment concurrence.

Meadows/Lakes/Forested Rocky Talus

Areas where existing vegetation patterns should be retained for habitat diversity.

The Roaring River Watershed Landscape Pattern After 50 Years Map (Fig. 20) shows that early seral structure will be significantly less than present (except that provided by the forested rocky talus openings) and may fall below range of natural conditions (RNC) unless natural disturbances make up the difference. The late seral structure will significantly increase (while mid seral decreases) from the present. The Pacific Silver Fir forest series will have late seral structures above RNV while western Hemlock forest series will be within RNC.

Recommendations for Restoration

Table 8. Listed in Priority

ALTERED PROCESSES	RESTOR. OBJ.	RESTOR. OPP.	AREA
Disturbance of vegetation and soils in wet meadow habitat	Reduce sediment and improve hydrologic connection	Remove Rd 4610044 spur	Squaw Meadows
Disturbance of special habitat.	To discourage motorized use and access to special habitats	Improve road closure trail #510	Indian Ridge Trail #510
Vegetation changes due to fire history	Reduce impacts from future fires and fire suppression	Develop fire management plan	Roaring River drainage
Biological productivity of soil	Remove motorized use on trail	Look for appropriate replacement area	Corral Springs Trail #507
Biological productivity of soil	Discourage motorized off road use. Reduce impact to off road vegetation and soil	Educate motorized user	Huxley Lake Trail #521
Silviculture Treatment of stands	Reduce length of time to reach LSR conditions	Precommercial and commercial thinning.	Stands <80 years old
Future loss of forage habitat due to vegetation changes	Provide forage opportunities for big game habitat	Consider vegetation manipulation to provide forage conditions	Roaring River drainage

Appendices

Appendix A - Acknowledgments

This document is dedicated to the people who managed to get this document out despite:

- the Continuing Resolution
- the furlough
- the ice storm
- the 1996 floods
- the power outages
- the “dog”
- the people sneaking their projects into GIS
- the budget
- the puppy distractions
- and the “iron fist”

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Melanie Meyer, Forestry Technician
Bruce Reed, Recreation Technician
Todd Reinwald, Soils Scientist
Merle Seidel, Cultural Resources Technician
Dan Shively, Fisheries Biologist
Ruth Tracy, Oak Grove Watershed Analysis Team Leader
Asia Young, Biological Technician

Core Team Members

Connie Athman, Hydrologist
Lynne Cady, Wildlife Biologist
Craig Edberg, Team Leader
Joyce Johnson, GIS
Jeanne Rice, Silviculturist
Sue Helgeson, Fisheries Biologist
Glenda Woodcock, Recreational Planner

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Appendix C - Glossary

Acronyms

ACS	Aquatic Conservation Strategy.
BLM	Bureau of Land Management.
DBH	Diameter at breast height, common measure of tree size.
ELNFH	Eagle Creek National Fish Hatchery.
LAD	Landscape analysis and design.
LSR	Late Successional Reserve. Northwest Forest Plan land allocation.
LWD	Large woody debris - portion of a tree that has fallen or been cut and left on the forest floor or in a stream. Refers to pieces at least 36 inches in diameter and greater than 50 feet in length.
Mt. Hood FP/LMP	Mt. Hood National Forest Land and Resource Management Plan. Also called Forest Plan.
ODFW	Oregon Department of Fish and Wildlife.
FIG	Columbia Basin Anadromous Fish Policy and Implementation Guide.
PSQ	Probable sale quantity.
REAP	Regional ecological assessment.
RMP	BLM's Resource Management Plan.
RNV	Range of natural variability.

- ROD** Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl. Commonly referred to as the Northwest Forest Plan or the President's Forest Plan.
- S&G's** Standards and guidelines - the rules and limits governing actions, and the principles specifying the environmental conditions or levels to be achieved and maintained.
- SCCA** Species and communities conservation analysis -computer database.
- SWD** Small woody debris - refers to pieces at least 24 inches in diameter and greater than 50 feet in length.
- T, E & S** Threatened, endangered or sensitive plant and animal species.
- TLML** Guild of wildlife species: terrestrial, late seral, capable of aggregating a mosaic of suitable habitat patches, large home range.
- USDI** U.S. Department of Interior.
- USFS** U.S. Forest Service.
- USFWS** U.S. Fish and Wildlife Service.
- VQO** Visual Quality Objectives

Appendix D - Public Meeting Information

Public Comments

An open house was held at the Forest Service in Estacada on January 26, 1996. At that meeting, people were invited to give answer some questions about the area in order to facilitate the input process:

- Why is Roaring River special to me?
- How do I use this area?
- How would I like to see this area managed?

The following comments were recorded on flip charts and on maps:

- Squaw Meadows — a special place

Close spur road because of sedimentation and garbage
Unique botanical area, also hydrologically
Trail goes into wilderness
Area ties to wilderness
Hawks and possible peregrine falcon seen in area

- Close road on Indian ridge

Garbage dumping
Road bisects LSR
Use for mountain biking?

- Close 4610 beyond Twin Springs

Road slumping out
Bisects LSR

- State of trails
 - Motorized trails—need more and better maintained
- Be selective about allowing bikes or horses on certain trails
 - Look at trail conditions—where sedimentation may occur
- Concern with shooting on 4610
- Close 4635 system
 - Noxious weeds, wildlife harassment, vegetation disturbance
- Don't close whole 4635 system
 - Need main road open for hunting, berry picking, dispersed camping
 - Hunting: grouse, bobcat (until Feb.)
 - 120 spur conflict: calving VS hunting
- Separate horse use areas from other camping
 - Different layout needed; smell; noise; etc
- Interconnect trails for horses in the Roaring River area
 - Have a horse camp
- Hunting use
 - Lots of hunters at upper and lower ends (Cougar Creek, Road 4610)
 - Provides a good hunting experience
 - Big/small game (cougar, bear, grouse)
 - Keep roads open for hunting and fire access (Road 4610 for hunters)
- Need in-stream surveys to find out what happened to native cutthroat
- OHV tie to Barlow (4610)
- Need OHV trails open on north & south side of Roaring River ((small OHVs)
- Need loop trails for horses
- Build horse camps (partnerships)
- Need tie trails between Squaw Meadows and Eagle Creek basin (horse)

- Need trail tie-in between Shining Lake and trail 517/518
- OHV trails
- Motorized use on old roads can be a boring experience; weave on and off (roads) in acceptable areas to better meet user needs

Open House Attendance List - 1/26/96

Name/Area of Interest

Phyllis Kirk, Watershed, Squaw Mdws

Susan Cox, Squaw Mdws, Roaring River Roadless Area

Carl & Terry Ruddel, Roaring River Area

Noel Hamel, All

Gary Hackett, OG Fork & PGE Hydro

Chuck Steahly, OHV Recreation

Gary Sischo, Recreation

Joe Blowers, Indian Ridge, Squaw Mdws, Roaring River

Betty Swanson, Equestrian

Ben Swanson, Equestrian

Ron Olson, OHV Recreation

Dick Pugh, Cleveland HS

Ron & Sandy Anderson, OHV Recreation

Bob Patterson, Rec & Clean Water

Charlie Sinclair

Alberta Gerould, Ancient Forests, Ecosystem Health

John Saemann, Hiking

Dick & Sally Seymour, Equestrian

Rod & Cheryl Klawitter, Western Wildlife & Sportsman Assoc.

Greg Peters

Scott Ryland, OHV Recreation

John Schoop, WWASA

Arnold Ryland, ATV Concerns

Doug Smith

Avis Rana, Water & Biodiversity

Barbara Schlett, Horse Trails

Becky Wolf, Horse Trails

Terry Wheeler, Horse Trails

Todd Hill, Roads/Trails

Cole Gardiner, Everything

Trudy Huffman, Horse Trails

Tom Wolf, Watershed, Biodiversity, Roaring River

Jim Allison, Trails

