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1995 BEAR WATERSHED ANALYSIS
APPENDICES



Ashland Ranger District
Rogue River National Forest

APPENDICES

APPENDIX A: KEY ISSUES & KEY QUESTIONS

APPENDIX B: FIRE

Identification of Specific Vegetation Zones for the Bear Watershed Analysis Area
Fire Behavior Fuel Model Key
Fuel Model Assignments
Chronology of Events

APPENDIX C: GEOLOGY, GEOMORPHOLOGY & SOILS

Geology and Geomorphology of the Bear Watershed Analysis Area
Characteristics of Soil Productivity

APPENDIX D: HYDROLOGY

What Sort of Debris is Transported
Stream Classification
Bibliography of Water Quality Studies
Map: Drainageways Crossed
Map: Dominant Precipitation Patterns

APPENDIX E: FISHERIES

Historic and Current Miles of Fish Habitat
River Mile Index

APPENDIX F: AQUATIC AND RIPARIAN HABITAT

Habitat Comparison Chart
Relative Comparison of Stream Gradients With Coarse Woody Debris
Historic and Current Conditions for Aquatic Processes and Functions
Maps: Reach Breaks of Neil Creek, West Fork & East Forks of Ashland Creek
Table: Processes & Human Influences on Aquatic and Riparian Ecosystems
Map: U.S. Fish & Wildlife Surveyed Wetlands
Map: Supplemental Water Distribution System
Broad Level Delineation of Major Stream Types (Rosgen)
Delineative Criteria for Major Stream Types (Rosgen)

APPENDIX G: HERITAGE RESOURCES

Cultural Uses in the Bear Watershed Analysis Area
Chronology of Important Dates

APPENDIX A

KEY ISSUES & KEY QUESTIONS

Key Questions

IMPORTANT TO REMEMBER: These questions drive the analysis for Chapter II: Historic and Current Conditions and Future Trends.

CLIMATE

Identification of the atmospheric/climate regimes under which the ecosystem of the Bear Watershed Analysis Area have developed is important to this analysis. Attributes to be discussed in this analysis include periods of flood and drought, storm patterns in the winter and summer, occurrence of severe lightning and wind storms, rain on snow events, etc.

Key Question:

1. What is the historical pattern of floods and droughts?
2. What are the winter/summer storm patterns of southwest Oregon, eastern Siskiyou?

TERRESTRIAL SYSTEM

Vegetation; Soil Productivity and Site Capability

The diversity of the vegetative component of an area, both species composition and structure, provide diverse habitats for a wide variety of plant and animal species. The ability of the analysis area to provide and maintain vegetative diversity is dependent on soil productivity and site capabilities. The parameters to be analyzed include plant associations, soil types, amount of coarse woody debris (CWD), and soil chemistry and biology as measured by compaction and loss of duff layers.

1. What plant series and associations occur in the watershed analysis area and how are they distributed.
2. What are the limiting factors for vegetation development in the watershed analysis area?
3. What processes have affected the vegetative composition of the analysis area?
4. What is the site productivity within the analysis area?
5. What activities (include Mt. Ashland Expansion) affect soil biology, fertility, and mechanics and where do these activities occur? (Disturbance mechanisms) What percentage of the analysis area are they? (% of city? are - impervious coverage may also be compacted area)
6. What are the historic & current levels of CWD.

Vegetation; Fire Regime

The analysis of the role of fire in the ecosystem is extremely important in southwest Oregon, considering the unique climate and vegetative conditions which influence fire management in this area. For a discussion of fire's influence on resources, fire risk is defined as the chance of various potential ignition sources (lightning, human caused, etc.) causing a fire, threatening valuable resources, property, and life. The chance of a fire starting is determined by hazards present. Fire hazard is a fuel complex defined by kind, arrangement, volume, condition, and location that forms a special threat of ignition, spread, and difficulty of suppression. Attributes that will be addressed and analyzed for fire processes, functions, and conditions will be fuel type and patterns, fire occurrence, fire intensities, fire sizes, fire timing, and fuel modeling (slope and aspect), resource values at risk, and fire risk.

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The watershed analysis area is located within a Class II airshed. The attributes that will need to be addressed for air quality within the analysis will be particulates and compliance with federal and state laws and regulations.

Key Questions:

1. What is the current fire regime?
2. What has been the effect of fire suppression on increased vegetative competition and fire hazard? What are the effects of dying vegetation on fire potential?
3. What is the historic fire occurrence and the timing of historic events? What were the patterns of aboriginal burning in the Watershed Analysis area? What areas were burned, when and for what purposes?
4. What was the scope of stand replacing fires under the historical regime?
5. How does increased human activity in the urban interface increase fire risk in the area.
6. How is the reintroduction of prescribed burning affecting fire hazard levels as related to vegetative competition, structures, dead and down woody material, and sediment production.
7. How does air quality differ from historical regimes and current suppression regimes?
8. What is the current air quality condition?
9. How will achieving a more historic regime for fire affect particulate requirements? (Disturbance regime step)
10. What is the potential particulate emission with the current situation? How would a large stand replacing fire affect particulate requirements.
11. What is the current fire regimes effect on sediment and stream flow as compared to the historical fire regime? (Disturbance regime, historical range of variability, and general trends steps).

Vegetation; Botanical Resources (A more detailed assessment of overall botanical resources will occur with LSR Assessment)

Key Questions:

1. What TE&S species occur or are suspected to occur in the Analysis Area?
2. What habitats for TE&S species occur in the Analysis Area?
3. What role does this analysis area play in providing for the and conservation and or recovery of these species?
4. Describe how/what natural and human processes affect these species and their habitats. (include Mt. Ashland expansion)

Vegetation; Wildlife habitats

The Bear Watershed Analysis Area is located within an LSR designated under the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl. It is important to understand how biological, physical, and social processes affect meeting the objectives identified for this land allocation.

In addition, the maintenance of well distributed, suitable habitat for appropriate furbearers, raptors, large ungulates, herptefauna, bats, predators, and the prey species for the various predators groups is needed to support biological diversity as well as to meet the biological role of the Late-Successional Reserve designation. Habitat stratification exists that directly correlates to elevation bands, this is

important when discussing the TE&S species found in the analysis area. The use of prescribed fire to protect, improve, and maintain the integrity of the LSR designation for wildlife will be discussed.

The analysis will focus in two main areas:

1) An LSR assessment will define the role of the LSR, provide a step to validate the ROD, and identify how the LSR is currently functioning as related to meeting the objectives outlined in the S&Gs (see ROD, pp C-11). This will provide a basis for recommendations for the protection, maintenance, enhancement, and restoration of LSR.

2) Define the role of the Watershed Analysis area in maintaining and enhancing biodiversity as related to all wildlife species, especially Threatened, Endangered, and Sensitive (TE&S) species.

note: There will be overlap of these two areas as one cannot completely separate these components of the ecosystem.

Late Successional Reserve: See attached process for Late-successional Reserve Assessment.

Wildlife species diversity:

The attributes to be analyzed include: The species associated with the analysis area; the habitat specifics required by these species to meet their life needs; and processes affecting the attainment, maintenance, and protection of habitats.

Key Questions

1. What wildlife species, recognized as threatened, endangered, and sensitive (TE&S) are associated with the analysis area?
2. How does the analysis area provide for conservation or recovery of these TE&S species?
3. What are the population numbers or trends of the TE&S species and other species of concern?
4. What is the structure of the habitat and distribution of habitat?
5. What non-TE&S wildlife species inhabit the analysis area.
6. what natural or human processes have affected, or are affecting the habitat of both TE&S and non-TE&S species.
 - a. How did fire affect habitat historically in the analysis area?
 - b. How have fire suppression efforts affected the habitat that currently exists in the analysis area?
 - c. What is the role of prescribed fire in maintaining desired habitat types in this analysis area?
 - d. What are the effects of roads, timber sales, trails and recreation use, ski area expansion, etc.

AQUATIC SYSTEMS

Hillslope Processes & Sediment Production:

Sediment regime attributes will be discussed in terms of landsliding, soil erosion, and channel erosion. The key attributes for these processes that will be addressed in the analysis are timing, volume, rate, character, and routing.

Key Questions:

1. What human processes affect slope and soil stability? (timber sales, roads, recreation [including ski area], trails, fire exclusion, etc.)
2. How did modern landforms develop? Where are these landforms located?
3. What are the effects of sediment on channel morphology and aquatic habitat?
4. What is the primary mechanism delivering silt to stream systems and the reservoir, and where do these processes occur?
5. What is the primary mechanism delivering coarse sediment to the stream systems and the reservoir, and where do these processes occur?
6. What trends can we expect in future sediment production and how do they compare to historic rates? Where is the sediment production likely to be higher than historic rates? (note: this will talk to the effects of sluicing, fire, urban growth rates, ski area expansion, etc.).

Stream Flow Regime

Attributes that need to be analyzed are 1 to 2 year storm events (bank full), flood events, and low flows. Bankful storm events have been determined to be the long term channel forming and maintenance event.

Key Questions:

1. What is the character, distribution and timing of low flow and major storm events in the watersheds (by sub-basin)? Note: include ski area expansion in trends.
2. Have low flow or bankful or flood events effected habitats for aquatic species?

Water Quality:

Attributes to be addressed include: fecal coliform bacteria, temperature, dissolved oxygen, nitrates, nitrites, phosphorus, ammonium, and turbidity.

Key Questions:

1. Is there evidence of increased sediment loading and/or reduced water clarity in the watersheds?
2. What other types of potential water quality impacts may be associated with human activities in the watersheds? (ski area expansion)

Nutrient Supply:

Key Question:

1. What is the chemical composition of the water and what effect does it have on the aquatic species and domestic water use?

Riparian Vegetation and Riparian Reserves

Riparian areas comprise unique communities of plants and animals which form an important element of the ecosystem. The President's plan identifies "Riparian Reserves" as part of the aquatic conservation strategy. Protection of these lands is essential for healthy aquatic habitat. Attributes to be addressed include: percent canopy cover and vegetative types (species, structure).

Key Questions:

1. What is the distribution of riparian reserves? (map)
2. Does existing vegetation maintain an 80% canopy cover?
3. What is the existing and potential supply for coarse woody debris (CWD) recruitment? Is this adequate for sustaining a diversity of species?
4. How do these areas function in providing habitat connectivity and transition habitat for upland species?
5. What future trends (changes) can be expected? (note: discussion of disturbance mechanisms, ski area expansion).

Viability of Fish Populations

Age, distribution and size of fish populations including anadromous coho salmon, summer and winter steelhead, resident cutthroat and rainbow trout. Other attributes to be analyzed are water temperature, riparian vegetation, coarse woody debris, pools per mile, width to depth ratio, pool to riffle ratio, habitat connectivity, embeddedness, water quality requirements, spawning gravel, and populations of macroinvertebrates (fish food).

Key Questions:

1. What are the historic and current populations and distribution of fish?
2. What fish species are recognized at risk in the watershed analysis area?
3. What fish species are recognized as at risk (e.g., threatened, endangered or sensitive) in the Bear Creek watershed?
4. What role does (or should) the watershed play in providing for conservation or recovery of these species?
5. How have altered physical processes impacted aquatic organism? (What is the current fish habitat conditions for the watershed (coarse woody debris, pool/riffle ratio, width/depth ratio, canopy cover, stream temperature, embeddedness)?)
6. Is habitat connectivity needed to have a viable populations of fish?
7. Does an adequate and diverse population of macroinvertebrates (insects) exist?

Other aquatic animals of concern:

1. What are the historic and current populations and distributions of other aquatic animals of concern.
2. What role does (or should) the watershed analysis area play in providing for the conservation of these species.

THE HUMAN ELEMENT: SOCIAL/ECONOMIC

Because of the adjacency to the City of Ashland, the consideration of human processes is very important to this Watershed Analysis. Social and economical issues to be addressed include: urban/wildland interface, domestic water production, developed recreation sites, water uses (sewage treatment, water rights, etc.), forest products, access and travel management, and cultural uses and historic sites. Analysis of these issues is important in understanding how the Bear Watershed Analysis Area contributes to the ambience and the economic stability of the local community.

Urban/Wildland Interface

With increased urban development in the urban-wildland interface, there is an increased use and need for open space. Providing recreation opportunities for mountain biking, jogging, hiking, and horseback riding will have to be considered in the context of a variety of other issues.

1. What challenges exist in managing for high fire risk with increasing urban expansion. (discussion of interagency coordination and customer relations involved in urban interface fire management).
2. What are the administrative closures restricting human activities in the Ashland Creek Watershed on National Forest Land? [no overnight camping, no campfires, and no grazing, no off road vehicles (including mt. bikes), and restricted access during extreme fire danger, CFR 36, part B, Forest Supervisor signatures]
3. What illegal activities are of concern in the urban interface? What is the relationship of the adjacency to the city on increased illegal activities in the area.
4. Does the social political atmosphere of the local community support reintroduction of fire for hazard reduction.
5. Are there conflicting recreational uses in the interface (i.e. horses vs. bikes, open roads vs. closed roads, other?)
6. What are the economic benefits of recreational opportunities provided in the interface.
7. What are the Visual Quality Objectives for the Watershed Analysis Area? How do these scenic attributes contribute to the "Ashland Setting"?

Water Quality and Infrastructures

Reeder reservoir impounds the waters of Ashland Creek, providing the domestic water supply for the City of Ashland. Sediment produced from the Ashland Creek Watershed accumulates in the reservoir, requiring periodic sluicing to remove the sediment.

1. What are the social and economic impacts associated with this periodic sluicing?
2. What are the socio-economic effects resulting from a major disturbance such as a stand replacing fire, epidemic level of insect and disease, or flood.
3. List documents available that may discuss the socio-economics of other city related waterquality issues.

Human Life

1. What are the risks to human life from wildfire, flood, and mass slope failure. (indirect and direct).

Mount Ashland Ski Area

Located in the southern portion of the analysis area is Mount Ashland Ski Area. The ski area was recently purchased by the community and is operated as a non-profit recreational facility.

1. What are the economic benefits associated with the ski area.
2. How would planned expansion of the ski area affect the local economy and future economic stability of the ski area.

3. What are the human values associated with the ski area and the planned ski area expansion.

Access and Travel Management and Dispersed Recreational Use

1. What types of dispersed recreational use occur in the analysis area?
2. What uses in the watershed analysis area need to be considered when analyzing access and travel management plans and road maintenance schedules?

Cultural Uses

1. What native american attributes exist in the analysis area (subsistence collecting, spiritual areas, prehistoric sites, etc.)?

Potential for Wild and Scenic River Designation

Potential for Wild and Scenic River designation must be completed for all streams on the Forest.

Key Questions:

1. What is the potential for Wild and Scenic designation for Ashland Creek as measured by the presence of outstanding, remarkable values?
2. What is the potential for Wild and Scenic designation for Neil Creek as measured by the presence of outstanding, remarkable values?

It must be remembered that many of these issues overlap with each other. Even though specific issues were highlighted as addressing certain elements, one must remember that there are interactions occurring amongst all the elements. All of these issues will be tracked through the entire analysis and interactions, functions, processes, and conditions may be discussed beyond those highlighted in this issues package.

APPENDIX B

FIRE

Identification of Specific Vegetation Zones for the Bear Watershed Analysis Area
Fire Behavior Fuel Model Key
Fuel Model Assignments
Chronology of Events

IDENTIFICATION OF SPECIFIC VEGETATION ZONES FOR THE BEAR PROJECT ANALYSIS AREA- influencing the Fire Environment.

The production and maintenance of water quality is dependent upon vegetation. Not only does the amount, type and location of vegetation influence water quality, vegetation influences fire probability and occurrence. From a fire management standpoint stand age and type, fuel loading, fuel arrangement and continuity of fuels are important considerations. The make up of vegetation, either dead or live, must be considered when discussing a fire and fuel complex.

Emphasis discription will take place for the Interior Valley Vegetation Zone and the Mixed Conifer Vegetation Zone of the Bear Analysis Area. These two zones are where the greatest fire hazard and risks are located., Vegetation Zones.

Jerry Franklin in his Vegetation of Oregon and Washington, publication states that zonal description of vegetation is must helpful in defining areas in which one plant association is the climatic climax. Vegetation on undulating topography is primarily a product of macro-climate and occur sequentially on mountain slopes, but often they interfinger. By describing the environmental composition and successional processes of each zone, conclusions can be drawn as to the types of vegetation that exist(ed) either live or dead.

See Vegetation Zone Map for the Bear Watershed Analysis area.

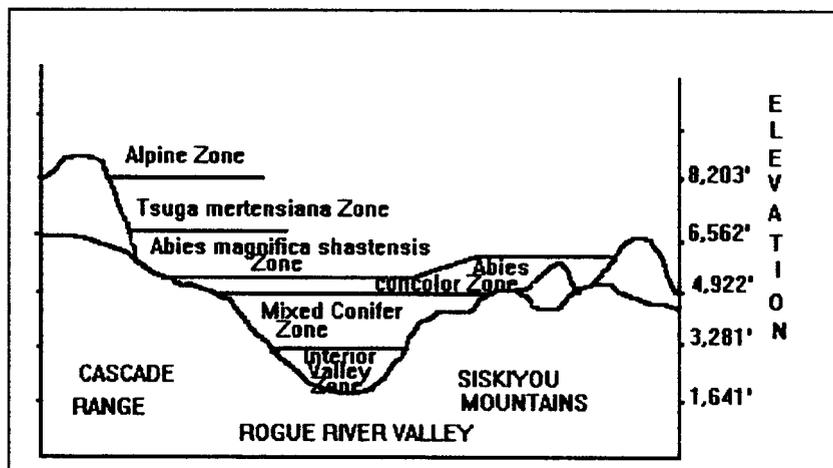


Figure 1

Description of Interior Valley Vegetation Zone.

- A) Environmental Characteristics- Rogue Valley area warmest and driest region west of the Cascade Range. Primarily because of the rain shadow influence of the coast and Siskiyou Mountains.
- B) Vegetation Composition-
 - 1) Oak Woodlands: Range from very open savannas with grass understories to dense forest stands and from pure oak types to communities with an abundance of conifer associates.
 - 2) Conifer Forest: The Rogue Valley area has perhaps the most diverse valley coniferous forests. Douglas-fir and ponderosa pine are the most important species. These forests vary greatly with the moisture regime, which include: (a) Tree layer of Douglas-fir, ponderosa pine or sugar pine of both. (b) Golden chinquapin, tan oak, madrone, © Understory shrubs.
 - 3) Grasslands: Grasslands are representative of the Interior Valley Vegetation Zone.

4) Sclerophyllous Shrub Communities: Conspicuous in southern interior valleys especially the Rogue River Valley. Some consider the southern Oregon shrub communities as an extension of northern California chaparral types. Narrow-leafed buckbrush, white-leafed manzanita, chief components of Oregon chaparral. Some chaparral areas within the Rogue Valley are considered climax and depend upon fire for continuance.

C) Successional processes specific for interior southwest Oregon, Interior Valley Vegetation Zone.

Fire was primary disturbance mechanism. Frequent low intensity fire return intervals of 8 to 10 years. Climax with disturbance may be Douglas-fir, ponderosa pine, oak with chaparral.

Description of Mixed Conifer Zone

A) Environmental

Very little precipitation during the summer. Summers are distinctly warmer and drier than similar elevations located at northern latitudes. Moisture regimes more favorable than within Interior Valley Zones.

B) Composition

Species occur in many combinations and degrees of moisture: *Pseudotsuga menziesii*, *Pinus lambertiana*, *P. ponderosa*, *Calocedrus decurrens*, and *Abies Concolor*. *Pseudotsuga menziesii* is probably the most abundant species, but it tends to decrease and *Pinus* spp. tend to increase in importance from north to south within the zone.

Abies concolor is often represented only by seedlings and saplings in existing mixed-conifer stands.

C) Succession

Brushfield communities can significantly slow the rate of forest succession or, with repeated fire, become semipermanent communities. *Ceanothus velutinus* is important as a brushfield dominant or invader following logging or fire within this zone.

Many tree species are relatively young and/or have been subjected to one or more fires since their establishment. *Pinus labertiana* is seral. *Pinus ponderosa* is also seral, although may reach climax status on poorly drained sites or extremely xeric site. *Abies concolor* appears to be the major climax species within the Mixed Conifer Zone but usually climax occurred on wetter sites according to Franklin.

Fire primary disturbance mechanism. Frequent low to moderate intensity fire return intervals of 15 to 20 years.

On a landscape basis from a pragmatic interpretation the vegetation within the analysis area- the following shows acres and percent of acres of the total representative by each vegetation zone:

	<u>Acres</u>	<u>Percent</u>
Interior Valley Vegetation Zone acres-	13,587	34%
Mixed Conifer Vegetation Zone acres-	16,443	41%
White Fir Vegetation Zone acres-	4,828	12%

Shasta Fir Vegetation Zone acres-	5,358	13%
Mountain Hemlock Zone acres-	198	.005%

FIRE BEHAVIOR FUEL MODEL KEY

- I. Primary carrier of fire is grass. Expected rate of spread is moderate to high, with low to moderate intensity.
 - A. Grass has a relatively fine structure, is generally below knee level and is easy to walk through Model 1
 - B. Grass has thick, coarse stems, is above knee level, and is difficult to walk through Model 3
 - C. Mixture of grass and litter beneath open timber or brush overstory that does not burn Model 2

- II. Primary carrier of fire is brush. Expected rate of spread and intensity are both moderate.
 - A. Vegetation type is southern rough or low pocosin Model 7
 - B. Live fuels absent or sparse with no capability to reduce fire spread rate Model 6
 - C. Live fuel moisture can have a significant damping effect on the fire behavior.
 - 1. Brush is about knee deep with a light loading of 1-H TL fuels Model 5
 - 2. Brush is close to head high with a heavy loading of 1-H TL fuels Model 4

- III. Primary carrier of fire is debris beneath a timber stand.
 - A. Live fuels are present in sufficient quantity to influence fire behavior. The load of 100-H TL fuels is heavy Model 10
 - B. Surface fuels are mostly foliage litter, with little or no live fuel.
 - 1. 1-H TL load strongly predominates; and 100-H TL fuels are sparse. Foliage litter is long needle pine or hardwood leaves, loosely compacted Model 9

2. 1-H and 10-H TL fuel load combined is about equal to 100-H TL load. Foliage litter is short needle coniferous or small hardwood leaves, tightly compacted Model 8

IV. Primary carrier of fire is slash.

A. Slash is not continuous. Other ground fuels must be present to help carry the fire. Average slash depth is about 1 foot. Model 11

B. Slash is continuous or nearly so. Other surface fuels need not be present to carry the fire. Average slash depth is about 3 feet Model 13

C. Slash generally covers the ground, though there may be bare spots or areas of light coverage. Average slash depth is about 2 feet Model 12

ALWAYS CHECK THE SELECTED MODEL WITH THE DESCRIPTORS

Fuel Model Assignments:

Fuel Model 1 - Although there are patches that still fit best as a fuel model 1, for the most part these patch types have a brush component and are best characterized as a 2. This is a nominal component within the landscape and patch sizes do not tend to be very large. It mostly occurs along the ridges of the landscape boundary. Fuel Model 5 - globally changed to fuel model 6. Again there are areas that would be best characterized if left as a 5, but overall decadence in the brush types indicate a 6 would be the best model description. Given the short time period for analysis and using the coarse filter approach, fuel model 6 was used to describe the brush strata in general. The brush patches would require more detailed assessment prior to any prescription development.

NCI -- (Non-commercial Forest) from the vegetation layer a model was not assigned. In this landscape a fuel model 6 best characterizes the NFC lands. For the most part they are scrubby white or black oak and associations, with more structural diversity than found in buckbrush types. They also have a higher degree of decadence as found in the buckbrush types. Individual stands could be typed differently during field review.

Fuel Model 11 -- Assumptions for this model: attributed to older plantations (>30 years).

Thinned Stands - Remained as fuel model 11. Assumption that thinned untreated stands have created a fuel model 11.

Poorly stocked stands--were assigned as fuel model 6. Assumption is the brush component will be the fire carrier. For the most part these stands are >30 years old, presumed brush with decadence. It is likely some of these stands would best be characterized as a fuel model 5. Need to ground truth at project planning level.

Adequately stocked stands - Went into a fuel model 9. Assumption is the litter accumulation is the fire carrier. Many stands went into fuel model 9 rather than an 8 because majority of area has high component of ponderosa pine. Further evaluation of individual stands would indicate species composition and most appropriate fuel model.

Fuel models 8, 9, and 10 within the Bear analysis area: as a generality, primarily on federal land it can be said that northerly slopes are more densely populated by short needle or long needle conifers, including shrub and hardwood vegetation, fitting the criteria for models 8, 9, and 10. Higher elevations where conifers of late seral stages are evident oftentimes are represented by model 10.

For those areas that was involved in the 1959 wildfire on National Forest, present vegetation is heavily represented by ponderosa and jeffrey pine. These tree species were planted after salvage logging. These planted areas best meet the NFFL fuel model 6- since thats how they burn during late fire season. Much of these areas have shrub/hardwood combinations within them also.

CHRONOLOGY OF IMPORTANT DATES

ASHLAND CREEK WATERSHED

1850 - 1900 THE CITY USES THE WATERSHED FOR WATER AND IRRIGATION. Early days water was used for source of power for early industry. Main use for woolen mill, flour mill, saw mill and later (1908) an electric light plant. ¹

1856 - CITY OF ASHLAND FOUNDED

1880's - SMALL SAW MILLS CONSTRUCTED. One located in the present area of Lithia Park - the other in the present area of Reeder Reservoir. ²

1888 - "PRIMITIVE" HYDROELECTRIC PLANT. Constructed at the present location of upper Lithia Park. ³

1893 - PRESIDENT CLEVELAND PROCLAIMS WATERSHED AS NATIONAL RESERVATION. Maintenance of water production and quality prime objective. Federal legislation in 1897 allowed wood production. But the original intent of reservation was continued under the Department of Interior management until forest preserves were transferred to the Department of Agriculture.

1900 - FIRST SURVEY OF THE ASHLAND RESERVE. Made by John R. Leibig of the U. S. Geological Survey. Stated Leibig, "If the purity and stability of the water volume in Ashland Creek is worthy of consideration the prohibition of sheep grazing within the reserve should be absolute." He further stated ... "whether easy or difficult access, it is obvious that the maintenance of the Ashland Creek water volume is prohibitive to lumbering operation in the reserve." ⁴

1906 - ASHLAND RESERVE CLOSED TO CAMPING.

1907 - ASHLAND RESERVE CLOSED TO GRAZING.

1909 - ASHLAND CITY GOVERNMENT HELPS FINANCE ROAD. Construction of road up Ashland Canyon for several miles. Promoted as a major West Coast health spa. Recreational impetus was increased by the stocking of eastern brook trout in Ashland Creek. ⁵

1910 - 4,000 ACRE FIRE BURNS INTO THE WATERSHED. Fire originates adjacent to the Wagner Road - burns into the shed and up the East Fork of Ashland Creek. Area of Winburn Ridge burns in separate fire. Many large fires in the Pacific Northwest. ⁶

1910 - CITY PETITIONS AND PROTESTS. Documents the damage from timber cutting to water production. Petitions that activities cease. Requests that a forest officer live in Ashland. Official document from City Council. ⁷

1916 - MUCH OF THE LITHIA PARK DEVELOPMENT IS COMPLETED. City hires professional to promote the wonders of Ashland Canyon. ⁸

1916 - OREGON AND CALIFORNIA LAND GRANT lands reverted to the United States ownership in 1916. Watershed lands were O & C Land Grant designated lands. (Environmental Impact Statement, Reeder Reservoir Maintenance Operations, An Element of the Rogue Valley Water Quality Management Plan, page 138, Responses to Comments from U. S. Forest Service - Rogue River National Forest)

1917 - 1,000 ACRE (plus) WILDFIRE BURNS IN WATERSHED. Ranger Gribble experienced definite problems in receiving assistance to help with the 1917 fire. ⁹

1920's - JESSE WINBURN BUILDS RESORT IN WATERSHED. Constructed stables and swimming pool. After disagreements with city council abandoned site. ¹⁰

1924 - LARGE FIRES IN THE WATERSHED. ¹¹

1928 - REEDER RESERVOIR DAM COMPLETED. Constructed at a cost of \$350,000. ¹²

1929 - CONGRESSMAN PROPOSES LEGISLATION TO PROTECT ASHLAND WATERSHED. Protection will mandate permanent action. Secretary of Agriculture advises against it since it would set precedence. ¹³

1929 - COOPERATIVE AGREEMENT WITH THE CITY OF ASHLAND AND THE DEPT. OF AGRICULTURE. Reiterates that the watershed will be managed primarily for maintenance of water quality.

1933 - CRATER NATIONAL FOREST CHANGED TO ROGUE RIVER. Because of confusion between Crater Lake National Park and Crater National Forest - the Rogue River National Forest is created. ¹⁴

1936 - REPORT TO CONGRESS - Acting Secretary of Agriculture reports to Congress - "If the Oregon and California Railroad land-grant lands were disposed of in their present status under the act of June 9, 1916, the only receipts which would be derived therefrom would be those which came from the sale of timber. The City of Ashland wishes the lands placed under national forest management in order to protect its source of water supply and, therefore, quite likely would object to timber sales within the area..."

(Environmental Impact Statement, Reeder Reservoir Maintenance Operations, An Element of the Rogue Valley Water Quality Management Plan, August 1980, p. 138, Responses to Comments from U. S. Forest Service - Rogue River National Forest)

1948 - JANUARY HEAVY RAINS. Caused runoff which carried large amounts of soil into water. Water was unpalatable for a month. This led to the installation of the present filter plant. ¹⁵

1955 - DISTRICT RANGER STATES THAT THE CITY periodically hydraulically cleans out sediment from small reservoirs in the east and west forks of Ashland Creek. ¹⁶

1955 - THE FOREST SUPERVISOR DISCUSSES WITH THE CITY COUNCIL the need to harvest timber in the watershed because of dead and dying Douglas fir trees. This is necessary because of the increased fire danger. Will make a test timber sale in the Tolman drainage first. ¹⁷

1955 - FOREST SERVICE reports that the watershed has been traditionally closed for recreational use because of access and fire closure. It is not expected to be encouraged in the future. ¹⁸

1956 -ROAD CONSTRUCTION STARTS IN THE WATERSHED to facilitate timber sales. Only roads in the watershed previous to new construction is the Ashland Loop Road constructed by the Civilian Conservation Corps (located mostly on the east ridge of the watershed divide) and a road running up Ashland Canyon, past the reservoir up the West Fork of Ashland Creek to the south end of Winburn Ridge. ¹⁹

1958 - TIMBER HARVEST STARTS IN THE WATERSHED.

1959 - 4,700 ACRE FIRE BURNS INTO WATERSHED. Starts near Jackson Hotsprings. South advance of fire was controlled at a fuel break established by the Civilian Conservation Corps in the 1930's. 28 miles of trenches constructed for erosion control after burn. (Explains what appears to be a system of old abandon trails on the north end of the watershed)²⁰. Many acres are grass seeded. Taylor of Skyline Mine reports damage to his mine shaft when water was pumped out of it to help suppress fire.

1962 - CITY REPORTS AN INCREASE OF SEDIMENT YIELD IN REEDER RESERVOIR. Columbus Day storm occurs in Oct.

1963 - 64 MOUNT ASHLAND SKI DEVELOPMENT COMPLETED.

1964 - DECEMBER FLOOD. Major damage in the watershed from flood. Reeder Reservoir fills up with sediment.

1965 - FOREST STOPS PLANNING TIMBER HARVEST IN THE SHED. City criticism of timber sales and road construction contributing to erosion. FS studies the situation.

1967, 69 & 71 - ABANDONED CAMPFIRES in the East Fork of Ashland Creek start fires that burn up to the Ashland Loop Road. Increase in illegal camping and the use of open fires.

1969 - ASHLAND WATERSHED INTENSIVE MANAGEMENT PLAN. Forest Supervisor and Ashland District Ranger meet Al Alsing and Gary Boshears (City Administrator. City Officials express concerns of encouragement of public use of watershed. They state that public use should not take place. Supervisor and Ranger agree that low priority should be given to developing or encouraging public recreation. (Forest Service letter - March 5, 1969, Filed under 3500 Cooperative Watershed Management, Ashland Watershed Intensive Management Plans, To files.) Chronology update 6-24-86.

1970 - REGIONAL FORESTER REPROACHES THE FOREST SUPERVISOR. Letter states that the Forest subordinated water quality for other management objectives. No more commercial logging until the forest can demonstrate no conflict to water quality. Lack of personnel and funding not an excuse.²¹

1973 - STUDY FROM THE CITY CONCERNING ASHLAND WATERSHED. Shed is the only practical water source. Sediment accumulations now have to be removed. Past recreational and timber management activities cause increase in sediment. Increase in expanded watershed activities will result in worsening of damage. Multiple use not valid for the shed. ²²

1972, 1973 & 1974 ARSONIST ACTIVE IN SOUTHERN OREGON. Starts fires adjacent to the watershed - 1973. Hillview fire 350+ acres above town.

1973 - DROUGHT IN PACIFIC NORTHWEST. Water use curtailed in city to deal with reduced stream flows.

1973 (Summer) - BULL GAP PICNIC AREA TORN DOWN. Vandalism continually requires maintenance to picnic facilities. Not used since the sixties because of cost of maintenance.

1974 - JANUARY - MAJOR FLOOD. Damage significant. Reservoir fills with sediment and filtration plant damaged.

1974 - REINFORCED GATES PUT ON MAIN ENTRANCES TO WATERSHED. Closed in winter months and during extreme fire danger.

1974 - FOREST SERVICE BUILDS SEDIMENT TRAPS. Forest Service crews build sediment traps on Mt. Ashland ski runs. Necessary because of erosion increase due to the flood of Jan. 1974.

1975 - 1980 INCREASED VANDALISM TO GOVERNMENT AND CITY PROPERTY. Vandals destroy gates in watershed. Off road motorcyclists increase off road activities. Increase erosion.

1975 to 1980 - MANPOWER PROGRAMS CONSTRUCT SHADED FUEL BREAKS. Work accomplished by hand. (CETA & YACC)

1977 - SKYLINE MINE CONDEMNED. Failure to show valid claim.

1977 - MONTGOMERY REPORT. No further road construction should occur except by mutual consent. Mining should not be allowed. Access and recreational activities should be tightly regulated. The Forest Service should inventory and study potential recreational uses of the watershed jointly with the City before recreation use is allowed. Forest harvest should not occur. Timber removal should be allowed only for special cases (non-commercial cutting) where both the Forest Service and City agree. The Forest Service should seek additional funding for more intensive fire protection. ²³

1979 - DISTRICT RANGER WRITES LETTER TO MT. ASHLAND SKI AREA. The District Ranger for the Ashland Ranger District (1979) stated in writing that he would testify that the ski area operation was contributing to erosion. This was because of the failure of ski area management insuring that sediment traps were cleaned out periodically - including other erosion work.

1979 - INTERIM WATERSHED PLAN. Provide interim management direction for the watershed until the Forest Plan is completed. City part of the planning process. City conditionally approves plan. Request by City to complete a detailed Fire Management Plan for the Ashland Watershed. Looking at prescribed burning, shaded fuel breaks and fire prevention to help prevent a catastrophic fire in the watershed.

1980 - MONTGOMERY, CONSULTING ENGINEERS, INC. - Input the EIS for Reeder Reservoir Maintenance Operations..."high levels of human activity...would be expected to increase the likelihood of a large problem fire." (Environmental Impact Statement, Reeder Reservoir Maintenance Operations, An Element of the Rogue Valley Water Quality Management Plan, August 1980, page 14, Input into the draft EIS, James M. Montgomery, Consulting Engineers, Inc.)

1980 - DIRECTOR OF PUBLIC WORKS, CITY OF ASHLAND - Public hearing input into the EIS for Reeder Reservoir Maintenance Operations..."minimizing human activities within the watershed and maximizing fire observations and quick control is not only the most logical but backed up by the history of fires within the Rogue River area." (Environmental Impact Statement, Reeder Reservoir Maintenance Operations, An Element of the Rogue Valley Water Quality Management Plan, August 1980, page 151)

1981 - FIRE MANAGEMENT PLAN COMPLETED. District Ranger selects fuel management as the most cost/effective method to deal with the fire danger in the watershed.

Increasing vegetation in the watershed is increasing the likelihood of a major fire. Recommend prescribed burning and shaded fuel break construction.

1982 - ASHLAND DISTRICT LAW ENFORCEMENT patrols in the watershed decrease. Increase in illegal fire wood cutting. Fire danger and off road vehicle signs are removed several times a week by vandals.

1982 - ADMINISTRATIVE TIMBER SALES START. Construction of shaded fuel breaks and initial attack helispots. Only on relatively flat ridges.

1982 - INCREASING MOTORCYCLE DAMAGE TO SOIL. Increasing destruction to government property (Signs). Two separate individuals are removed from the watershed for occupancy. Lived in tent and tepee.

1982 - REPORT OF INCREASING OVERNITE CAMPING ON ROAD. Road south of City granite pit increasingly is used for overnite vehicle camping at night during the summer months. Forest Service employees find that they move out before regular hours of FS employment.

1983 - PRESCRIBED BURNING STARTS IN THE ASHLAND RESEARCH NATURAL AREA. First use of prescribed fire in Research Natural Areas nationally.

1983 - HELICOPTER LOGGING NOT ECONOMICAL. District fuels and logging spec. look at the economic and environmental opportunity for helicopter logging in the watershed. Objective would be to remove dead, dying or diseased trees. Size of landings, new road building, haul routes, the amount of volume harvested and the cost of slash treatment preclude this opportunity to help reduce fire danger.

1983 - POT SITE LOCATED IN THE EAST FORK OF ASHLAND CREEK.

1984 - PERMIT REQUEST FOR THE SKYLINE MINE. Taylor goes through the process of proving up on his claim.

1985 (winter) - DESTRUCTION OF GATES CLOSING WATERSHED.

1985 (April) - PRESENT FINANCIAL PLAN FOR FIRE MANAGEMENT OBJECTIVES. Forest Supervisor reviews and approves. Reduction in manpower programs requires service contracting to meet objectives. Plan outlines short term and long term objectives. Forest Supervisor (Devlin) expresses concerns of a proposed trail

increase in trail system as an example of increasing "supply" for recreational needs. (Hess study, 1986). Fire/fuels planning specialist counters with that any increase promoted by the forest service has to be properly managed from a fire prevention and watershed quantity/quality protection standpoint- that administratively insure that dollars on an annual basis are available to employ a workforce to manage, educate, inform, and regulate the various publics that are using the watershed. There is more to fire prevention and watershed mgt than replacing paper signs that are torn down daily.

1986 (May) - CITY ADMINISTRATOR FORMS COMMITTEE. According to Medford Mail Tribune article, Administrator wants a committee to look at the possibility that the Rogue River Forest Plan may allow for commercial logging in the Ashland Watershed.

1986 (June) - WINBURN RIDGE ADMINISTRATIVE SHADED FUEL BREAK TIMBER SALE STARTS. Predicted by the Interim Watershed Plan.

1986 (June) - MID JUNE DISTRICT FIRE PREVENTION PERSONNEL locate seven individuals at Reeder Reservoir. Access was achieved from the Nature Trail parking area. Filtration water plant operators report continued mountain bike tracks in the area of Reeder Reservoir.

1986 (June) -DISTRICT RECEIVES A COPY OF ROGUE RIVER NATIONAL FOREST NEW RELEASE. Release informs public as to roads for mountain bike useage. One of the areas promoted is road "2060 above Lithia Park." This road leads into the watershed.

1986 (June) - PRESCRIBED FIRE WITHIN THE ASHLAND WATERSHED. Site specific long term objectives is to alter dense vegetation to natural pine type. Short term objectives is to eliminate hazardous dead and down and living vegetation contributing to fire danger.

1986 (August) - WATERSHED CLOSED TO PUBLIC ACCESS DUE TO EXTREME FIRE DANGER.

1986 (Fall) - FOREST SERVICE TO COMPLETE EIS FOR MT. ASHLAND SKI AREA.

1987 (January) - FOREST SUPERVISOR STATES SKI EXPANSION WOULD NOT INFLUENCE REEDER RESERVOIR. Article in the Ashland Daily Tidings newspaper. The ski area expansion is far enough away from Reeder Reservoir that there should not be any measurable influence.

system in shed. Not compatible with fire danger and prevention in the watershed.

1985 (August) - PRESENT FINANCIAL PLAN TO REGIONAL OFFICE. Region Fire Director approves - does make suggestions.

1985 (August) - TOXIC WASTE DUMPED on Loop Road. EPA contractor paid by Forest Service to clean up. Responsible party not known.

1985 - CITY OFFICIALS CRITICIZE FOREST SERVICE. Criticism based on lack of timely response to closing the watershed due to extreme fire danger.

1985 (December) - NEWS RELEASE ON MT. ASHLAND SKI EXPANSION. Long range plan is for extension into the north slopes of watershed.

1986 (January) - SERVICE CONTRACT FOR SHADED FUEL BREAKS STARTS. Steepness of slope and economics preclude administrative timber sale.

1986 (February) - PRESENT FIRE MANAGEMENT FINANCIAL PLAN TO NEW FOREST SUPERVISOR. Forest Supervisor expresses concerns of trail system in shed. Not compatible with fire danger concerns.

1986 (March) - HYDRAULIC REMOVAL OF SEDIMENT. City request permit from DEQ for removal of sediment from Reeder Reservoir by pressurized hydraulic removal. Controversy of downstream fisheries develops. City administrator alludes that past management practices in the shed is the reason for sediment accumulating in the reservoir.

1986 (spring) - PRESCRIBED BURNING outside of the Research Natural Area.

1986 (May) - MEMORANDUM OF UNDERSTANDING APPROVED. City Mayor and Forest Supervisor approve Memorandum of Understanding. Memorandum outlines the conditions which the watershed would be closed due to extreme fire danger. Also the memorandum deals with the training that city volunteer fire prevention personnel receive for public contact procedures. Memorandum objectives explained to City Council and City Mayor.

1986 (May) - RANGER AND FOREST LANDSCAPE ARCHITECT present study concerning close-in recreational use in the Ashland Watershed. Study recommends educational program to increase visitors awareness of sensitivity. Suggests

1987 (January) - SEWER DRAINFIELD AT MT. ASHLAND - checking with district records and personnel showed that the area south of the drainfield was never checked to see if any seepage was surfacing.

1987 (May) - DRAFT ENVIRONMENT IMPACT STATEMENT. Mt. Ashland Ski Area expansion DEIS released for public review. Forest Service chooses alternative V.

1987 (June) - CITIZENS COMPLAIN THAT PUBLIC INVOLVEMENT MEETING WAS IMPROPER. League of Women Voters write letter to Ashland Daily Tidings Editor that the public involvement meeting for the proposed Mt. Ashland Ski Area expansion was too informal. That meeting was more of a salesman approach than an interchange of questions by the public and answers by the appropriate government officials.

1987 (June 16) - CITY HIRES ENVIRONMENTAL LAWYER TO CHALLENGE DEIS. City states that development of a septic drainfield in the watershed is unacceptable. That the DEIS doesn't specifically define what the mitigation measures are for the various influences that implementation of the proposed alternative will manifest. That a worst case scenario will be necessary.

1987 (July) - TAYLOR OF SKYLINE MINE forceably removed from National Forest by U. S. Magistrate order. U. S. Marshals do the removing. Forest Service employees remove his personal belongings and equipment.

1987 - SERIOUS DROUGHT PACIFIC NW. Low snowfall and rainfall into fire season since the start of the water year (1 Sept. 1986.) Drought year.

1987 - MID-JULY FIRES IN WATERSHED. Lightning fires in watershed requires Class II Incident Command System overhead team.

1987 - PACIFIC NW FIRES. End of August thousands of fires started by lightning. Rogue Valley filled with smoke for weeks.

1988 - UNUSUAL AMOUNT OF DEAD ponderosa and sugar pine trees noticed above town (forest/urban interface). Mortality associated with Pine Beetle.

1988 - SUSPECTED ARSON FIRE. Fire started during "Eastwind." Suspected arson fire started at valley bottom burns into National Forest. Evacuation of residents from upper Tolman Creek area.

1989 - ENTOMOLOGIST SURVEY of dead trees confirms major insect infestation killing pine trees. Combination of moisture stress brought about by drought and increasing vegetation density competing for limited water - weakens trees. Insects are able to kill tree.

1989 - DEAD TREES INCREASE FIRE DANGER. A large administrative timber sale planned, to remove by helicopters dead or dying trees. Objective is to reduce the fire danger within the Ashland Watershed. Ashland Ranger District, private landowners and City of Ashland remove dead and dying trees to reduce fire danger.

1991 - PRESCRIBED BURNING on private, City and National Forest on increase. Cooperation necessary in order to solve the fire danger and forest health problem within the forest/urban interface.

1991 - CITY OF ASHLAND completes Forest Management Plan for City owned forested land. Plan emphasizes vegetation management through manual cutting, prescribed fire, shaded fuel breaks, and small timber sales.

1992 - SERIOUS DROUGHT YEAR.

1992 - PUBLIC WANTS HAZARD REDUCTION. Citizens "demand" that the City of Ashland protect their watershed from catastrophic fire. City trying to find funding or initiatives to finance hazard reduction for non-commercial vegetation. For information: much of the public considers the forested area above town as the watershed. Actually many separate drainages, in addition to the Ashland Creek Watershed

1993 - RELATIVELY WET FIRE SEASON. Low fire occurrence within interior southwest Oregon.

1994 - MOUNTAIN BIKES. City reports that illegal mountain bike activity probably is the major cause of erosion on City owned land. Starting 1991 on National Forest land increasing illegal (used off of designated roads or trails) mountain bike use on shaded fuel breaks takes place. Because the vegetation is thinned from shaded fuel breaks mountain bikers ride their bikes on steep terrain, locking their brakes, skidding on the erosive thin litter layer soils, channeling and exposing the soils to weathering and erosion.

1 Harold A. Thomas, Ashland District Ranger, Multiple Use Plan, Problem Area #1 Ashland Creek Watershed. Rough Draft. Feb. 11, 1959, p.24.

2 Jeffrey M. Lalande, The Prehistory and History of the Rogue River National Forest: A Cultural Resource Overview. (Forest Service - USDA, Pacific Northwest Region, Rogue National Forest, 1980), p. 80.

3 Lalande, op. cit., p. 92.

4 Anthony Netboy, "A Report on Legislation, Official Policy and Direction in Management of Municipal Watersheds by the Forest Service with Special Reference to the Ashland Creek Watershed," Interim Plan for the Ashland Creek Watershed, Rogue River National Forest, U. S. Forest Service, 1979, appendix, p.75, citing John R. Leibig, The Cascade Range and Ashland Forest Reserve and Adjacent Regions, p. 473.

5 Lalande, op. cit., p. 88.

6 Lalande, op. cit., p. 89.

7 Rogue River National Forest, U. S. Forest Service, Interim Plan for the Ashland Creek Watershed, Sept. 1979, appendix, p. 38.

8 Lalande, op. cit., p. 88.

9 Lalande, op. cit., p.89.

10 Lalande, op. cit., p. 92.

11 Lalande, op. cit., p. 89.

12 Thomas, op. cit., p. 24.

13 Rogue River National Forest, U. S. Forest Service, Interim Plan for the Ashland Creek Watershed, Sept. 1979, appendix, p. 47.

14 Rogue River National Forest, U. S. Forest Service, History of the Rogue River National Forest 1933 - 1969, vol. 2, overleaf.

- 15 Thomas, op. cit., p. 28.
- 16 Thomas, op. cit., p. 31.
- 17 Rogue River National Forest, U. S. Forest Service, Interim Plan for the Ashland Creek Watershed, Sept. 1979, appendix, pp. 51-55.
- 18 Thomas, op. cit., p. 33. Refers to letter written in 1955.
- 19 Thomas, op. cit., p. 25.
- 20 Rogue River National Forest, U. S. Forest Service, History of the Rogue River National Forest 1933-1969, vol. 2. (see 1959 section under fire control and soil and watershed management - there are not any page numbers)
- 21 Rogue River National Forest, U. S. Forest Service, Interim Plan for the Ashland Creek Watershed, Sept. 1979, appendix, pp. 99-104.
- 22 Rogue River National Forest, U. S. Forest Service, Interim Plan for the Ashland Creek Watershed, Sept. 1979, appendix, pp. 7-19, citing DEQ Letter to City of Ashland & Report of Evaluation, Aug. 1973.
- 23 Rogue River National Forest, U. S. Forest Service, Interim Plan for the Ashland Creek Watershed, Sept. 1979, appendix, pp. 21-27, citing Summary, J. M. Montgomery Report, 10/20/77.

APPENDIX C

GEOLOGY, GEOMORPHOLOGY & SOILS

**Geology and Geomorphology of the Bear Watershed Analysis Area
Characteristics of Soil Productivity**

APPENDIX

Geology and Geomorphology of the Bear Watershed Analysis Area

The Bear Watershed Analysis Area (WAA) is situated in the complex terrain of the Klamath Mountains Physiographic Province. The watershed is located in the northeast portion of the Klamath Province, which extends into Northern California. The current GIS layer has been updated to reflect the geology of the entire watershed (see Figure 19 of the main report; Hillslope Processes). Nearly 84% of the Bear WAA is composed of dissected granitics of the Ashland Batholith. Of the remainder of the watershed, 12.1% consists of clastic sedimentary rocks and 4.1% consists of metamorphosed sedimentary rocks of the Applegate Group. The metasedimentary rock types are located near Wagner and Wrights Creeks on the northwest edge of the watershed. The extreme northern area of the watershed (in and above the city of Ashland) contains sedimentary rocks and minor amounts of alluvium are found along Bear Creek.

The Klamath Mountains are composed of four belts of rocks which were previously part of a deep marine environment. The four belts of rock are composed of oceanic sediments interlayered with lava flows. These composite belts are bounded by thrust faults. The Klamaths began as an island chain that extended off the Southern Oregon/Northern California Coast and trended in a northwest direction to British Columbia. A subduction zone between two tectonic plates developed during this time frame.

The subduction process caused descending rocks to melt, forming large granitic bodies at depth. Also as a result of this subduction, a series of volcanos were produced on top of the older oceanic terrains. As the volcanic arc separated from the land mass, a backarc basin developed between the older volcanic chain and the new volcanic mountains above the subduction zone (Orr, Orr, & Baldwin 1992). The four belts or terrains slowly assembled close to the West Coast of Northern American and were accreted to the continent approximately 150 million years ago. Dikes and sills were intruded into the basin during the late Jurassic Time also. The Klamaths were then rotated 340 kilometers from Eastern Oregon and into their present position.

From 100 to 15 million years ago the landscape was somewhat subdued and contained much more flat topography than today. Volcanic, sedimentary and metasedimentary rock types were exposed at the surface of the ground. During the last 14 million years the area was uplifted 20,000 feet in elevation and tilted mainly to the east. This uplift was centered at Condrey Mountain dome in the southern portion of the Applegate Ranger District. The uplift caused the Bear WAA to be tilted 20 to 40 degrees away from Condrey Mountain. Steep dissected mountains were being sculpted and developed during this time. As the mountains were uplifted, erosion and landsliding began to increase and the overlying volcanic and sedimentary materials were stripped away. Most of the eroded sediments were eventually transported to the Pacific Ocean via large streams.

Molten granitic rocks (magma) intruded into pre-existing rocks deep within the earth's crust. Magma slowly cooled, allowing quartz, feldspar and dark minerals to begin to crystallize and eventually the magma solidified into a large body of granitic rock called a batholith. Slowly the granitic terrain started to break through and increased exposure to the surface. Millions of years of erosion, stream development, folding, faulting, landsliding and glacial processes have developed the modern day topography in the Bear watershed.

The granitics (Kjg on geology map) are composed mainly of the following rock types: diorite, tonalite, granodiorite and granite. Small dikes and veins of quartz monzonite and pegmatites commonly occur throughout the watershed. The granitic rock types range from 164 to 145 million years in age (Jurassic Period). The bedrock found at the surface today was once covered by 20,000 feet of volcanic and sedimentary rock types. The batholith was exposed to the earth's surface after millions of years of uplift, faulting and erosion of the overlying materials. Gold deposits have been mined in several areas in the granitic portion of the watershed. Both placer and hard rock mines are found in this area. Horn Gulch is a location where several gold mines were located. Skyline Mine which is now the Three Sisters Mine is also a hard rock gold mine.

The granitic terrain is subject to weathering, erosion and landsliding. Granitic rocks are often very hard and resistant before weathering, but decompose to form softer granular material that is easily eroded. The weathering of granitic rocks produces a weathering product called grus. Grus is often referred to as DG or decomposed granite. Grus is subjected to physical, chemical and biological action and weathering. Thus, grus eventually breaks down into smaller and smaller particles and organic material to produce the soils. When soils develop on steep slopes and into drainages in the Bear Watershed Analysis Area (WAA), they are more prone to debris landslides. Numerous active landslides are found in the Bear WAA. Soils thicknesses range from 2-3 feet on north aspects and from 1-2 feet on south aspects.

Metasedimentary rocks (TrPzs on map) in the Wagner Subbasin are found generally in lower elevations to the northwest of the granitic terrain. Rock types included in TrPzs are mainly shale, sandstone, chert and layered tuff. These rocks along with the volcanic materials were subsequently intruded into by the granitics of the Ashland Batholith. Soils are mainly silty clays and clay loams and are finer-grained compared to the granitic soils. Soils are generally deeper than in the granitics and range from 3 to 6 feet in depth.

Softer sedimentary rocks (Kc on map) of the Hornbrook Formation are found in the lower elevations and are exposed at the surface beginning about a mile or less above Bear Creek. The sedimentary rocks cover a portions of the lower valley areas from Ashland to Medford. Rock types found in this area are mainly sandstones and conglomerates which are derived principally from fragments derived from pre-existing rocks. These sediments formed during the time when an inland ocean covered the Rogue Valley. Rocks in the Ashland area were deposited as sediments in ancient oceans and streams worked across the landscape. The Rogue Valley transitioned several times from ocean to dry land and from volcanic terrain to river valley. Gold, silver, sand and gravel, coal

deposits are all products from combinations of geologic processes related to this history. Sediments were often transported for long distances from their origin and deposited. After being deposited the sediments consolidated to form the exposed sedimentary rocks.

A minor portion of the Bear WAA is composed of alluvial deposits (Qal). It is concentrated in lower Ashland Creek and form small terraces near Bear Creek. Unconsolidated sands, silts, gravels and cobbles are found along sections of Bear Creek.

Alluvial fans (Qaf) have been deposited just below the sandstones and conglomerates and above the Qal deposits. The alluvial fans have usually formed from streams which issue from narrow canyons onto the valley floor. The following streams: Ashland, Neil, Hamilton, and Tolman Creeks are examples of streams where these deposits are found near the valley bottoms.

Quaternary glaciation has affected the upper elevations of the Bear WAA. A steep-walled cirque and lateral moraine are located in the headwaters of East Fork of Ashland Creek. This feature is an area referred to by skiers as "The Bowl" at Mt Ashland Ski Area. Another cirque is found at Grouse gap (the headwaters for the West Fork of Ashland Creek). Several tarns (old cirque lakes) and recessional moraines are located below the Grouse Gap Cirque. Glacial moraines and U-shaped valleys are also found below the Grouse Gap cirque. Glacial till deposits extend several hundred feet below the cirques at "The Bowl" and at Grouse Gap. Some of the higher valleys near Mt. Ashland contain large areas of glacial erosion and deposition. Several glacial boulder deposits are located in areas of gentle slope and stream gradients above 6,000 feet in elevation.

There are few major faults located in the watershed. Two small northwest trending faults are found in the Wrights Creek Sub-basin. Other than these faults only minor ancient faults have been mapped.

Seismic risks are considered low for the Bear WAA itself. However, the watershed could suffer damages to the reservoir and roads from large earthquakes from the adjacent Klamath Falls (Basin and Range) faults or subduction zone related earthquakes off the Southern Oregon/Northern California Coast.

Appendix

Characteristics of Soil Productivity

Soil biology, chemistry and physics act both independently and collectively to create soil characteristics that determine "Soil Productivity". Productivity is the ability of a soil to yield vegetation (crops).

It is estimated that 90+ percent of the soil chemical and biological activities occur within the top 12" of soil due to food, moisture and air relationships. This is the area most adversely impacted due to compaction which slows the air and water transmission rates and slows root respiration.

Before talking about the activities which affect soil biology, chemistry and physics (mechanics) we need to first identify the three characteristics and their relationship remembering each is a study within itself. Soil biology is the living, both plant and animal, populations within the soil. Each type functions somewhat differently. They utilize the existing organic matter as energy and tissue building material. The populations are sensitive to temperatures, aeration (both aerobic and anaerobic conditions), and moisture conditions (saturation etc.). They are the primary factors in nutrient cycling and organic (humus) development.

Soil chemistry is generally related to the fertility characteristics of the site. It is dependent on the parent material of the soil, the clay content, the humus content, vegetative regime etc. These give the soil its ability to supply and or hold the nutrients. Other chemical soil characteristics relate to the soils ability to tie-up nutrients thus making them unavailable to plants. The soil physical characteristics important to soil productivity are the structure, texture, mineralogy, etc. Soil structure is altered by mechanical forces and organic characteristics and affects the infiltration rates, permeability, aeration, etc. which directly affect productivity. Texture relates to soil infiltration and permeability rates which determines aeration and water holding capacities. It also relates to nutrient holding capacity for the fertility levels.

The surface soil (topsoil) is where most of the biological and chemical activity occurs. It is the major zone of root development, carries most of the nutrients for plant use and supplies a large portion of the water used by plants. It is easily altered by management activities yet is extremely important to maintaining productivity of the soil. Research has shown that as much as 80 to 90 percent of the productivity can be attributed to the topsoil.

The productivity of a soil is determined in a large degree by the nature of its subsoil. It is much less active and provides less of the nutrients and water to plants than the surface soil, however it is the zone that carries the plants over during times of stress etc. If its permeability or structure is altered it may affect the rooting capability of the plants through aeration or lack of aeration and increased resistance (strength of soil) to rooting. This sometimes changes the suitability of the existing vegetation through stress and die-off.

This report has touched on some of the important factors for soil productivity and interactions of soil biology, chemistry and physics. It is important to make prescriptions with these factors in mind along with the current conditions of the soil and its restoration capability.

Management activities that affect the soils productivity characteristics are listed below. Effects of the impacts are taken from research conducted in the Pacific NW and SW.

TRACTOR LOGGING

The use of tractors for logging has created the potential for compacted soils over various percentages of the site. This compaction comes about on areas used for skidding. Primary roads and landings are impacted the most. Monitoring has shown that both of these as well as secondary skid roads exceed Regional standards and guidelines for percent of increase in bulk density for the soils measured. Forest Land Management Plan (FLMP) standards and guidelines limit the percent of area compacted to 10 percent of the area except in certain situations. Communication with FIR revealed that adequate skidding could be done if 3 percent of the area was dedicated to skid trails.

CABLE HARVESTED AREAS

High-lead yarding:

This system of logging has had the most detrimental effect on the soils of all the cable yarding systems. It does not suspend the logs rather it drags them from the unit to the landing which is in a cone shape. This allows soil gouging whenever the log is dug into the soil and near the landing the soil is 100 percent scalped of its surface soil. Gouging which is the scalping of the surface soil within the unit may have various effects depending on the localized topography and soil characteristics. They need to be analyzed as to the current condition and effect on productivity and potential for erosion for reaching drainages. The percent of surface soil loss near landings needs to be assessed because it depends on the units shape, number of yarder settings etc. Gouging reduces the soil productivity.

Skyline yarding:

This type of cable yarding has various forms. Generally the yarding is not detrimental to the soils productivity except in isolated pockets if the logs did not have suspension and/or created trenches up and down the slope.

POST SALE ACTIVITIES AND OTHER ACTIVITIES

These take on many different forms and need to be assessed as to the soils potential or resiliency for various effects.

In the above activities the following ties need to be made to soil productivity which is the Issue. In general, compaction effects the soil biology by reducing the macropore space, and changing the air and water relationships within the soil. Soil displacement and removal effects the soil biology by removing the source for food, and altering the air and water relationships.

In general, compaction effects the soil chemistry by changing the water movement within the soil and can change to anaerobic conditions which create a different chemical reaction. Soil removal or displacement changes the soil chemistry by removal of the highest nutrient (elements) source and the material that hold the nutrients in place. It changes the water holding capacity.

Compaction alters the soil physical characteristics by changing the structure to massive or breaks down the structure which in turn slows the exchange of air and water into and within the soil. Displacement or removal generally alters the soil physical conditions by destruction of the structure.

All past management activities need to be assessed as to their impacts on soils productive capabilities prior to new management activities on the particular soil-site. Rehabilitation or restoration measures are extremely slow and rarely restore a site to full potential. Impacts are long term or permanent so alternatives or mitigation measures need to be discussed and planned for all management activities. In addition, the Cumulative Effects on the soils need to be addressed. Such things as the effect of multiple past entries and the relationship of runoff from roads and from burning or how they interact to create erosion in the depositional soils and positions.

"The compaction process is basically a simple operation - a change in volume for a given mass of soil. This change is variously designated as a change in bulk density, void ratio, or porosity. However, because of the highly complex character and almost infinite variability of soils and of the natural and man-imposed forces acting on soils, understanding the soil compaction process has challenged both the best practical farmers and the most capable agricultural scientists" McKibben, 1971:9.

Compaction is the densification of the soil material. This is the destruction of the macropore space and the soil structure. The result is reduced aeration, (air and water movement within the soil) and the increased strength of the soil to rupture from roots trying to elongate through the soil material.

Clay soils (of metasedimentary terrain) can be compacted. The plastic characteristics of clay restrict the potential to restore by ripping or subsoiling. When the clay becomes wet (saturated) it flows back together resulting in decreased macropore space and/or elimination of structure, puddled.

Sandy materials (granitics and sedimentary/alluvial terrains) are easily compacted however the noncohesive nature allows ripping and/or subsoiling to loosen the soil. It may not restore the naturally weak structure of these textures. The noncohesive nature does not allow the soil to flow when wet, it breaks. Macropore space is easier to maintain in these soils.

The deleterious effects of compaction in clay soils usually result from changes in fabric, for example, puddling (Warkentin: 1971:126).

Puddling is the rearrangement of the soil particles. It occurs when plastic soils are worked or tilled when wet. It is the worked condition of the plastic soil until its pore space is much reduced, it becomes practically impervious to air and water, and is said to be puddled. It becomes hard and dense.

Clay soils if worked when wet are very prone to being puddled and are prone to become hard and cloddy when dry, due to the cohesive tendencies of the small platelike, viscous particles. These soils are very delicate to manage when moist to wet due to these tendencies.

Sandy soils have very low plasticity and cohesion, are loose friable and have good aeration and drainage.

The following is a good explanation of the structural management for different soil textures:

• Coarse-textured soils. Looseness, friability, good aeration and drainage, and easy tillage are characteristic of sandy soils. On the other hand, such soils are often too loose and open, and lack the capacity to absorb and hold sufficient moisture and nutrients. They are, as a consequence, likely to be droughty and lacking in fertility. They need granulation. There is only one practical method of improving the structure of such a soil - the addition of organic matter. Organic material will not only act as a binding agent for the particles but will also increase the water-holding capacity.

The maintenance of a soil in sod is recognized the world over as a highly effective means of promoting granulation. This method has been used for centuries, unknowingly perhaps, to encourage and maintain a favorable soil structure.

Fine-textured soils. The structural management of a silicate-clay is not such a simple problem as that of a sandy one. In the sands, the plasticity and cohesion are never great due to low content of inorganic colloids. In clays and similar soils of temperate regions, however, the potential plasticity and cohesion are always high due to the presence of large amounts of colloidal clay. The more plastic such a soil becomes, the more likely it is to puddle, especially if worked when wet. A soil of high plasticity is prone to become hard and cloddy when dry, due to the cohesive tendencies of the small platelike, viscous particles. Such soils must be treated very carefully, especially in tillage operations. If plowed too wet, the aggregation of particles is broken down, and an unfavorable structure is sure to result. On the other hand, if plowed too dry, great clods are turned up which are difficult to work down into a good seedbed. (Buckman and Brady 1960:62-63).

Some of the more important factors that are known to influence plant growth are:

1. Temperature.
2. Moisture supply.
3. Aeration.
4. Soil Reaction.
5. Biotic factors.
6. Fertility.

The relationship is important for many of these for instance:

Many environmental factors do not behave independently. An example is the inverse relation that exists between soil air and soil moisture or between the content of oxygen and carbon dioxide in the soil atmosphere. As the soil moisture increases, the soil air decreases, and as the carbon dioxide content of the soil air increases, the oxygen content decreases. (Tisdale and Nelson 1975:24).

Coarse textured soils have rapid transfer of air, temperature and moisture within the topsoil in their loose natural state. If compacted the transmission is much slower and can lead to deficiencies of desired levels.

Fine textured soils have slow transfer of air moisture within the topsoil in their natural state however if compacted they essentially have no to very slow transmission of air and water which can allow an anaerobic root environment to occur. Generally the vegetation will change to one adapted to anaerobic conditions or very shallow rooted species (Incense Cedar and grass for example).

Fertility of a soil is based on its parent material and resulting weathered products. The ability to provide nutrients to plants is in the ion exchange of the soils.

Ion exchange is simply the reversible process by which cations and anions are exchanged between solid and liquid phases. If two solid phases are in contact, exchange of ions may also take place between their surfaces.

Of the two phenomena, cation and anion exchange, the first is generally considered to be more important in soil.

Cation exchange. Soils are composed of the three forms of matter - solids, liquids, and gases. The solid phase is made up of organic and inorganic materials, the organic fraction of which consists of the residues of plants and animals in all stages of decomposition, and the stable phase is usually termed humus.

The inorganic fraction of soil solids is composed of primary and secondary minerals, and in fact consists of particles of rock size or larger to sizes that are of colloidal dimensions.

The fractions of the soil that are the seats of ion exchange are the organic and the mineral fractions, with effective particle diameters of less than 20 microns. This includes a portion of the silt and all of the sand fraction as well as colloidal organic matter. (Tisdale and Nelson, 1975:105)

As seen from the above, sandy soils are generally very deficient in the size material to hold nutrients, chemically inert, except for their organic products which have very high nutrient holding capacity called cation exchange capacity. Of course clayey soils have much higher content of the size material that will hold nutrients through this ion exchange. Organic material that is important to the clays is the aggregation of the particles that the organic residues promote.

People often confuse soil fertility with soil productivity but its best defined as:

The term fertility refers to the inherent capacity of a soil to supply nutrients to plants in adequate amounts and in suitable proportions. Productivity is related to the ability of a soil to yield crops. Productivity is the broader term since fertility is only one of a number of factors that determine the magnitude of crop yields. (Buckman and Brady, 1960:7)

All of the above leads to the concern for soil productivity and:

Satisfactory soil productivity is the ultimate objective of soil utilization. The scheme used is a coordination of certain practices and manipulations that are designed to best attain this objective. Sound soil fertility management is, therefore, a practical application of edaphological principles and consequently calls for a thorough knowledge of the nature and properties of soils and their relationship to higher plants. (Buckman and Brady, 1960:544)

Soils in the Bear WAA include those described in the old Section 14 timber sale area. The following is what I wrote about them on Sept. 25, 1980:

"The soils in this area are weathering from intrusive igneous rock material. They are characteristically very erosive. The textures are sandy and soils are shallow, both of which result in droughty site conditions. Topographic flats seem to be shallow (less than 2-3 feet deep) with common boulders or rock outcrops.

North aspects tend to be higher in organic matter (darker colored) and about a foot deeper than south aspects.

The bedrock in the area varies from easily-dug rock to hard. Trees are shallow-rooted because of the shallow soil, unless they can root into rock joints or fractures. The soils are 2 feet deep +/- 1 foot on the N aspect and 1 foot deep +/- 1 foot on the S aspects. Swales tend to collect soil from erosion off of higher ground.

South-facing slopes show ravel which will reflect in brush disposal prescriptions.

If the objective is to maintain site on this sale, the following factors must be evaluated:

1. shallow soil materials.
2. very erodible soil material.
3. low water-holding capacity.
4. slopes - steepness and shape.
5. aspects.
6. springs and older glades.

The selection of the logging method and fuels treatment must be considered as to how they interact on the sites characteristics. (above)"

APPENDIX D

HYDROLOGY

What Sort of Debris is Transported

Stream Classification

Bibliography of Water Quality Studies

Map: Drainageways Crossed

Map: Dominant Precipitation Patterns

Appendix D

What Sort of Debris is Transported?

(adapted from Stream Hydrology an Introduction for Ecologists, by Nancy Gordon, et al.)

Total load refers to the amount of dissolved and particulate organic and inorganic material carried by a stream. Although sharp boundaries do not exist, the total load can be divided into three groupings:

- **Flotation load**

Flotation load consists of the logs, leaves, branches and other organic debris which are generally lighter than water (until they become waterlogged).

- **Dissolved load**

A stream's **dissolved load** is the material transported in solution. Local geology, land use and weathering processes affect the amount of dissolved load, which can often exceed the sediment load by total weight.

- **Sediment load**

Sediment load can be further subdivided on the basis of particle transport rate, size distribution, density, or chemical and mineral composition. Sediment is usually considered to be the solid inorganic material. Commonly, sediment load is separated into the following categories:

- **Washload**

Washload refers to the smaller sediments, primarily clays, silts and fine sands, which are readily carried in suspension by the stream. This load is "washed" into the stream from the banks and upland areas and carried at essentially the same speed as the water. Only low velocities and minor turbulence are required to keep it in suspension, and it may never settle out. It is the *rate of supply* from uplands or streambanks which determines the amount of washload transported, rather than the ability of the stream to carry it. Streams have an almost unlimited capacity for transporting washload. Streams cannot become "saturated" with sediment as they can with dissolved solids. High washloads may typify streams with banks of high silt-clay content. However, washloads can also be contributed from fire-denuded slopes or from other disturbances in the watershed from road or dam building and agricultural practices.

- **Bed-material load** - which can be transported as either **Suspended load** or **Bedload**.

Bed-material load is the material in motion which has approximately the same size range as streambed particles. In alluvial streams the amount of bed-material load transported is controlled by flow conditions. This load may be further subdivided according to whether it is transported in suspension or remains in touch with the bed.

Suspended bed-material load is the portion which is carried with the washload, remaining in suspension for an appreciable length of time. It will settle out quickly when velocities drop. **Bedload** is that portion which moves by rolling, sliding or "hopping". Therefore, it is only found in a narrow region near the bottom of the stream.

Stream Classification

(Forest Service Handbook, Region 6 Supplement 2500-90-1)
effective August 1, 1990

Stream Class. The present and foreseeable uses made of the water and the potential effects of on-site changes on downstream uses, are the criteria for defining four stream classes. The importance of use will be relative to the general area. Size is not necessarily a criterion for classification. Classify whole streams or parts of streams. One stream may be sectionalized into several classes.

Class 1. Perennial or intermittent streams or segments thereof that have one or more of the following characteristics:

- Direct source of water for domestic use (cities, recreation sites, etc...)
- Used by large numbers of fish for spawning, rearing or migration.
- Flow enough water to be a major contributor to the quantity of water in a Class 1 stream.

Class 2. Perennial or intermittent streams or segments thereof that have one or both of the following characteristics:

- Used by moderate though significant numbers of fish for spawning, rearing or migration.
- Flow enough water to be a moderate or not clearly identifiable contributor to the quantity of water in a Class 1 stream, or be a major contributor to a Class 2 stream.

Class 3. All other perennial streams or segments thereof not meeting higher class criteria.

Class 4. All other intermittent streams or segments thereof not meeting higher class criteria.

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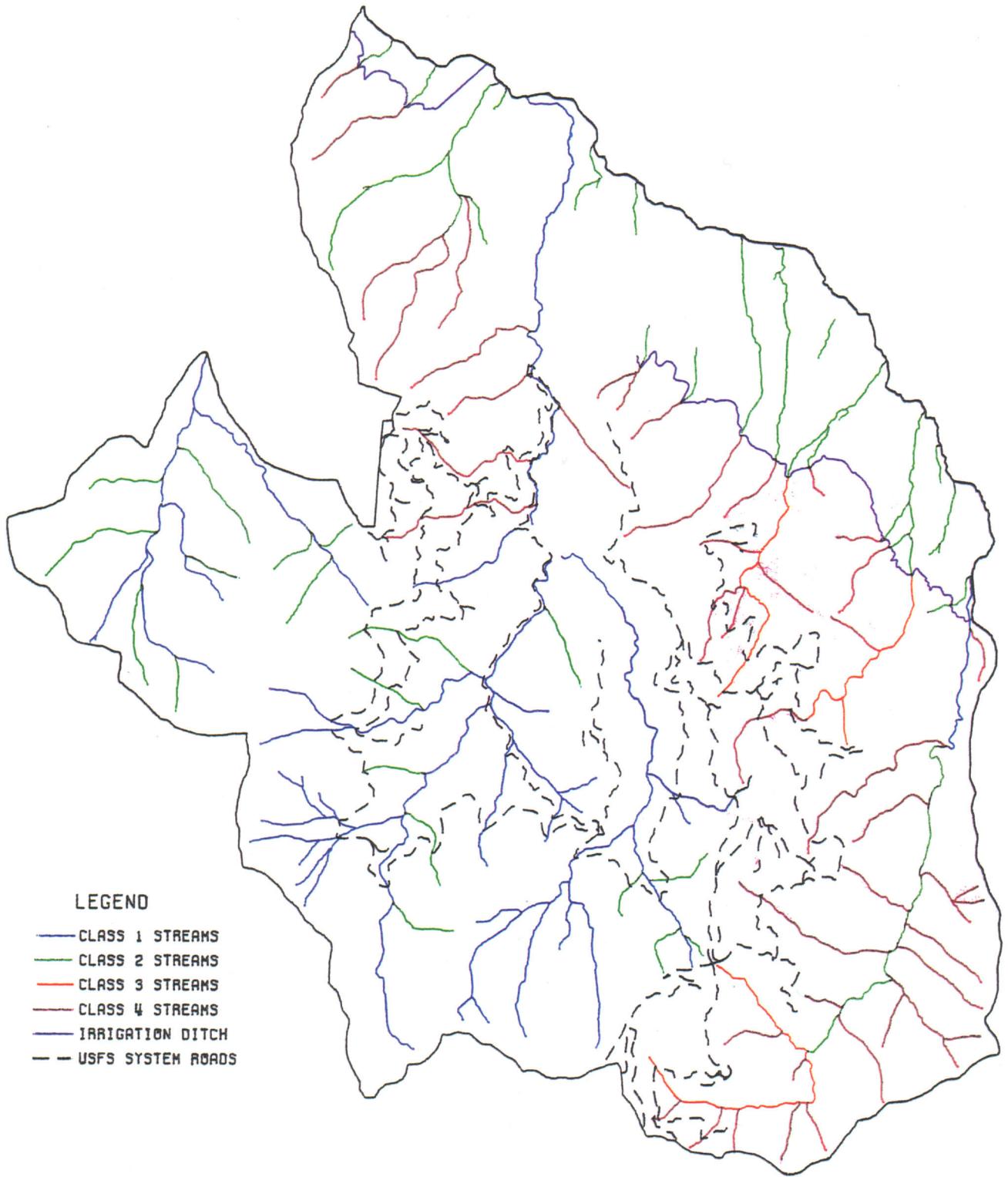
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BEAR WATERSHED ANALYSIS AREA

Drainageways Crossed



LEGEND

- CLASS 1 STREAMS
- CLASS 2 STREAMS
- CLASS 3 STREAMS
- CLASS 4 STREAMS
- IRRIGATION DITCH
- - - USFS SYSTEM ROADS

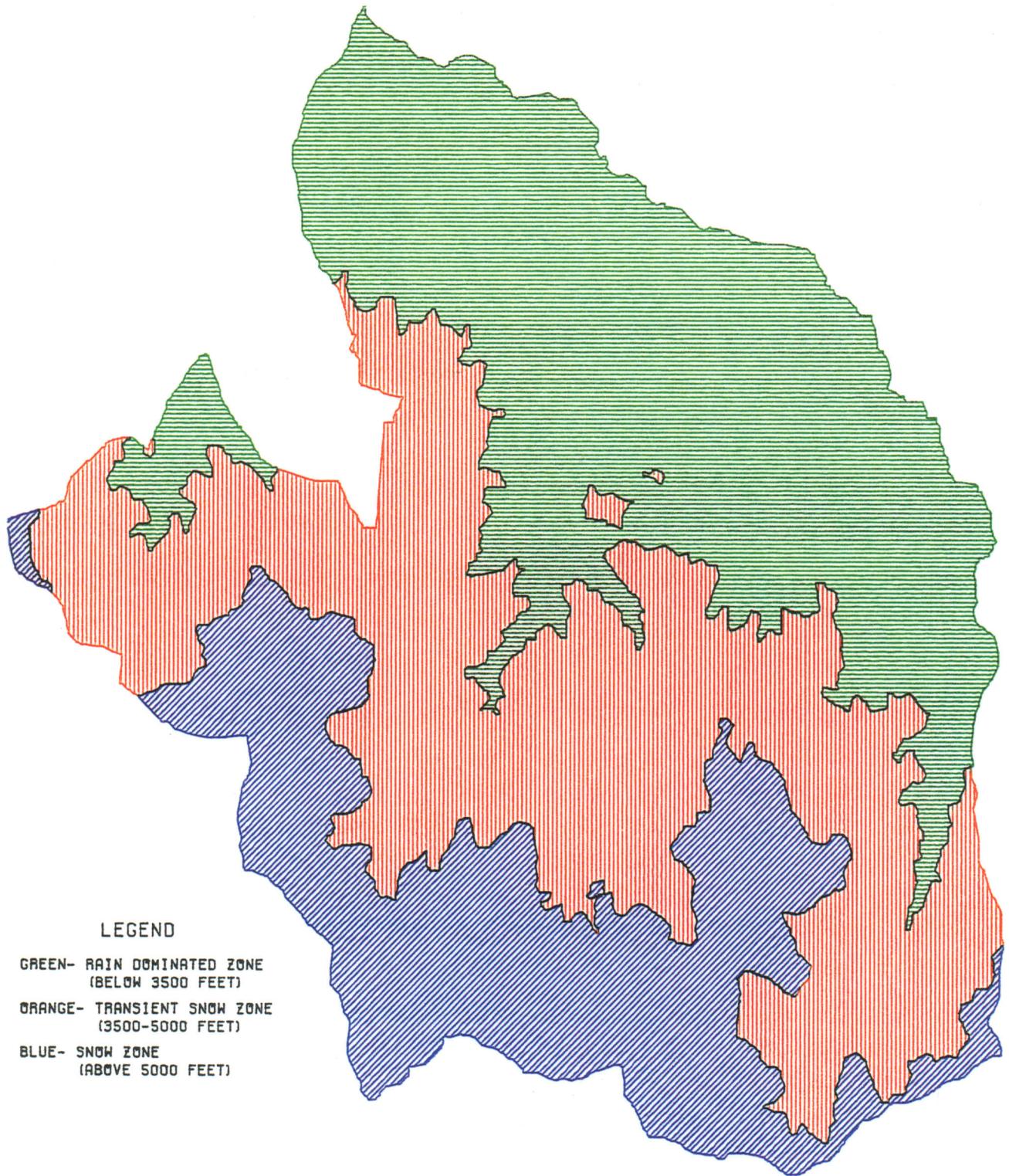
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BEAR WATERSHED ANALYSIS AREA

Dominant Precipitation Patterns



LEGEND

- GREEN- RAIN DOMINATED ZONE
(BELOW 3500 FEET)
- ORANGE- TRANSIENT SNOW ZONE
(3500-5000 FEET)
- BLUE- SNOW ZONE
(ABOVE 5000 FEET)

SCALE 1: 90000.



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APPENDIX E

FISHERIES

Historic and Current Miles of Fish Habitat
River Mile Index

Appendix E

Historic and Current Miles of Fish Habitat <i>Bear Watershed Analysis Area (Estimated)</i>								
	Coho Salmon		Steelhead		Rainbow Trout		Cutthroat Trout	
Stream <small>(listed in stream order)</small>	Historic	Current	Historic	Current	Historic	Current	Historic	Current
	N=NOT PRESENT (Miles of Stream)							
Headwater of Wagner Ck.	N	N	2.2	1.1	2.2	1.1	2.2	1.1
Horn Gulch	N	N	0.8	N	0.8	N	0.8	0.8
Wildcat Canyon	N	N	0.5	0.2	0.5	0.2	0.5	N
Wright's Ck.	N	N	1.8	0.4	1.8	0.4	1.8	N
Ashland Ck.	2.2	N	4.5	2.5	4.5	4.3	4.5	1.5
 E. Fork	N	N	4.5	N	4.5	0.8	4.5	4.7
 W. Fork	N	N	4.6	N	4.6	0.5	4.6	4.6
Hamilton Ck.	1.3	N	2.3	0.2	2.3	0.2	2.3	N
Neil Ck.	3.6	N	8.9	8.1	8.9	8.1	8.9	2.7
Tolman Ck.	0.9	N	1.9	0.1	1.9	0.1	1.9	N
Clayton	0.9	N	1.9	0.4	1.9	0.4	1.9	N
TOTAL MILES	8.9	0	33.9	13.0	33.9	17.0	33.9	15.4

River Mile Index

	Rogue River	Bear Creek	Tributary
(River Miles)			
Bear Ck.	126.8		
Wagner Ck.		17.3*	
Horn Gulch			5.7**
Wright's Creek		20.7	
Ashland Creek		21.1	
E. Fork of Ashland Ck.			4.3
W. Fork of Ashland Ck.			4.3
Hamilton Ck.		23.5	
Neil Ck.		24.8	
Tolman Ck.			1.3
Clayton Ck.			1.9

* Analysis area for Wagner Creek starts 5.3 miles upstream from confluence of Bear Creek.

* Horn Gulch starts .4 miles upstream from Bear Watershed analysis area.

APPENDIX F

AQUATIC AND RIPARIAN HABITAT

Habitat Comparison Chart

Relative Comparison of Stream Gradients With Coarse Woody Debris

Historic and Current Conditions for Aquatic Processes and Functions

Maps: Reach Breaks of Neil Creek, West Fork & East Forks of Ashland Creek

Table: Processes & Human Influences on Aquatic and Riparian Ecosystems

Map: U.S. Fish & Wildlife Surveyed Wetlands

Map: Supplemental Water Distribution System

Broad Level Delineation of Major Stream Types (Rosgen)

Delineative Criteria for Major Stream Types (Rosgen)

Appendix F

Habitat Comparison

	Forest Service Lands (data obtained from 1990 stream surveys) <u>Colluvial & Bedrock Canyons</u>										Private Lands (Estimated data) <u>(Slope-bound valley)</u>		Expected Range of Conditions** *
											Lower		
	East Fork of Ashland Creek*				West Fork of Ashland Creek*			Neil Creek*			Ashland Ck.**	Neil Crk.**	
	Reach 1	Reach 2	Reach 3	Reach 4	Reach 1	Reach 2	Reach 3	Reach 1	Reach 2	Reach 3	Reach 1	Reach 1	
No. of pieces of wood per mile <small>(diam. 24" dbh X 50') or 2 times bankful width</small>	326	243	51	98	142	114	172	19	82	65	0	0	40-250***
Habitat unit types per mile	53	78	70	80	170	54	45	63	69	115			
Pool:Riffle	52:48	24:76	29:68	19:79	23:77	22:78	5:95	18:88	3:97	12:88	5:95	5:95	
Pools per Mile	88.9	40.5	18.1	4.1	16.6	12.2	4.5	14.6	14.6	10.9	<10	<10	- 90 pools per mile in Canyon segments. - 70 pools per miles in Slope-bound Valley seg + ++
Slope	9%	11%	8%	9%	8%	8%	13%	10%	12%	20%	2% - 4%	2% - 4%	
Total Miles Surveyed	3.5 miles				2.7 miles			4 miles					

* Data obtained from R-6 stream surveys on Forest Service lands during 1990.

** No stream survey data available, data estimated.

*** Based on stream surveys conducted in the Siskiyou Mountains. This is a range found in undisturbed streams, mostly canyon stream types on federal lands.

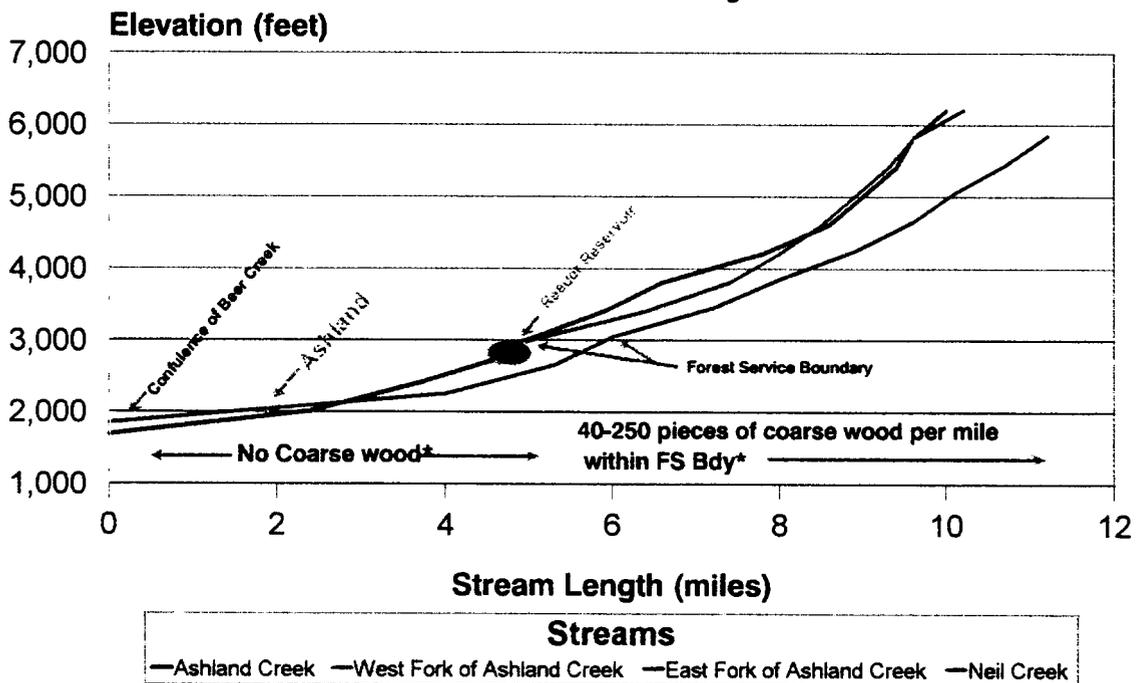
+ R-6 stream surveys: records pools longer than they are wide only; pocket pools and step-pools in the upper higher gradient reaches which are important habitat in the canyon areas were often not counted because of this requirement.

++ Rosgen personnel communication, 1994

- Coarse wood pieces per mile are generally higher in the lower elevations due to lower stream gradients and gravity. The analysis areas wood regime is presently backwards, more wood is present at higher elevation gradient areas than in the lower reaches.

Relative Comparison of Stream Gradients with Coarse Woody Debris

Bear Watershed Analysis Area



*Expected Range of Conditions (40-250 pieces of coarse wood). Coarse Wood (dimensions 24" dbh X 50' or greater)

- See Physical Process & Human Influences on Aquatic and Riparian Ecosystems: Coarse Woody Debris for further information.

Historic and Current Conditions (Estimated) for Aquatic Processes and Functions

N/A = Not applicable

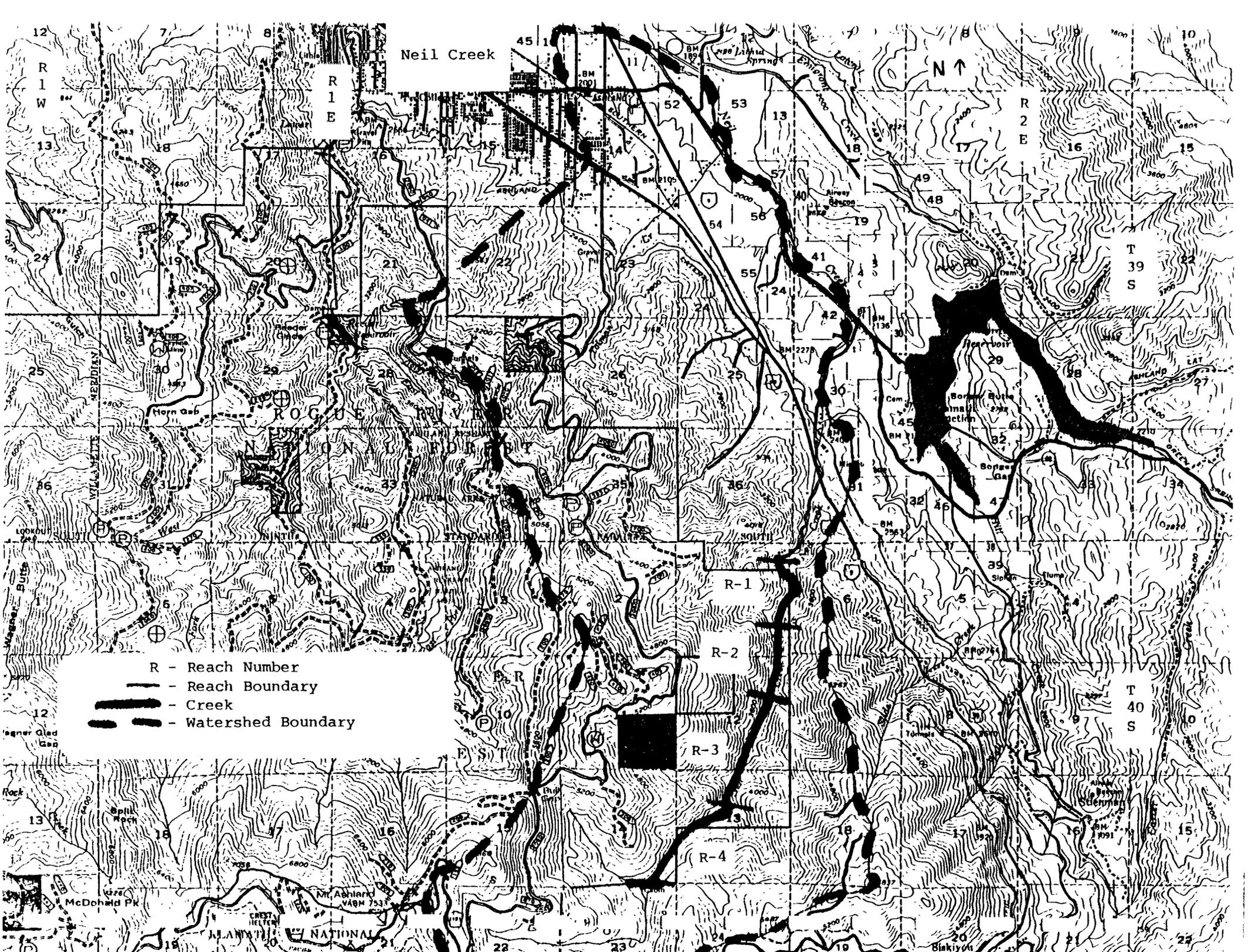
Parameters	Greater Bear Creek Watershed		Bear Watershed Analysis Area*			
	Alluvial Valley		Slope-bound Valley		Canyons	
	Historic	Current	Historic	Current	Historic	Current
Large Woody Material (wood per mile) (dimensions 24" dbh X 50")	>80	0	>80	0	>80	>80
Pools per mile	50	<20	70	<10	90	80
Side Channel/mile	High	Low	Fair	None	N/A	N/A
Rosgen Classification (Dominate/Subdominate)	C	F/C	B	G/B	A/AA	A/G
Stream Temp. (summer)	<58 F	>68 F	<58 F	>65 F	<58 F	<58 F
Spawning Gravels	Good	Poor	Good	Poor	Fair	Fair
Fisheries (relative density):						
<i>Steelhead</i>	High	Low	Medium	Low	High	None
<i>Coho Salmon</i>	High	Low	Low	None	N/A	N/A
<i>Rainbow Trout</i>	High	Low	Medium	Low	High	Poor
<i>Cutthroat Trout</i> ***	High	Low	Medium	None	High	High
Macroinvertebrates (relative density); Positive indicator groups****	Good	Poor	Good	Poor	Good	Good
Riparian Canopy	90%	60%	90%	70%	90%	90%
Riparian Component (%) (Hardwood:Conifer)	60/40	90/40	60/40	90/30	30/70	30/70

* See Bear Watershed Analysis map depicting Slopedbound valleys and Canyon segments.

** Pools per mile, Leopold, 1994).

*** Historic sea-run cutthroat trout extirpated - resident cutthroat trout inhabit present habitat.

**** Positive indicator groups or taxa in a healthy stream system are highly intolerant taxa which are particularly sensitive to high summer temperatures or impairment due to habitat quality limitations (sedimentation, high winter scour, opening of the riparian canopy, reduction of channel depth).

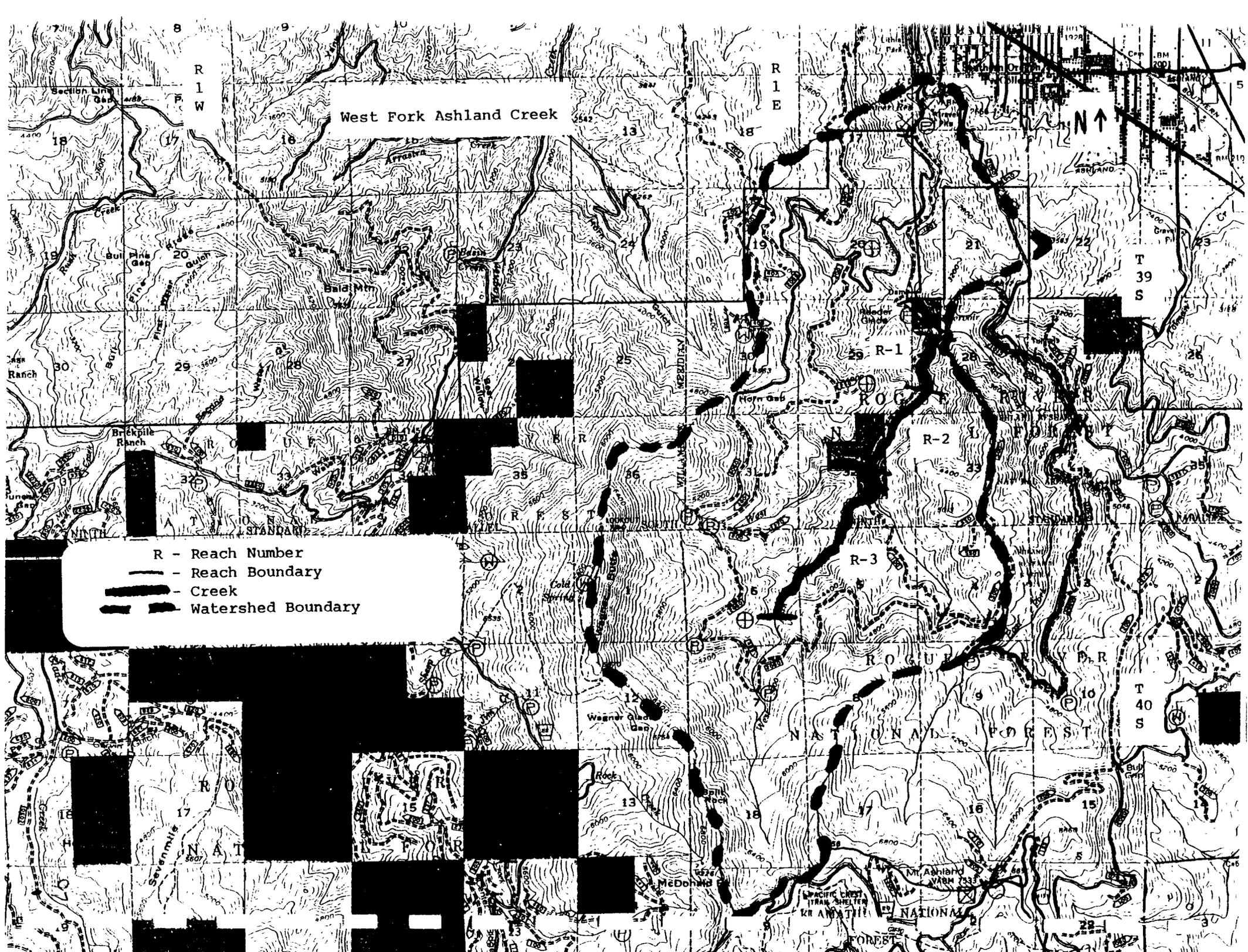


Neil Creek

N ↑

- R - Reach Number
- - Reach Boundary
- - Creek
- - Watershed Boundary

CREST HILLEN NATIONAL



West Fork Ashland Creek

- R - Reach Number
- - - Reach Boundary
- Creek
- Watershed Boundary

ROGUE NATIONAL FOREST

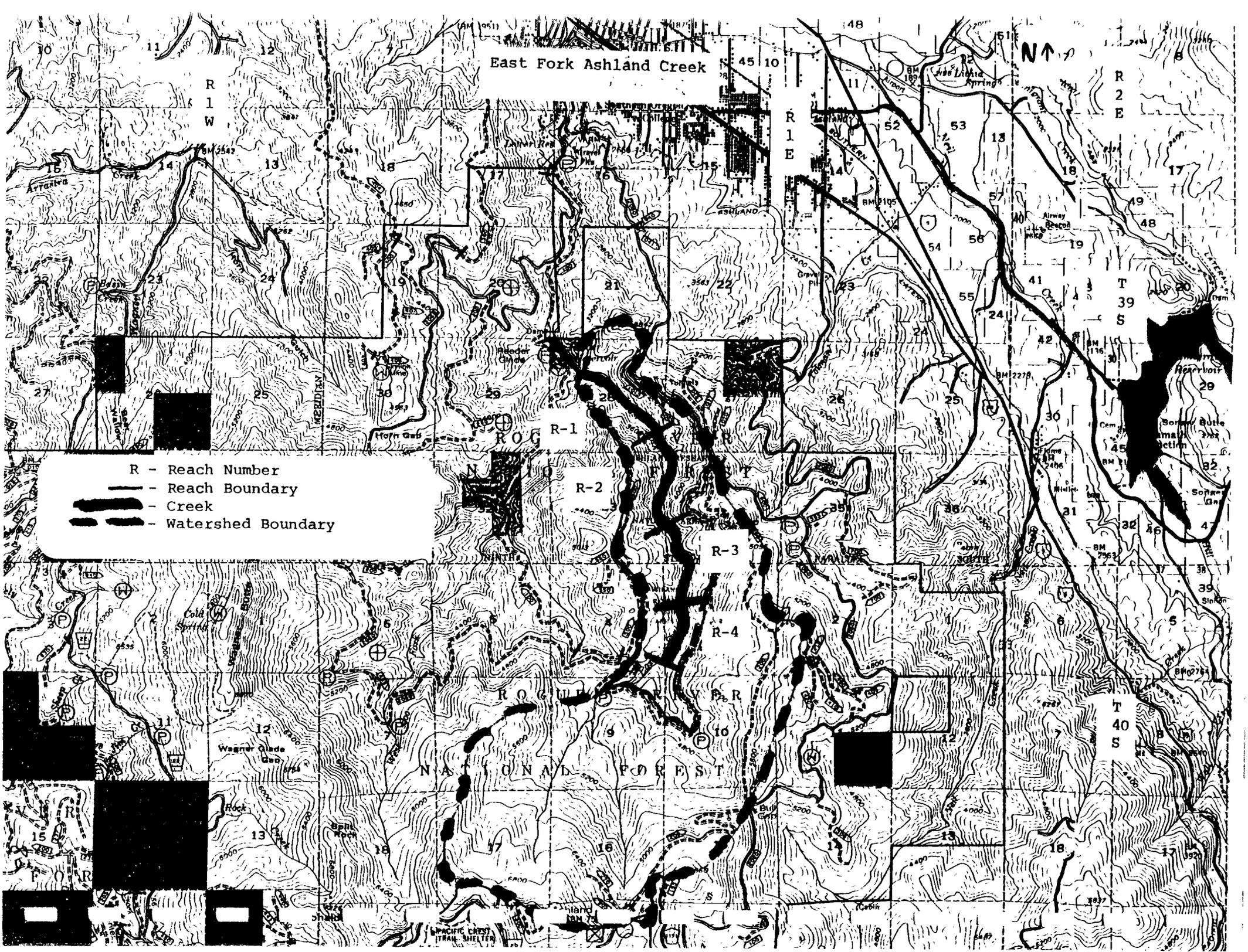
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NATIONAL FOREST

East Fork Ashland Creek



- R - Reach Number
- - Reach Boundary
- - Creek
- - Watershed Boundary



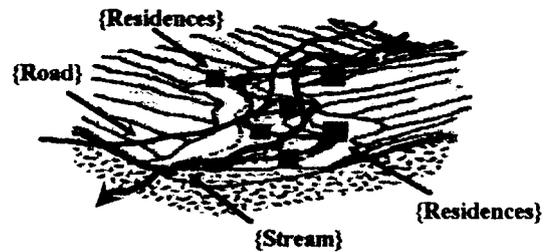
Processes & Human Influences on Aquatic and Riparian Ecosystems

Alluvial Valley – approximately 30 miles of anadromous streams *Greater Bear Creek Watershed - Overview of Main Channel*

**Stream
Attribute**



**Historic: Pre-European
to late 1800's**



Early 1900's to Current

Geomorphology

- | | |
|---|--|
| <ul style="list-style-type: none"> • Complex and diverse stream and wetland habitats. • Abundant side channel habitat with cool stream temperatures for salmonids. • Beavers, waterfowl, and amphibians were abundant. | <ul style="list-style-type: none"> • Confined and straightened channel within wide alluvial valley • Streams have downcut and abandoned the floodplain in many segments, little side channel habitat for salmonids. • Rosgen stream type channel digressed from a C unconfined valley with stream meanders to an F channel downcut with little floodprone area laterally. |
|---|--|

**Habitat
Complexity**

- | | |
|---|--|
| <ul style="list-style-type: none"> • Complex and diverse stream and wetland habitats. • Abundant side channel habitat with cool stream temperatures for salmonids. • Large wood complexes. • Beavers, waterfowl, and amphibians were abundant in sloughs. | <ul style="list-style-type: none"> • Simplified streams, fewer lateral scour pools, decreased sinuosity, few large pieces of wood. • Significant reduction of wetland habitats and side channel habitat.¹ |
|---|--|

**Riparian
Vegetation**

- | | |
|---|---|
| <ul style="list-style-type: none"> • Willows, cottonwoods, oak Savannah (Oregon white oak and black oak) and some conifers. • Mature riparian forests provided stream cover, shade due to the low width to depth ratio and sinuosity. | <ul style="list-style-type: none"> • Cottonwoods provide some stream shading. • Straightened stream channel and an increase of width to depth ratio has decreased shade. • Removal of floodplain vegetation and riparian forest has lowered productivity and diversity of habitat. • Large trees are rare in riparian zones except on edge of stream channel. |
|---|---|

Alluvial Valley - approximately 30 miles of anadromous streams

Greater Bear Creek Watershed - Overview of Main Channel

Stream Attribute	<u>Historic:</u> Pre-European to late 1800's <i>Continued..</i>	Early 1900's to <u>Current</u> <i>Continued..</i>
Large Wood Supply	<ul style="list-style-type: none"> Large and small woody complex created by willows, cottonwoods and conifers. Good supply. 	<ul style="list-style-type: none"> No wood complexes in stream channel. Regular removal of wood pieces from channel, less supply in riparian zones.
Substrate	<ul style="list-style-type: none"> Gravel with some bedrock, cobbles and silt. 	<ul style="list-style-type: none"> Silt and bedrock dominate with cobble and gravels.
Water Quality & Quantity	<ul style="list-style-type: none"> Moderated stream temperatures, riparian forests provided shade during summer months, insulated water temperatures during winter. Stream temperatures conducive to salmonids. Turbidity was moderate during high flows. Flows were seasonal as a result of storms and drought. 	<p><u>Flow Regime:</u> Irrigation water is stored in many reservoirs located within and outside of the watershed and released during the summer for irrigation. The water regime is upside down due to this current flow regime.</p> <ul style="list-style-type: none"> Water utilized for irrigation is diverted from the Klamath River Basin and Little Butte Creek watersheds into the Bear Creek watershed. Water from Little Applegate River Watershed is diverted into Wagner Creek and provides irrigation and municipal water for the City of Talent. See Appendix D Transbasin Irrigation/Municipal Water Map. <p><u>Water Quality:</u> Poor water quality; elevated stream temperatures due to irrigation return flows and municipal drainage flows, fertilizer runoff, nonpoint pollution, e.g., runoff from parking lots, mobile home parks, residential areas, truck stops, shopping centers.</p> <ul style="list-style-type: none"> Water quality, e.g., chemistry studies in the Greater Bear Watershed are listed in Appendix F.
Aquatic/Riparian Connectivity	<ul style="list-style-type: none"> Mature riparian forests, flood pulses connected stream with floodplain at regular intervals. Occasional fish migration barriers by waterfalls and large wood jams with sediment stored behind them. 	<ul style="list-style-type: none"> Disconnected instream fish habitat prevents fish migration. Several dams on the mainstem of Bear Creek are obstacles/hindrances. The following are obstacles and/or barriers to anadromous and resident fish before entering the Bear Watershed Analysis area (see Bear Creek Sub-Basin , 1995 report, for specific locations). <ul style="list-style-type: none"> -River mile 10 - Jackson Street Dam - anadromous fish barrier/obstacle, resident fish barrier (proposed for removal during 1996, funds provided by the Southwest Oregon Watershed Health Board). Ineffective fish ladder. -River mile 18 - City of Talent municipal water diversion (Push-up Dam). Utilized during the summer months for municipal and irrigation needs. -River mile 25 - Talent Irrigation Diversion at Oak Street in Ashland, Or. Irrigation diversion boards placed in March , impeding the migration of winter steelhead. Ineffective fish ladder. Downcutting and channel simplification in Bear Creek have decreased overall channel connectivity with floodplains. Late seral stands on floodplain along Bear Creek are rare. Stream confined by roads, agricultural practices and urbanization. Fragmented riparian habitat and decrease of riparian zones.

Alluvial Valley - approximately 30 miles of anadromous streams

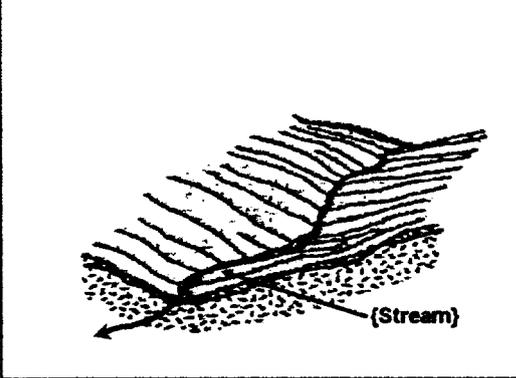
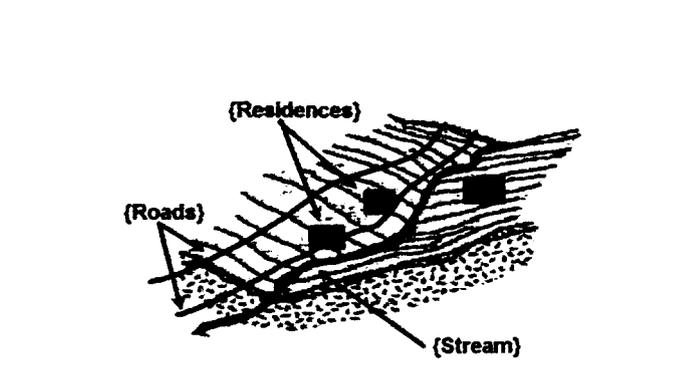
Greater Bear Creek Watershed - Overview of Main Channel

Stream Attribute	Historic: Pre-European to late 1800's <i>Continued..</i>	Early 1900's to Current <i>Continued..</i>
Fisheries	<ul style="list-style-type: none"> • Abundant coho salmon, sea-run or adfluvial cutthroat, chinook salmon, steelhead, and rainbow trout. • Large resident salmonids associated with wood complexes, off channel area refuge habitat for juveniles. • Adequate flow/wetted habitat for summer rearing during most years in mainstem or off-channel areas. 	<ul style="list-style-type: none"> • Limited movement and reduced populations of chinook salmon. • Coho are virtually nonexistent. • Cutthroat rare in mainstem. • Moderate population of steelhead. • Warm water fish occupy Bear Creek from the mouth to Phoenix due to increased summer stream temperature. • See species present, distribution and trends section for more details.
Trends	Changes in stream channel dimensions will continue; accommodate the amount of water and sediment carried if the eight interrelated channel variables remain in balance (Rosgen, 1991).	<ul style="list-style-type: none"> • Few guidelines or enforcement of agricultural use and residential use of floodplains, and riparian zones. • Development of the Bear Creek Greenway leaves "belts" of riparian forest, riparian reforestation ongoing. • Little improvement of floodplain function. • Large trees will remain rare along streambanks and in channels.

Slope-bound Valley

Bear Watershed Analysis Area

Lower Valley Stream Segments - Lower stream reaches of Wrights Creek, Ashland Creek (below Lithia Park), Hamilton Creek, Tolman Creek, Clayton Creek, and Neil Creek (see map, Figure 39).

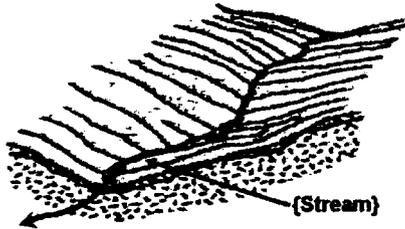
<p>Stream Attribute</p>	 <p style="text-align: center;">Historic Condition</p>	 <p style="text-align: center;">Current Condition</p>
<p>Geomorphology</p>	<ul style="list-style-type: none"> Moderate slope-bound valley (see historic lower valley drawing above), Rosgen B channel moderately entrenched, moderate gradient, 2-4%, stable banks. Located within this area are areas of unconfined floodplains, resembling lower alluvial valleys, (described earlier when discussing historic geomorphology of the main stem of Bear Creek). These were often wetlands. Sinuosity is moderate to low with moderate to high stability. Valley width is one to two times the active channel width. 	<ul style="list-style-type: none"> Confined, cutdown, moderate slope-bound valley (see current lower valley drawing above). Due to urbanization, agriculture, and roads, Rosgen stream type channel has changed with human activities from a B stream type (moderately entrenched) with inclusions of C stream type, to streams that are narrow and deep, entrenched gully (G stream type) with the elimination of most inclusions of the C stream type.
<p>Habitat Complexity</p>	<ul style="list-style-type: none"> Riffle dominated, with infrequently spaced pools, good spawning and rearing habitats. Inclusions of rich biological areas, wetlands and main and side channels, high water tables, hardwood-lined side channels and sloughs with conifers in floodplain within alluvial inclusions See Aquatic Habitat Conditions: Habitat Complexity for spawning gravel information 	<ul style="list-style-type: none"> Decreased sinuosity, large wood is removed and large pool habitat is reduced. Habitat, once conducive to coho salmon, now supports only steelhead and small trout. Loss of channel sinuosity and downcutting in channels has decreased interactions of the stream channel with the historic floodplain. Note inclusions of broader floodplains, e.g., between Oak St. and Water St. (20 foot buffer, parking lots/road). Simplified, channelized stream with a riffle dominated system (90:10 pool:riffle). See Aquatic Habitat Conditions: Habitat Complexity for spawning gravel information
<p>Riparian Vegetation</p>	<ul style="list-style-type: none"> Hardwoods dominated (alders, willow, cottonwood and some oak) with many conifers (approximately a 60/40 hardwood/conifer component). 	<ul style="list-style-type: none"> Riparian buffer is 20 feet along streams in this section due to urbanization and commercialization. City of Ashland ordinance requires a buffer of 20 feet along streams - this maybe not adequate for future large wood supply.
<p>Large Wood Supply</p>	<ul style="list-style-type: none"> Complex wood niches 	<ul style="list-style-type: none"> Nonexistent. Aggressive wood removal to reduce hazards to bridges and culverts during high flows. Future conifer wood recruitment nonexistent; hardwood

Slope-bound Valley

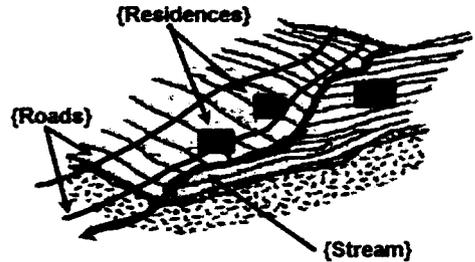
Bear Watershed Analysis Area

Lower Valley Stream Segments - Lower stream reaches of Wrights Creek, Ashland Creek (below Lithia Park), Hamilton Creek, Tolman Creek, Clayton Creek, and Neil Creek (see map, Figure 39).

**Stream
Attribute**



Historic Condition



Current Condition

dominated or nonexistent riparian zone exists.

Slope-bound Valley

Bear Watershed Analysis Area

Lower Valley Stream Segments - Lower stream reaches of Wrights Creek, Ashland Creek (below Lithia Park), Hamilton Creek, Tolman Creek, Clayton Creek, and Neil Creek (see map, Figure 39).

Stream Attribute	<u>Historic Condition</u> <i>Continued...</i>	<u>Current Condition</u> <i>Continued...</i>
Substrate	<ul style="list-style-type: none"> • Cobble and gravel with decomposed granites. 	<ul style="list-style-type: none"> • Cobble and gravel interspaces are often filled with fine decomposed granitic sediments; impacts macroinvertebrates, reduces fish hiding cover, and embeds redds with silt.
Water Quality & Quantity	<ul style="list-style-type: none"> • Cool, clear water 	<ul style="list-style-type: none"> • Decrease in dissolved oxygen and nutrient input affect fish populations. TID diversion ditch alters flow patterns during irrigation season, and contributes to sediment transport throughout the system (RVCOG, 1995). During storms, these irrigation ditches act as conduits for ditch water not used, thus warming streams and therefore Bear Creek. • Bear Creek is a water quality limited stream; designated by the Department of Environmental Quality (DEQ). • The City of Ashland Wastewater Treatment plant contributes both thermal and chemical (phosphorous, ammonia, and chlorine) pollution in this stream section. The city is now under a mandatory compliance schedule by the Oregon Department of Environmental Quality to reduce temperatures and phosphate levels from effluent discharges (water quality, e.g., chemistry studies in the Greater Bear Creek watershed are listed in Appendix D). The City of Ashland is currently pursuing alternatives for rectifying the situation. • Intermittent sluicing of Reeder Reservoir contributes increased sediment loads to Ashland and Bear Creeks (see Individual In-depth Analysis Canyon stream valley: Ashland Creek (water quality) for further information on sluicing).
Aquatic Connectivity	<ul style="list-style-type: none"> • Good instream vegetation, flow regime, and floodplain connectivity. 	<ul style="list-style-type: none"> • Instream Connectivity - healthy aquatic/riparian ecosystems should link together. Disconnected instream fish habitat prevents fish migration. Several obstacles/hindrances are present. • The following are obstacles and/or barrier locations to anadromous fish within the FS Bear WA Area and barriers to resident fish, juvenile trout, and steelhead. <ul style="list-style-type: none"> • Wagner Creek - numerous irrigation diversion dams below National Forest lands. • Wright's Creek - Hwy. 99, road crossing culvert. • Ashland Creek - Lithia Way, bridge underpass. • Hamilton Creek - East Main St., road crossing culvert • Ashland Creek & Wagner Creek - numerous unscreened irrigation ditches impede downstream migration (smolts). • Tolman Creek - Hwy. 99, road crossing culvert. • Neil Creek - numerous irrigation diversions; diversion is 4.4 miles downstream from railroad bridge. The diversion dam is placed during April; 5 feet high (winter steelhead barrier). • Unnamed tributaries pass through developments, e.g., store

Slope-bound Valley

Bear Watershed Analysis Area

Lower Valley Stream Segments - Lower stream reaches of Wrights Creek, Ashland Creek (below Lithia Park), Hamilton Creek, Tolman Creek, Clayton Creek, and Neil Creek (see map, Figure 39).

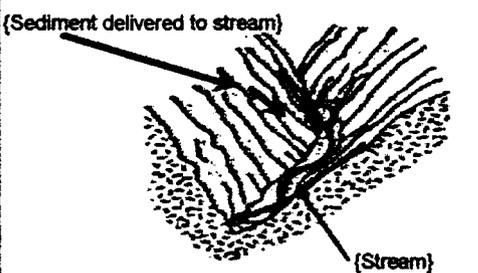
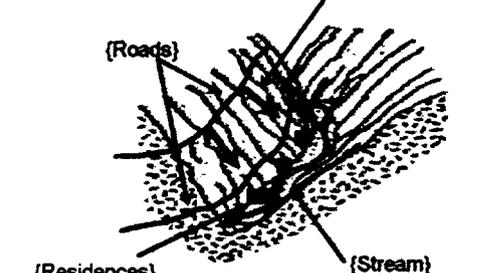
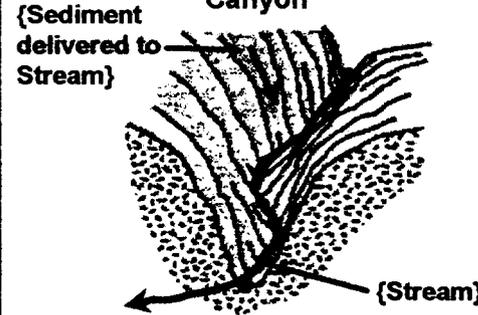
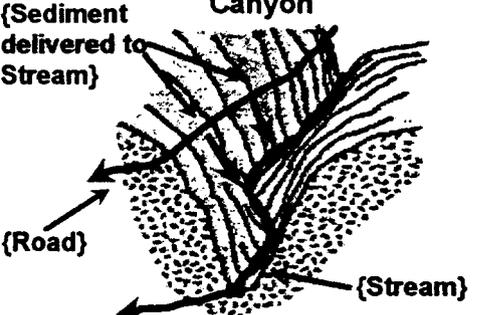
Stream-Attribute	<u>Historic Condition</u> <i>Continued..</i>	<u>Current Condition</u> <i>Continued..</i>
Aquatic Connectivity (continued)		<p>complexes, Southern Oregon State College, Bi-Mart via underground conduits. These underground conduits eliminate fish cover, substrate complexity, and macroinvertebrate productivity.</p> <ul style="list-style-type: none"> • Downcutting and channel simplification have decreased overall channel connectivity with floodplains. • Connectivity of late seral stands is in poor condition due to urbanization and agricultural development. Most streams were bordered by a road, house, or agriculture (livestock grazing or crops)
Fisheries	<ul style="list-style-type: none"> • Good population representative of all age classes; winter and summer steelhead and coho salmon, rainbow trout, and cutthroat trout. • Large salmonids associated with woody complexes, inclusions of off channel area refuge habitat for juveniles. Adequate flow for summer rearing during most years. • The earliest records of salmonids in the Bear Creek drainage were in the <i>Ashland Daily Tidings</i> newspaper. Salmon were harvested near the Ashland Creek mill on April 18, 1870 (near Lithia Park). • Anecdotal history from a long time Ashland resident recalls catching numerous steelhead around 1909 in Ashland Creek. • Another anecdotal story was about Ashland Business College students during the early 1900's. They packed 100 pound boxes of salmon during the winter months and shipped them down to the San Francisco Bay Area to finance college tuition and living expenses (Sulley, 1990). 	<ul style="list-style-type: none"> • Lack of quality refuge habitat for juveniles, few large trout present, fish barriers reduce salmonid habitat. • Summer stream temperatures increase due to decrease in stream shade and widening of channel. • Less channel sinuosity and downcutting in channels have resulted in simplification of fish habitat for overwintering fish during high flows. Overwintering habitat is often a "bottleneck" for survival of juvenile salmonids, and this could be limiting production (Reeves et. al 1991.)
Trends	<ul style="list-style-type: none"> • Very stable plan and profile. Stable banks. • Riparian vegetation and instream large woody material will continue to provide organic matter, shade, nutrient storage, low velocity areas, microhabitat, structure to scour pools, and provide cover. 	<ul style="list-style-type: none"> • Changes in channel morphology and loss of floodplain connectivity would most affect overall channel complexity and survival of fish during storms. • Reduction of side channels, a critical habitat need of juvenile coho, has reduced the amount of habitat.

Canyon stream valley - Overview*

Bear Watershed Analysis Area

*see individual In-depth Analysis - Canyon stream valley for further information

Upper Reaches of Wrights Creek, Hamilton Creek, Tolman Creek, Clayton Creek, Ashland Creek (Lithia Park and above). Neil Creek, Wagner (headwater) Creek, East Fork and West Fork of Ashland Creek on Forest Service Lands (see map, Figure 39)

Stream Attributes	<p>Alluviated Canyon</p> <p>(Sediment delivered to stream)</p>  <p style="text-align: right;">{Stream}</p>	<p>Alluviated Canyon (Sediment delivered to stream)</p> <p>{Roads}</p>  <p style="text-align: right;">{Stream}</p> <p>{Residences}</p>
	<p>Colluvial or Bedrock Canyon</p> <p>{Sediment delivered to Stream}</p>  <p style="text-align: right;">{Stream}</p>	<p>Colluvial or Bedrock Canyon</p> <p>{Sediment delivered to Stream}</p>  <p style="text-align: right;">{Stream}</p> <p>{Road}</p>
	<u>Historic Condition</u>	<u>Current Conditions</u>
Geomorphology	<p>Colluvial, and/or bedrock canyons</p> <ul style="list-style-type: none"> • Narrow stream valley, usually less than 2 channel widths; steep stream gradients (4% greater), low width:depth ratios, bedrock and/or boulder streambed, transport sediment and wood, cool water summer water temperatures. • Rosgen A (gradient 4-10%) stream type with AA (gradient >10%) stream type in the steep headwaters with some lower gradient segments. <p>Alluviated canyons</p> <ul style="list-style-type: none"> • Inclusions of unique niches "flats" (Reeves, et al). Some floodplains - mostly terraces. • Rosgen F channel • Gravel, cobble, and small boulders 	<ul style="list-style-type: none"> • Alluviated, colluvial and/or bedrock canyons. Same stream types: Rosgen A (gradient 4-10%) stream type with AA (gradient >10%) located in the steep headwaters. • Instability more chronic in well-roaded, intensely harvested sub-watersheds and from human disturbances (stream type changed from a Rosgen A to G). Steep sideslope and tributary stream drainage patterns altered by road network

Canyon stream valley - Overview*

Bear Watershed Analysis Area

*see individual In-depth Analysis - Canyon stream valley for further information

Upper Reaches of Wrights Creek, Hamilton Creek, Tolman Creek, Clayton Creek, Ashland Creek (Lithia Park and above). Neil Creek, Wagner (headwater) Creek, East Fork and West Fork of Ashland Creek on Forest Service Lands (see map, Figure 39).

Stream Attributes	<u>Historic Condition</u> <i>Continued...</i>	<u>Current Condition</u> <i>Continued...</i>
Habitat Complexity	<ul style="list-style-type: none"> • Steep, entrenched, narrow, deep, confined cascading step-pool streams. • Cascade pools frequent; pocket pools associated with boulders and step pools. • See Aquatic Habitat Conditions: Habitat Complexity for spawning gravel information 	<ul style="list-style-type: none"> • Steep, entrenched, narrow, deep, confined cascading step-pool streams. • Cascade pools frequent; pocket pools associated with boulders and step pools. • In areas of urbanization, compaction and reduction of the riparian zone and wood removal decreased overall complexity. • See Aquatic Habitat Conditions: Habitat Complexity for spawning gravel information
Riparian Vegetation	<ul style="list-style-type: none"> • Large conifers and hardwoods on flood terrace in alluviated canyons. 	<ul style="list-style-type: none"> • Wide range of riparian vegetation between canyon stream segments. Range from nonexistent, e.g., grazing impact on Clayton Creek, to late seral stage, e.g., East and West Forks of Ashland Creek (located within Ashland municipal watershed). See Individual In-depth Analysis Canyon (Mountains) for further information.
Large Wood Supply	<ul style="list-style-type: none"> • Large conifers were transported downstream during high flows unless caught in nick points. 	<ul style="list-style-type: none"> • Varied from nonexistent large wood supply to abundant large woody material between canyon stream segments. • Large woody material recruitment potential to streams has sharply declined since forest management began in the 1940's and urbanization has increased significantly. This will continue to have a long term negative effect on fish habitat until existing stands reach a size to once again contribute a stable large wood supply. • Note Ashland Creek and East and West Forks of Ashland Creek for in-depth analysis.
Substrate	<ul style="list-style-type: none"> • Bedrock, small and large boulders. embeddedness of cobbles and gravels infrequent, ephemeral and localized (decomposed granites). 	<ul style="list-style-type: none"> • Bedrock, small and large boulders. Substrate embedded with decomposed granitic fines generally throughout stream system.

Canyon stream valley - Overview*

Bear Watershed Analysis Area

*see individual In-depth Analysis - Canyon stream valley for further information

Upper Reaches of Wrights Creek, Hamilton Creek, Tolman Creek, Clayton Creek, Ashland Creek (Eithia Park and above). Neil Creek, Wagner (headwater) Creek, East Fork and West Fork of Ashland Creek on Forest Service Lands (see map, Figure 39).

Stream Attributes	<u>Historic Condition</u> <i>Continued..</i>	<u>Current Condition</u> <i>Continued..</i>
Water Quality & Quantity	<ul style="list-style-type: none"> • Cold water, abundant macroinvertebrates. 	<ul style="list-style-type: none"> • During low flows (summer months) in the Bear Creek watershed, the Bear WAA is the major contributor of good, high water quality. • Temperatures are rated optimal and unique for the Bear watershed. • Roads contribute sediment in the form of dissolved solids, suspended solids and bedload. • Intermittent sluicing of Reeder Reservoir contributes increased sediment loads to Ashland and Bear Creeks (see Individual In-depth Analysis Canyon (Mountains: Ashland Creek (water quality) for further information on sluicing.
Aquatic Connectivity	<ul style="list-style-type: none"> • Good instream, vegetation, flow regime, and floodplain connectivity. 	<ul style="list-style-type: none"> • See In-depth Analysis - Canyon stream valley for further information.
Fisheries	<ul style="list-style-type: none"> • Anadromous winter and summer steelhead, resident rainbow and cutthroat trout. Coho salmon in alluviated canyons. • Good quality fish habitat available. 	<ul style="list-style-type: none"> • If present, resident rainbow and cutthroat trout, steelhead if accessible.
Trends	<ul style="list-style-type: none"> • Various plans and profile. Stable banks. • Resilience is high for sediment export and low for large wood material. 	<ul style="list-style-type: none"> • Many bedrock and colluvial canyons under federal ownership, protected by guidelines of the President's Forest Plan, Aquatic Conservation Strategy. Will recover under the Aquatic Conservation Strategy. • Nonfederal ownership will improve slightly with better land management practices..

Individual In-depth Analysis - Canyon stream valley*

*see Canyon stream valley Overview for general analysis

Bear Watershed Analysis Area

Current Conditions

Stream Attributes	Ashland Creek (Lithia Park to Reeder Reservoir)	East Fork and West Fork of Ashland Creeks
Geomorphology	<ul style="list-style-type: none"> • Alluviated canyon unique for this analysis area (see above drawings). • Roads, recreation and residential development along creek, e.g., Lithia Park, active gravel removal pit, road development and homes along Winburn Way. • Stream has cut down and abandoned the flood terrace. • Less floodprone area than historic, stream changed from a B/C to a B/F channel. 	<ul style="list-style-type: none"> • Colluvial and Bedrock canyons. Refer to Canyon stream valley Overview.
Habitat Complexity	<ul style="list-style-type: none"> • Entrenched, narrow, deep, confined cascading step-pool streams. • Cascade pools frequent; pocket pools associated with boulders and step pools. Quality fish habitat with side channels restricted due to urbanization, road building within the floodplain. • See Aquatic Habitat Conditions: Habitat Complexity for spawning gravel information 	<ul style="list-style-type: none"> • See Aquatic Habitat Conditions: Habitat Complexity for spawning gravel information • Refer to Canyon stream valley Overview
Riparian Vegetation	<ul style="list-style-type: none"> • Some large conifers and hardwoods on flood terrace above upper end of Lithia Park. • Lithia park area has exotic and indigenous conifers and hardwoods. Area is manicured and some stream banks are exposed due to park management, recreation and flood control activities. 	<ul style="list-style-type: none"> • East Fork and West Fork of Ashland Creek have a high connectivity of late seral stands; subwatersheds provide municipal water for City of Ashland. • Large conifers and hardwoods on flood terrace.
Large Wood Supply	<ul style="list-style-type: none"> • Nonexistent; wood removed for flood prevention measures. • Wood removal followed the 1964 and 1974 floods to reduce hazards to bridges. This resulted in further habitat simplification. 	<ul style="list-style-type: none"> • The management related debris flows described in the hillslope processes section have accelerated delivery rates of large wood, boulders, and fines to stream channels. • The debris flows in the East and West Forks of Ashland Creek, has traveled 1/4 mile to 1 1/2 miles, often intersecting or traveling in fish bearing streams. • In lower stream reaches there are major deposits of large wood where these flows stopped • Channels altered by debris flows are often scoured to bedrock, and channel roughness has been simplified and lost storage capacity of sediment and nutrients. Debris flows are also a source of large woody debris.
Substrate	<ul style="list-style-type: none"> • Embeddedness of cobbles and gravels frequent, localized (decomposed granites). 	<ul style="list-style-type: none"> • Refer to Canyon stream valley overview for further information.

Individual In-depth Analysis - Canyon stream valley*

*see Canyon stream valley Overview for general analysis
Bear Watershed Analysis Area

Current Conditions

Stream Attributes	Ashland Creek (Lithia Park to Reeder Reservoir) <i>Continued...</i>	East Fork and West Fork of Ashland Creek <i>Continued...</i>
Water Quality	<ul style="list-style-type: none"> • Cold water temperature. • Pollution has been sighted within this segment, e.g., fecal coliform has been noted in Lithia Park near the children's playground, a gravel removal pit has been cited for depositing excessive sediment in the stream. Residential activities have been noted to deposit household waste in the stream. • Sluicing activities from Reeder Reservoir can occur approximately every 3 years or depending on yearly precipitation. <ul style="list-style-type: none"> • Sluicing activities (removal of excess sediment from Reeder Reservoir via Ashland Creek) has caused an increase of sediment in the stream below the dam • Activities that increase the transport and deposition of granitic sediments in streams can reduce the productive potential and threaten the viability of fish populations (Thurow, 1992). See key questions in Hillslope processes for more information. 	<ul style="list-style-type: none"> • Excellent water quality; cold summer stream temperatures. During summer of 1994 (record drought), high stream temperatures were at 65 degrees Fahrenheit.
Aquatic Connectivity	<ul style="list-style-type: none"> • Instream Connectivity - healthy aquatic/riparian ecosystems are linked together. Disconnected instream fish habitat prevents fish migration. Several obstacles/hindrances are present. The following are obstacles and/or barriers to anadromous fish within the Bear Watershed Analysis Area and barriers to resident fish, juvenile trout and steelhead. <ul style="list-style-type: none"> • River mile 1.5 - Winburn Way (entrance to Lithia Park), road crossing culvert. • River mile 1.9 - Lithia Park (opposite of the children's playground), irrigation diversion dam • River mile 2.7 - Lithia Park (below swimming pond), by-pass pipe and spillway pipe. Anadromous fish barrier. Removal would allow 1.8 additional anadromous miles of habitat. Barrier is in place year around. • River mile 4.3 - Hosler Dam was constructed .5 miles downstream from the East and West Forks of Ashland Creek in 1928, creating 	<ul style="list-style-type: none"> • Hosler Dam - Reeder Reservoir (below the East and West Forks) is a fish barrier to anadromous fish migrating upstream. • The small reservoirs located at the confluence of East and West Forks (above Reeder Reservoir) are fish barriers to resident trout during low flow.

Individual In-depth Analysis - Canyon stream valley*

*see Canyon stream valley Overview for general analysis

Bear Watershed Analysis Area

Current Conditions

Stream-Attributes	Ashland Creek (Lithia Park to Reeder Reservoir) <i>Continued...</i>	East Fork and West Fork of Ashland Creek <i>Continued...</i>
Aquatic Connectivity (continued)	<p>Reeder Reservoir. Fish ladders or passage is not available.</p> <ul style="list-style-type: none"> Numerous unscreened irrigation diversion dam and push-up dams located from the entrance of Lithia Park to mouth of Ashland Creek. Downcutting and channel simplification has decreased overall channel connectivity with floodplains. Connectivity of late seral stands are lacking due to urbanization. Most stream were bordered by roads, houses, and agricultural. 	
Fisheries	<ul style="list-style-type: none"> Steelhead trout inhabit area up to Granite Street reservoir. Resident rainbow and cutthroat trout are located throughout reach. 	<ul style="list-style-type: none"> Excellent habitat for fisheries. Rainbow and cutthroat trout populations inhabit these streams. Reeder Reservoir, the major municipal water source for the City of Ashland, serves as a temporary rearing area for large trout that spawn up the East and West Forks of Ashland Creek. Reeder Reservoir is periodically drained for sediment purpose. Public access is prohibited
Trends	<ul style="list-style-type: none"> Alluviated canyons may be key to survival of coho salmon. Cool water with potential for complex habitat. Lands within the City of Ashland have a city ordinance requiring a 20 foot buffer. Bank degradation and channelization of stream will continue to downcut the stream channel, simplifying the aquatic habitat. 	<p>The East and West Forks of Ashland Creek are in the Ashland Municipal watershed; area is protected for water quality and quantity.</p> <p>Roads contribute sediment in the term of dissolved solid, washload, suspended load and bedload (see key question on flow regime for more information). (See appendix XXX on types of debris.)</p>

Individual In-depth Analysis - Canyon stream valley*

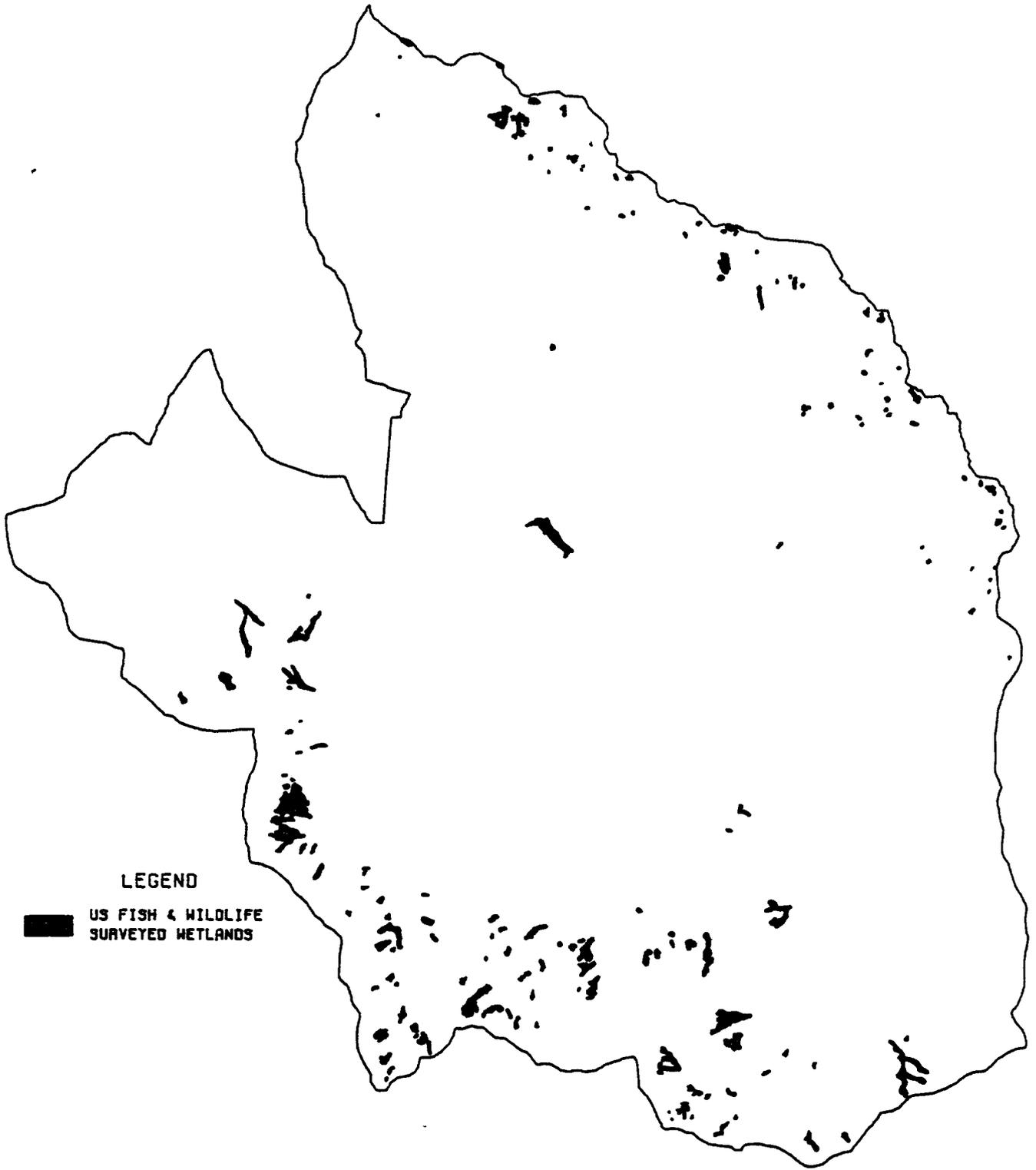
*(See Canyon stream valley Overview for general analysis
Bear Watershed Analysis Area)

Current Conditions

Stream Attributes	Neil Creek (Bear Creek mainstem is created by the convergence of Neil Creek and Emigrant Creek.)	Upper reaches of Wrights, Hamilton, Tolman, Clayton and Wagner Creeks and Horn Gulch
Geomorphology	<ul style="list-style-type: none"> • Colluvial and Bedrock Canyons on public lands. • Steep sideslope and tributary stream drainage patterns altered by road network 	<ul style="list-style-type: none"> • Colluvial and bedrock canyons (for Wagner and Horn Gulch - refer to Geology section of watershed setting.)
Riparian Vegetation	<ul style="list-style-type: none"> • Forest Service lands in Neil Creek are in fair condition, although the integrity of the riparian area is punctured by several clearcuts (also on private lands) with boundaries next to the stream 	<ul style="list-style-type: none"> • Refer to Canyon stream valley Overview for information.
Aquatic Connectivity	<ul style="list-style-type: none"> • Low summer flows in Neil, Clayton and Tolman Creeks appear to be affecting the fish carrying capacity of Neil Creek. • Irrigation and residential water use decreased summer low flows, reducing steelhead production. • River mile 4.4- numerous irrigation diversions; diversion is downstream from railroad bridge, possible winter steelhead barrier. • Low flows can also exacerbate high stream temperature. • Instability more chronic in past managed areas - well-roaded, intensely harvested. 	<ul style="list-style-type: none"> • Low summer flows in Neil, Clayton and Tolman Creeks appear to be affecting the carrying capacity of Neil Creek. • Irrigation and residential water use, decreased summer low flows reduce steelhead production. Low flows can also exacerbate high stream temperature. • Instability more chronic in past managed areas - well-roaded, intensely harvested
Fisheries	<ul style="list-style-type: none"> • Tributary streams disconnected from the main stem due to the construction of Hosler Dam. • Excellent habitat for fisheries. • Refer to Canyon stream valley Overview for information 	<ul style="list-style-type: none"> • Refer to Canyon stream valley Overview for information.

BEAR WATERSHED ANALYSIS AREA

U.S. Fish & Wildlife Surveyed Wetlands



LEGEND

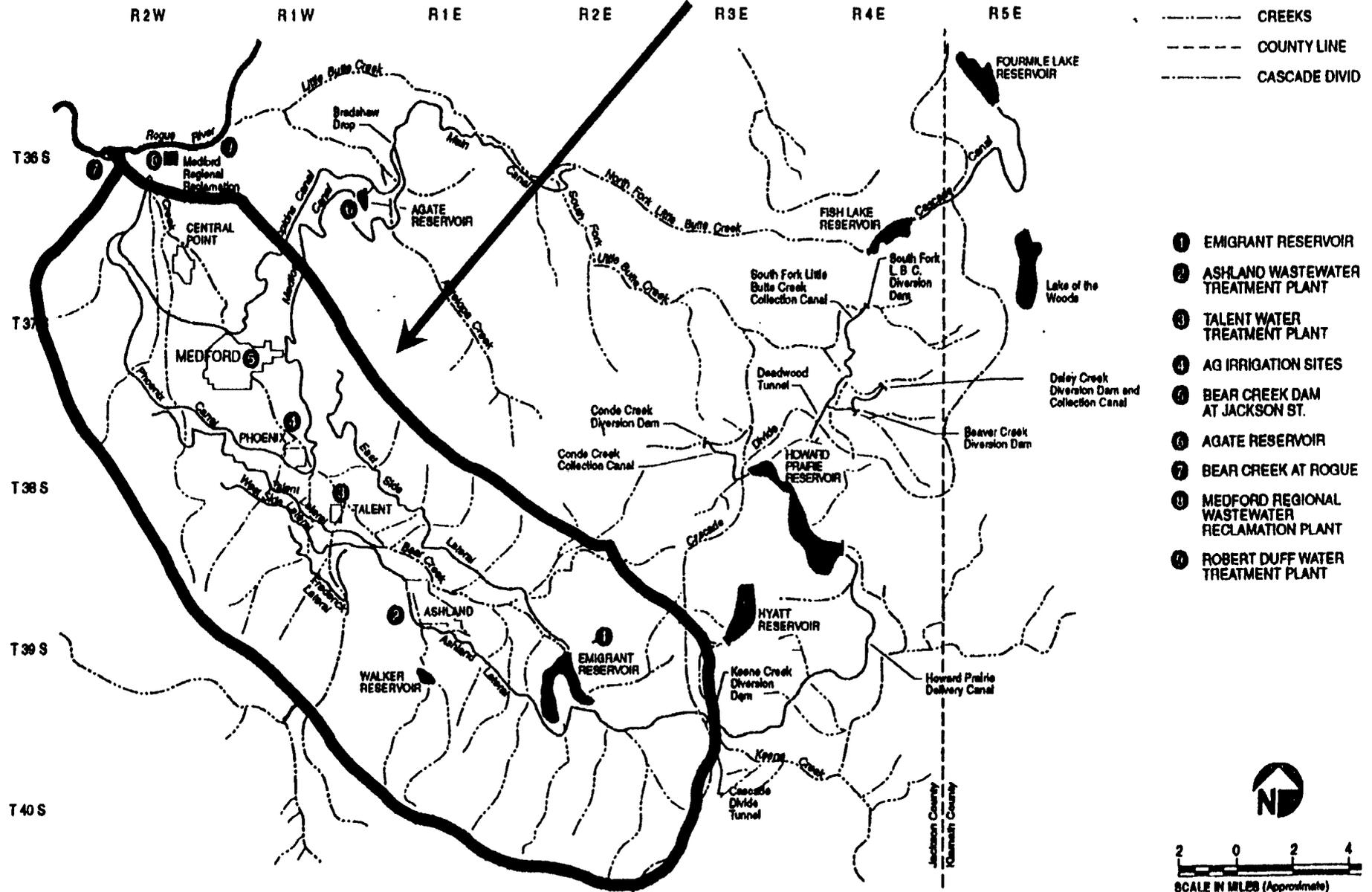
 US FISH & WILDLIFE SURVEYED WETLANDS

SCALE 1: 5000.



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Bear Creek Watershed



- LEGEND**
- CANALS
 - - - - - CREEKS
 - - - - - COUNTY LINE
 - - - - - CASCADE DIVID

- ① EMIGRANT RESERVOIR
- ② ASHLAND WASTEWATER TREATMENT PLANT
- ③ TALENT WATER TREATMENT PLANT
- ④ AG IRRIGATION SITES
- ⑤ BEAR CREEK DAM AT JACKSON ST.
- ⑥ AGATE RESERVOIR
- ⑦ BEAR CREEK AT ROGUE
- ⑧ MEDFORD REGIONAL WASTEWATER RECLAMATION PLANT
- ⑨ ROBERT DUFF WATER TREATMENT PLANT



Supplemental Water Distribution System

C76

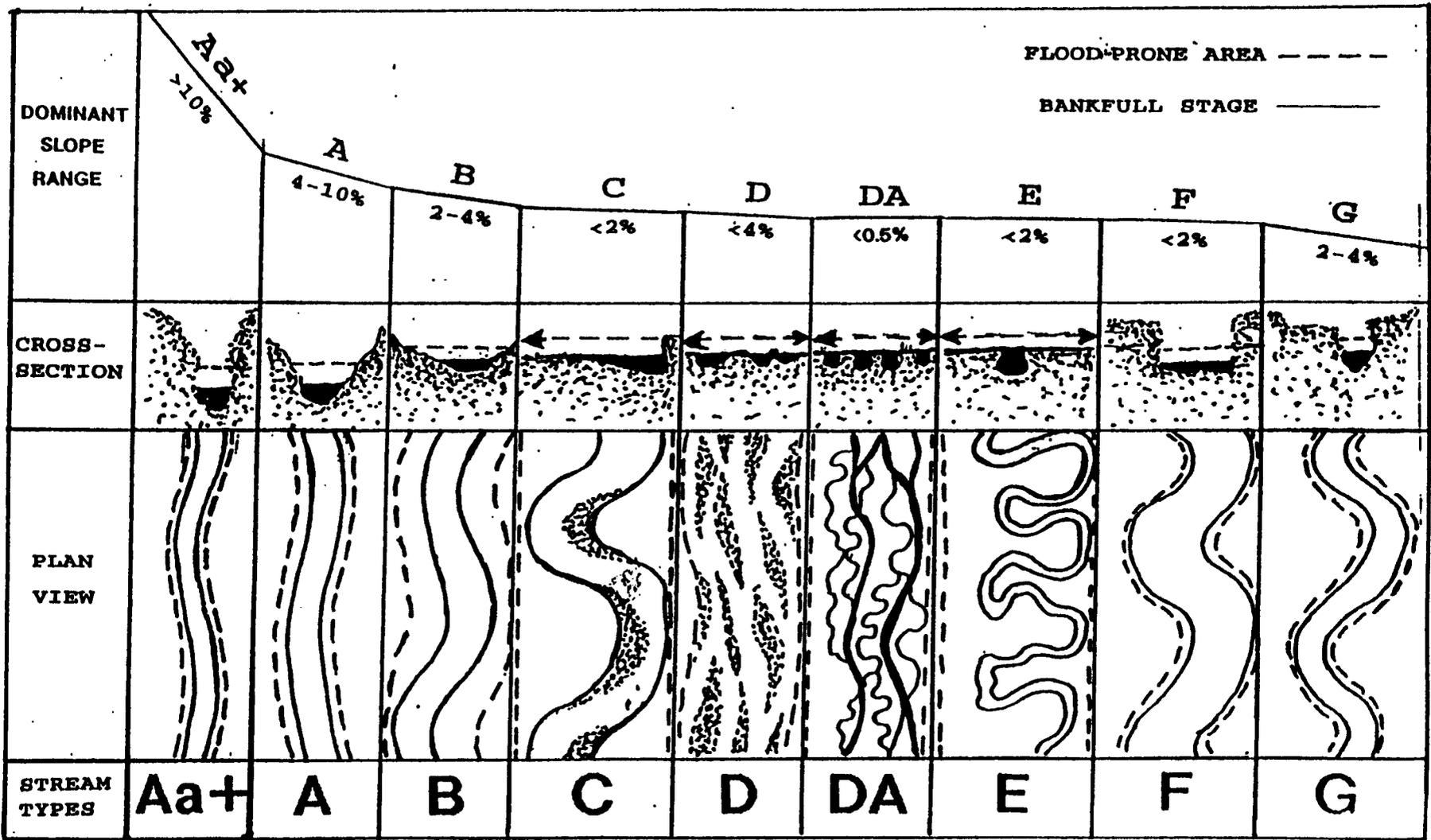


Figure 1. Broad level I delineation of major stream types showing profile, cross-sectional and plan view morphology.

CS7

Dominant Bed Material	A	B	C	D	DA	E	F	G
1 BEDROCK								
2 BOULDER								
3 COBBLE								
4 GRAVEL								
5 SAND								
6 SILT/CLAY								
ENTRI.	<1.4	1.4-2.2	>2.2	N/A	>2.2	>2.2	<1.4	<1.4
SIN.	<1.2	>1.2	>1.4	<1.1	1.1-1.6	>1.5	>1.4	>1.2
W/D	<12	>12	>12	>40	<40	<12	>12	<12
SLOPE	.04-.099	.02-.039	<.02	<.02	<.005	<.02	<.02	.02-.039

Figure 4. Illustrative guide showing cross-sectional configuration, composition and delineative criteria of major stream types.

APPENDIX G

HERITAGE RESOURCES

Cultural Uses in the Bear Watershed Analysis Area
Chronology of Important Dates

CULTURAL USES IN THE "BEAR WATERSHED ANALYSIS AREA"

For the past several thousand years, the upper Bear Creek watershed has experienced a variety of human activities.

PREHISTORIC USE

The first inhabitants may have arrived as early as 10-11,000 years ago at the time of the last glacial retreat from the Mt. Ashland vicinity (the "Late Wisconsin" sub-period), but no known archaeological sites or artifacts date from this period. From about 9,000 to 4,000 B.P., Early Archaic peoples developed "central-based wandering" subsistence patterns in the area. Archaeological evidence points to processing of plant foods such as roots, bulbs, and nuts. Salmon may have become an important food source during the latter half of this period.

The Middle Archaic (4,000-1,500 B.P.) saw increasing use of natural resources by a growing population. Improved plant gathering and anadromous fish harvesting techniques may have played an important role in population increases. Hunting of elk, deer, bear, and other game is firmly established in the archaeological record.

The Late Archaic (1500-200 B.P.) saw further population increases and growing winter villages in the upper Bear Creek Valley. Winter dwellings generally consisted of semi-subterranean houses and sweathouses constructed with sugar pine planks. (Sugar pine was probably felled by long-burning fires which were set at the base of the tree.) One village was certainly located in the present vicinity of Ashland's lower Lithia Park. Seasonal base camps were established at higher elevations throughout the area, including the Siskiyou Crest, and at various mid to low elevations above the Valley floor. One camp, located below the East and West forks of Ashland Creek, was most likely used for hunter/gatherer activities in the upper Ashland Creek drainage.

A variety of plants and animals were used by the native groups during the period. Acorns were perhaps the most important plant food. Acorns were gathered in the early spring and prepared for consumption through a rather lengthy and complex process in order to leach the bitter taste. Camas bulbs, which were roasted, was also an important food source. Other sources of plant foods included sugar pine nuts, wild plums, manzanita berries, tarweed, sunflower (both the stalk and seed), Oregon grape, serviceberry, bear grass bulbs, the cambium layer of either the sugar or white pine, and a variety of other plants, shrubs, herbs, and tree nuts. The only cultivated plant was tobacco and it was not a food source. According to one early source, smoking tobacco was "indulged in to a considerable extent and had a semi-religious character."

Game animals were hunted for use as food, clothing, and tools. In addition to the previously mentioned use of deer, elk, and bear, native groups also hunted beaver, rabbit, ground squirrel, and birds (crows and woodpeckers). One account says that the beaver were cooked whole over a fire, fur and all. Non-game food included grasshoppers, ants' eggs, and snails. A primary food source was salmon, and to a lesser extent, trout, and possibly freshwater mussels.

Compared to historic period activities, prehistoric use of the Bear watershed had minimal impact on the environment. A notable exception was the anthropogenic use of fire as a management tool. Prehistoric cultural groups probably used fire for many purposes: creating and maintaining oak woodlands for production of plant foods and for facilitation of acorn gathering; stimulating growth of tender grass and sprouting of brush for deer and elk grazing and browsing; maintaining beargrass-gathering areas; driving of deer and other big game; preparing tobacco plots; facilitating travel by "opening" the forest; and perhaps many other uses. While the full effect of prehistoric human-set fire is not fully understood, it is most likely that it had a pronounced effect on the composition and arrangement of floral species in the Bear Watershed Analysis Area.

HISTORIC USE

The Contact Period (1790-1856) in southwest Oregon is the time of contact between Native American cultural groups and Euro-American explorers, trappers, miners, and settlers. Peter Skene Ogden's brigade of Hudson's Bay Company trappers was the first Euro-American presence in the Rogue Valley. (Local cultural groups had probably traded for Euro-American goods prior to this time through trading networks which reached the Pacific coast where contact had taken place in the late 18th century.) Ogden wrote that "this is certainly a fine Country and probably no Climate in any Country equal to it." Ogden's party was followed by other Hudson's Bay trappers through the 1830s, Ewing Young's cattle drive of 800 head in 1837, and the Wilkes Expedition in 1841. While passing near present-day Jackson Hot Springs, a member of the Wilkes' group commented that he saw a woman "who was so busy setting fire to the prairie and mountain ravines that she seemed to disregard us." In 1846, the Applegate brothers laid out the Applegate Trail from the Willamette Valley to the Humboldt River in Nevada. The route paralleled Bear Creek and passed through the future location of Ashland. In the early 1850s the first settlers and miners arrived in the Rogue Valley. By 1856, after a series of skirmishes and "wars," almost all Native American cultural groups were either killed by fighting and disease, or had been removed to a reservation on the north-central Oregon coast.

Ethnographic studies indicate that the Shasta were the primary cultural group which inhabited the Analysis Area during the contact period. The Upland Takelma also used the area. The Takelma referred to Bear Creek as "Si'kuptat" (meaning "dirty water") and the Shasta called it "Ussoho." Most Rogue Valley territorial boundaries for the aboriginal groups of southwest Oregon are fairly clearly defined if one keeps in mind that upland gathering areas often overlapped. The most controversial "boundary" is the northern portion of the Shasta's range and the southern portion of the Upland Takelma's range. Based on the latest evidence, that line would be somewhere in the vicinity of the confluence of Wagner and Bear Creeks and would have extended south into the present Shasta and Scott Valleys and east to the Jenny Creek/Howard Prairie areas.

Unlike the Applegate drainage to the west, upper Bear Creek never yielded significant amounts of gold with the exception of the Ashland Mine, a lode mine west of Ashland. Some small scale placer mining took place, but no large-scale hydraulic operations. Impacts to riverine habitat due to mining operations

were very minimal. The "Bula" or Lamb Mine diverted water from the East Fork of Ashland Creek along a three-mile ditch to a stamp mill located in the Tolman Creek drainage. The diversion probably required a small dam. cursory visits have been made to the probable dam site and there is little evidence of human activity/effects in the area.

Early upper Bear Creek residents were more interested in manufacturing, farming, and providing goods and services, than they were in joining the "gold rush" in the Applegate. In 1852, Abel Helman constructed a small water-powered sawmill in the present vicinity of Lithia Park. This was later followed by a flour mill, marble cutting plant, and woolen mill. By 1855, the lower sections of Neil, Clayton, and Tolman Creeks were homesteaded. Patrick Dunne's claim on lower Neil Creek holds one of the earliest water rights in southern Oregon.

From the 1850s through 1900 small-scale timber harvesting took place in the lower elevations. Sawmills were located on lower Neil and Clayton Creeks, and near present-day upper Lithia Park and Reeder Reservoir. In 1898, a water-powered sawmill was located on upper Neil Creek. A second mill was a little further upstream and it included a small pond in the impounded creek (sec. 13). A couple of years later, rough-cut lumber from the first mill was flumed for three miles to a box and planing mill located next to Southern Pacific Railroad. The effects on soil, water, and vegetation from the impoundment, flume, and mills are unknown.

Continued small-scale logging continued through World War II with relatively small localized effects in the various sub-basins of the watershed. (In 1928, Arthur Coggins purchased ten million board feet in the upper Tolman Creek drainage, but the sale was cancelled after he cut only one million board feet.) Intensive timber management, logging, and road building began after the War on private, Forest Service, and Bureau of Land Management lands with more widespread effects. In the late late 1950s and early 60s, large-scale logging and road building took place in the Ashland Watershed. Forest Service road additions included 2060000, 2060200, 2060270, 2060489, 2060500, and 2060550.

Grazing in the Bear Watershed Analysis Area began with the first settlers in the 1850s. It was first confined to the lower stretcheds of the sub-basins and continues at the present time, including many streamside areas. Intensive grazing in the late 1800s and early 1900s took place along the Siskiyou Crest. Thousands of sheep and cattle, along with smaller numbers of hogs and horses used the high elevation meadows. Most of this took place outside of the Analysis Area in the Grouse Creek and Little Applegate drainages adjacent to Ashland Creek. However, substantial grazing has occurred in the upper Wagner Creek drainage on the west side of Wagner Butte and probably to a lesser extent in the upper Neil Creek drainage. Even though prohibited by establishment of the Ashland Forest Reserve in 1893, some grazing probably took place in the Ashland Watershed. (In the 1990s, cattle herds occassionally drift into the Watershed from nearby allotments.)

OTHER ACTIVITIES/USES:

A variety of other activities took place from around 1900 through World War II. In 1899, Nimrod and Anna Long homesteaded near the junction of Weasel Creek and the West Fork of Ashland Creek (approx. one mile southwest of present-day Reeder Reservoir). In 1920, the property was purchased by Jessie Winburn, a

wealthy financier from New York. Winburn was involved in a relatively short, but heated, relationship with the City of Ashland concerning his activities in the municipal watershed. He largely ignored their concerns about grazing, fishing, and polluting. The conflicts quickly tired the impulsive Winburn and he sold his land to the City in 1923.

Forest Service presence in the Analysis Area got a start in 1899 when the first ranger, John R. Leibig, was hired to oversee protection of the Ashland Forest Preserve (est. 1893). Initial concerns centered around grazing, and then quickly included recreation uses, fire, and timber cutting. In 1900, Leibig commented that "if the purity and stability of the water volume in Ashland Creek is worthy of consideration the prohibition of sheep grazing within the reserve should be absolute." He went on to say that "...it is obvious that the maintenance of the Ashland Creek volume is prohibitive to lumbering operation in the reserve." In 1913, Crater National Forest employee, Martin Erickson, stated "...it is important to give the Ashland watershed special fire protection...Campers are quite numerous in the headwaters." Recreation/fire concerns led to increased patrols and the establishment of the Wagner Butte and Mt. Ashland fire lookouts by 1923. Both points had served as temporary "rag camps" with portable firefinders as early as 1910. The Forest Service constructed and/or improved trails to both lookouts. Employees also installed phone lines to each location.

By 1920, the City of Ashland was already a noted tourist area. "Lithia water" had been piped to town from springs near Emigrant Creek, Lithia Park was established along with a campground within the park, and a road had been established up "Ashland's Grand Canyon" along Ashland Creek and its West Fork to an elevation of about 4500 feet. (The portion of the road past Reeder Reservoir was abandoned in 1972.) From that point, tourists ascended the Mt. Ashland Trail to Mt. Ashland and then completed the return loop via the Grouse Creek Trail along the divide between Neil/Tolman Creeks and Ashland Creek.

As the town continued to grow, its water needs increased. One proposal called for a 3200-foot long tunnel which would divert Neil Creek water to Ashland Creek. Instead, the city decided to construct a 103-foot high dam just below the forks of Ashland Creek. Hosler Dam/Reeder Reservoir was completed in 1928 at a cost of \$350,000. Except for a relatively small amount of water obtained from the Talent Irrigation District, the city relies on the 14,000 acre watershed as its sole source of water.

As the town expanded, so did the general Rogue Valley population and its need for additional water sources. In 1916, with the construction of Emigrant Lake, the Talent Irrigation District's "East Canal" and "Lower East Lateral" began delivering water to Rogue Valley orchardis and other users. In the 1950s, Emigrant Lake was enlarged and the "Ashland Canal" was constructed through Ashland. In 1925, the TID began diverting water from McDonald Creek to Wagner Creek via the "McDonald Canal." The canal basically follows the same route as an 1897 diversion known as the "Greely Ditch." The "McDonald Canal" not only serves agriculture; it also provides municipal water for Talent.

Reeder Reservoir and TID developments followed initial water claims which began during settlement times. Volume claims for water are greater than that produced in some of the area's sub-basins. For example, Neil Creek in the vicinity of Neil Creek Road and Reiten Drive is a small trickle during the late

summer months. Numerous claims date to the 1850s and 60s and water is diverted through a large number of ditches in the area (Dunn, Neil, Hill, Taylor, and others).

The 1930s brought the Civilian Conservation Corps (CCC) to the area. The CCC was developed by the Federal government as a jobs program in response to the "Great Depression." The 75-mile Beaver Creek-Mount Ashland Loop Road was constructed in 1937. The eastern segment ascended the Siskiyou along the edge of the Ashland Watershed to Mt. Ashland. The road provided magnificent scenery and immediately received heavy use by recreationists. Numerous wood culverts were installed along this route and some are still in use today. Forest Service engineers continued to install leftover CCC wood culverts "by hand" through the 1950s.

In 1936, the CCC constructed the Trail Camp Ski Shelter (20'x30') in the headwater area of Clayton Creek. A 450-foot-long "wet meadow" served as the ski run and a gas engine-powered rope tow functioned as the sole ski lift. A privy was also installed and a water source in the meadow was developed, although the latter may not be directly tied to the "ski area." Rogue River National Forest's first "Winter Sports Use Report" estimated that 500 skiers used Trail Camp in the 1937-38 season. CCC work plans also called for construction of "Bull Gap Camp Ground," however, the "Camp Ground" does not show up on 1937 or 1946 editions of Rogue River National Forest maps, so it may be that the plans were not implemented or that only minor work was done. The site was certainly used as a picnic ground in the early 1950s. That use continued through about 1971 when an administrative decision was made to abandon the site, most likely because of sanitation concerns related to the Ashland Watershed, (although the privies were located on the Neil Creek side of Bull Gap), and a high amount of vandalism.

Beginning in the 1940s numerous ski area development sites in southwest Oregon were surveyed by the private sector and the U.S. Forest Service. The sites included Mt. Ashland, Brown Mountain, Pelican Butte, and Mt. Bailey. It was not until 1963 that a "modern-day" ski area was developed on the north slopes of Mt. Ashland. Three surface lifts, one chairlift, day use lodge, rental shop, and over 20 ski runs were constructed. A master plan developed in the early 1970s proposed underground parking, overnight lodging, a small golf course, an archery range, equestrian trails, and lift construction down to the 5200-foot level in the East Fork of Ashland Creek. The plan stalled due to financial problems and City of Ashland concerns. The ski area remains virtually unchanged except for replacement of the surface lifts with chairlifts (Windsor-1980, Comer and Sonnet in 1987), upgrade and replacement of the original sewage system (1980), night light installation and associated power lines (1983), and parking lot paving (1988). The ski area continues to use its original water source, a type of reverse drainfield collection system at a subsurface spring located a short distance west of Ariel.

Erosion and sediment contribution to Reeder Reservoir from the ski area has been a major concern. During the 1970s it was felt that the ski area was a major source of sediment delivery to the East Fork of Ashland Creek. (One headwater source of East Fork is located between the "Windsor Liftline" and "Bottom" ski runs.) Subsequent studies have indicated that the ski area's contribution is minor.

Directly associated with Mt. Ashland ski area development were a number of other projects in the immediate vicinity. They included Mt. Ashland Access Road construction, PP&L's underground powerline installation through the Neil Creek and Ashland Creek sub-basins to Mt. Ashland's summit, National Weather Service and KMED-TV (now KTVL) facilities at the summit, and an electronic site on the knoll immediately east of the ski lodge. Present and proposed projects in the Mt. Ashland vicinity include expansion of the National Weather Service site with the installation of Doppler radar technology (in progress), recontouring of "Upper Dream" and "Avon" ski runs, ski area sewage expansion sites, and serious consideration by the ski area's Board of Directors for pursuing ski area expansion/improvement plans contained in the 1991 Final Environmental Impact Statement, Mt. Ashland Ski Area.

CHRONOLOGY OF IMPORTANT DATES
FROM A HERITAGE RESOURCE PERSPECTIVE

"BEAR" WATERSHED ANALYSIS AREA

- 45,000 B.P. - Mid Wisconsin sub-period glaciers may have reached the 5200' level in the east and west forks of Ashland Creek. Glaciers probably reached down Neil Creek, but extent is unknown.
- 11,000 B.P. - Small populations of Paleo-Indian hunters might have arrived in the Siskiyou Mountains, but no known archaeological sites or artifacts date to this period.
- 10,000 B.P. - Late Wisconsin sub-period glaciers retreat from Mt. Ashland. Glacial extent was probably to the 6000-6500' level.
- 9,000-4,000 B.P. - Early archaic human settlement in the area. Development of "central-based wandering" subsistence patterns.
- 6,500 B.P. - Salmon may have become a food source for resident groups.
- 4,000-1,500 B.P. - Increasing use of natural resources by growing Middle Archaic population: anadromous fish, plants, game.
- 1,500-200 B.P. - Further population increases in the Late Archaic. Growing winter villages at lower elevations including the present lower Lithia Park and Ashland Plaza area. Continued use of fire for manipulating the environment. Seasonal camps are established at mid and high elevations, including the Siskiyou Crest, and are used as base areas for hunting, food gathering, and plant collecting.
- 1790-1856 - "Contact" period between Native American cultural groups and Euro-Americans in southwest Oregon. Based on ethnographic evidence, the "Shasta" were the primary inhabitants of all the drainages in the Bear WA. However, the Upland Takelma "territory" included Wagner Creek and probably extended up Bear Creek to the mouth of Ashland Creek. The Rogue River Indian Wars of 1851-56 suddenly ended most aboriginal occupation of the area.
- 1827 - Peter Skene Ogden of the Hudson's Bay Company is the first Euro-American to cross the Siskiyou and enter the Rogue Valley. On February 10, his brigade camps about a mile or two below the confluence of Ashland and Bear Creeks. "This is certainly a fine Country and probably no Climate in any Country equal to it." He notes the "flowers in blossom," the "numerous" racoon, and that "field mice are numerous all over the plains." He also makes note that beaver were hunted quite heavily by the native inhabitants.
- 1830-1840s - Hudson's Bay Company trappers continue to pass through the area.
- 1837 - Ewing Young and other American trappers/settlers drive a herd of 800 cattle from California missions to the Willamette Valley. Their route follows Bear Creek and crosses the Siskiyou near Siskiyou Summit.

1841 - The "Wilkes Expedition" passes through the Rogue Valley. One member of this group (Navy explorers and scientists) describes an Indian woman "who was so busy setting fire to the prairie and mountain ravines that she seemed to disregard us." This took place near present-day Jackson Hot Springs.

1846 - Jessie and Lindsay Applegate lay out the Applegate Trail from the Willamette Valley to the Humboldt River in Nevada. The route parallels Bear Creek, passes through the future location of Ashland, and then follows Emigrant Creek before climbing the Cascades near present-day Tyler Creek Road.

1850s - Gold miners flock to the eastern Siskiyou. Most of the significant mining activity takes place west of Ashland Creek in the Applegate River drainage with no major "strikes" in upper Bear Creek tributaries.

1851 - Patrick Dunn, a young Irish Miner, crosses the Siskiyou from California's Salmon River Country. For a short time he mines near Jacksonville, then he establishes one of the Rogue Valley's first ranches along lower Neil Creek. In 1853 he becomes friends with the Hill family (see below). In August, skirmishes develop into full-fledged fighting with local Indians. Several Indian men are killed. Dunn's summer crop is burned and all of his livestock killed.

1852 - Abel Helman builds small water-powered sawmill on Ashland Creek (first named Rock Creek, then Mill Creek). This was later followed by a flour mill, a marble cutting plant, and woolen mill. All are located in the present "Plaza" vicinity in Ashland.

1853 - Isaac and Elizabeth Hill, along with their four children, homestead in the area now covered by Emigrant Lake. There were no Euro-American women in Bear Creek portion of the Rogue Valley prior to Elizabeth's arrival in April. The Hill-Dunn Cemetery is located on a small portion of the original homestead above the high water level of Emigrant Lake.

1854 - Patrick Dunn and Mary Hill (daughter of Isaac and Elizabeth) are married. The wedding was the first in Jackson County which at that time included most of southern Oregon. Patrick is later elected to the first Oregon Territorial Legislature and Mary is crowned as "Mother Oregon of the Oregon Pioneers". In 1860, they build a large two-story house along Neil Creek which stays with the family through 1976. (The home, currently owned by the Provost family, is on the National Register for Historic Homes. A portion of the "Dunn property," also owned by the Provosts, is the location for the proposed Clear Springs Resort between Highway 66 and Interstate 5.)

c.1854/55 - Neil, Clayton, and Tolman Creek areas are settled. The Neil brothers (Clairborne and Leander) arrive from Tennessee in 1854. Clairborne becomes a prominent citizen of the era. Fletcher and Henry Clayton arrive in 1855. Oregon Surveyor General/Judge James C. Tolman arrived in the area in the early 1850s and settled a large farm and ranch. In 1855, Helman lays out twelve lots for a permanent town site.

1859 - Siskiyou Mountain Wagon Road is constructed over the Siskiyou Mountains. Ashland (pop. 50) is a stopping point for travellers.

1876 - Steam-powered lumber mill on upper Wagner Creek.

1878 - Brief gold rush to upper Ashland Creek.

1880s - Sawmills on Ashland Creek near present-day upper Lithia Park and Reeder Reservoir. Other sawmills located on Clayton Creek and Neil Creek.

1887 - Southern Pacific Railroad completes the Portland/San Francisco line. The "Golden Spike" is driven in Ashland.

1889 - Electric service starts in Ashland and a schedule of rates is established.

1890 - "Grouse Creek Trail" established along present-day Ashland Loop Road. The trail is first used as a travel route to the Grouse Creek mining district southwest of Mt. Ashland. Later used as a return loop for tourists who took excursion wagons part way up the West Fork of Ashland Creek, then horses to Mt. Ashland. This early City of Ashland tourist attraction was promoted as the Mt. Ashland Loop" and the new road (1909) up Ashland Creek was billed as a tour through "Ashland's Grand Canyon."

1891 - Ashland Mine begins operation with a 250-foot tunnel. The Ashland Tidings says "the hills which shelter Ashland are holding treasures which can be unlocked by the courageous efforts of patient search and the winning combination of local capital." By 1894 a second tunnel (592 feet long) was excavated. The mine operates through 1942.

c. 1895-1920 - Neil Creek and Wagner Creek drainages used as travel routes for sheep herders on their way to the summer grazing areas along the Siskiyou Crest, primarily in the meadows between Grouse Gap and Jackson Gap. Some grazing took place in the upper Neil Creek drainage (a few sheep continued to graze here into the 1950s), and, no doubt, some illegal grazing in the headwater meadows of Ashland Creek. (Neil Creek Trail was probably established by 1900, even though early Forest maps do not show the trail.)

1898 - Water-powered sawmill on upper Neil Creek. After 1900, rough cut lumber flumed three miles down from the sawmill to a box and planing mill located next to the Southern Pacific Railroad. A second sawmill was located up the drainage (Sec. 13) where the impounded stream formed a log pond.

1899 - First ranger hired to oversee protection of the Ashland Forest Preserve (est. 1893). One duty was to prevent grazing in the Preserve. Thousands of sheep were herded along the crest of the eastern Siskiyou at the time, and some no doubt found their way into the headwaters of Ashland Creek, especially the west fork with its extensive meadow system.

1899 - Nimrod and Anna Long homestead on a "T"-shaped piece of property near the West Fork of Ashland Creek (Sec. 32). The Longs build a cabin on the site and in 1920 sell to Jessie Winburn. (The creek which runs west to east through the "T" is sometimes called Weasel Creek. A wood-routed "Weasel Creek" sign was in place here prior to 1974. It was located where the old west fork road crossed the creek and was either stolen or washed downstream by the 1974 flood.

1900 - Monument-grade granite discovered along Quartz Creek, a tributary to lower Neil Creek. Quarried intermittently through 1916, then continuously

through the mid 1930s. "Ashland Granite" was a popular material for gravestones and was also used at Portland City Hall, the State Capitol Building in Olympia, WA, and the Salem post office.

1900 - Ashland Woolen Mills is destroyed by fire.

1905 - "Bula" or Lamb Mine established at midslope on east side of East Fork Ashland Creek. Later, a three mile long ditch diverts water from the East Fork to a stamp mill built in the Tolman Creek drainage near the Tolman/Hamilton Creek divide. The present-day "Toothpick" and "Lamb Mine" trails follow the ditch route.

1907 - Ashland National Forest created then almost immediately absorbed into the newly-established Crater National Forest.

1908 - Municipal electrical power generated from Ashland Creek. Both forks are impounded.

1908-1915 - Lithia Park is established. In 1908, Ashland citizens, by a vote of more than five to one, choose to dedicate all city-owned property bordering Ashland Creek from the Plaza to the National Forest as a city park. By 1915, "lithia water" is piped to the park (and other city locations) from springs located near Emigrant Creek, and John McLaren, Superintendent of Golden Gate Park in San Francisco, is hired as a landscape architect.

1910 - First mention of skiing on Mt. Ashland.

1911 - Ashland Creek Ranger Station (or "Tool House") built somewhere in the vicinity of East/West Fork confluence.

1920 - Jessie Winburn purchases the Long property. He builds an entire compound of structures in the Adirondack style and also constructs a swimming pool. Ashland Board of Health is concerned about Winburn's cesspool and livestock. Winburn ignores the city and continues to fish in Ashland Creek and picnic near the City's water intake station, both prohibited by City ordinance. He sells to City in 1923 and Forest Service crews use the structures through the late 1930s.

1921 - Skyline Mine is established by this date although one source states that the mine "was worked since the early 1900s." A gravity and amalgamation mill, cabins, and a shaft with headframes were present in the late 1920s. The mine showed low returns through the years. In 1987, the Forest Service razed the structures and filled in the shafts.

1922/23 - Fire lookout buildings established on Mt. Ashland in 1922 and Wagner Butte in 1923. Both peaks may have served as "rag camps" (temporary camp with portable firefinder) as early as 1910. The original trails (est. no later than 1910, perhaps as early as 1890-1900) to both lookouts passed through the Ashland Watershed and are long abandoned. However, both can still be followed by an astute trail finder.

1924 - City of Ashland considers new water sources. One proposal is to divert water from Neil Creek via a 3200-foot long tunnel through a ridge into Ashland Creek.

c.1925 - Talent Irrigation District constructs the "McDonald Canal" which diverts water from the Little Applegate watershed to Wagner Creek. A lower water volume diversion first took place in 1897 when the "Greely ditch" was extended to Wagner Gap.

1928 - First large timber sale in the Bear WA. Arthur Coggins purchases ten million board feet in upper Tolman Creek drainage, but cuts only one million and the sale is cancelled.

1933 - Ethnographer J.P. Harrington interviews Molly Horton, an elder from the Upland Takelma. She states that her group referred to Bear Creek as "Si'kuptpat (meaning "dirty water") and that the Shasta called it "Ussoho" (no known translation).

1937 - "Beaver Creek-Mt. Ashland Loop Road" is constructed by the Civilian Conservation Corp. The portion located in the Bear WA starts at Terrace Street in Ashland and heads south to "4 Corners" (road 2060), then continues to Bull Gap (road 200), then west to the Mt. Ashland Lodge (trail 1017) and Grouse Gap (road 20). Many of the original wood culverts are still in place in 1995. (Note: Not all of the present wood culverts are CCC vintage, as Forest Service road engineers installed wood culverts on the Loop Road through the 1950s.)

1937 - Trail Camp Ski Shelter is constructed near the headwaters of Clayton Creek. Local skiers made use of a gas-engined rope tow well into the 1950s. Actual post Native American use of the site may date to before 1900 as the adjacent wet meadow (used for the ski run) is one of the few water sources along the old Grouse Creek Trail (see "1890" above).

1937 - "Bull Gap Camp Ground" plans appear on a 1936 CCC work plan, but the campground does not show up on 1937 or 1946 Rogue River National Forest map editions. "Bull Gap Picnic Ground" was certainly established by the early 1950s. A water source was developed about 250 yards upslope and piped to the site. Picnic units were located on the Ashland Creek side of the gap while the outhouse were located in the Neil Creek drainage.

1950s/60s - Large scale timber harvesting and road building in Ashland Creek drainage. Forest Service road additions include 2060000, 2060200, 2060270, 2060489, 2060500, and 2060550.

1958 - Talent Irrigation District constructs the "Ashland Canal" which contours through south and west Ashland at an approximate 2300-foot elevation. (In 1916, TID's "East Canal" and "Lower East Lateral" were constructed on the east side of Bear Creek. Both were enlarged in 1958. The 1916 date coincides with Emigrant Lake Dam construction while the 1958 is the same year the lake was enlarged.) Note: These dates may not be exact, especially as it pertains to the Ashland "Canal." The 1954 USGS 15' quad for Ashland shows the Ashland "Lateral" in the same location as the present canal at the southeast and central portions of town, but it does not show in the northwest. Perhaps a smaller "lateral" preceded the "canal"? Further research is needed.

1963 - Sargeant Sambo dies in Yreka at age 102. "Sargeant" was from the Shasta cultural group and had paternal ties to the southern Bear Creek Valley. He

provided invaluable ethnographic and linguistic information to researchers for over 60 years.

1978-1982 - Ski Ashland Surface Erosion Monitoring Study is conducted by the Forest Service. The study concludes that "sediment yield from the ski area is not as great as some thought" and that "it is an insignificant amount of material when considering the main problem of accumulated sediment in Reeder Reservoir 5.5 miles down stream."

1987 - Ski Ashland constructs two new chairlifts as replacements for a rope tow and a small "T-bar." The Comer Chairlift spans the uppermost headwaters of the East Fork of Ashland Creek.

1988 - Ski Ashland sewer drainfield is tested for possible contamination of springs (Cottonwood Creek drainage) on the south side of the parking lot. Water samples are taken throughout the summer and there is no evidence of contamination from the drainfield.

1991 - Ski Ashland Final EIS is completed and approved for expansion and improvements at the ski area. The document is "conceptual." Each project will require further "site specific" analysis.

1992 - Steven's Pass (Harbor Properties) sells Ski Ashland. Community raises money as no private buyer makes an acceptable offer. City of Ashland becomes permit holder and leases out to the non-profit Mt. Ashland Association for \$1/year.

1994 - PP&L replaces failed 440 volt underground powerline between Ski Ashland Lodge and Ariel chairlift's bottom terminal. The route follows the 210 road along the base of the ski area.

1995 - Ski Ashland hires consultants to study sewage expansion sites including one in the Ashland Watershed, a second in the Neil Creek drainage, and a third on the divide between Neil Creek and Cottonwood Creek. The ski area also sets a record for the greatest amount of income and skier visits in its 31-year history.