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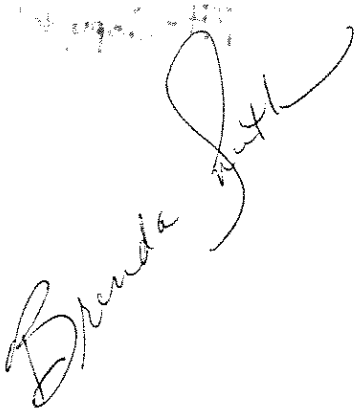
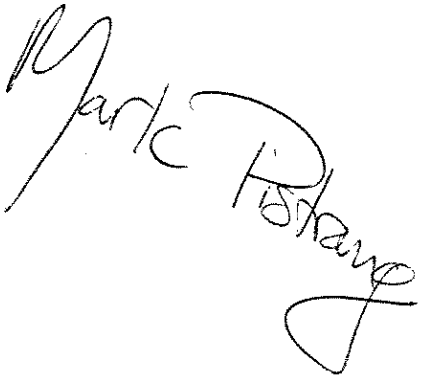
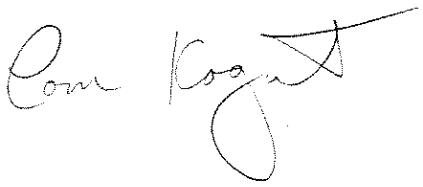
Lower Cispus East Watershed Analysis

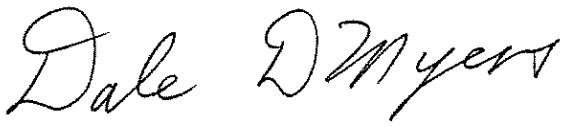
April 1996

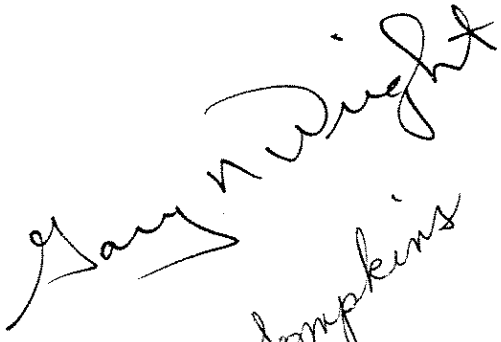
Gifford Pinchot National Forest
Randle Ranger District

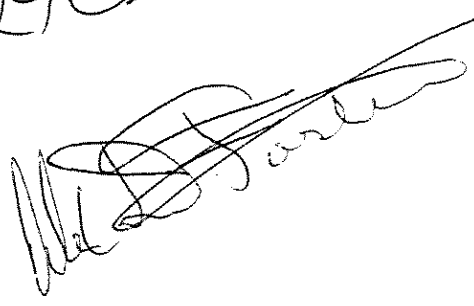


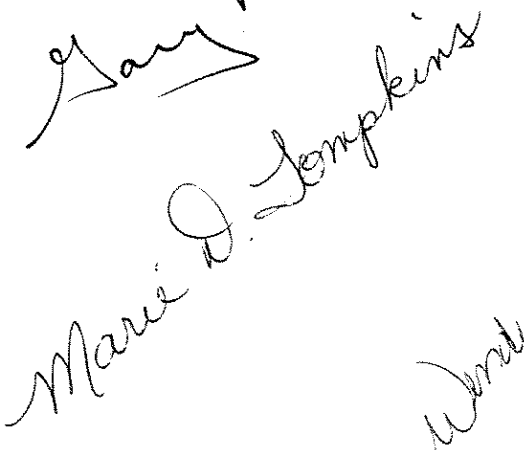


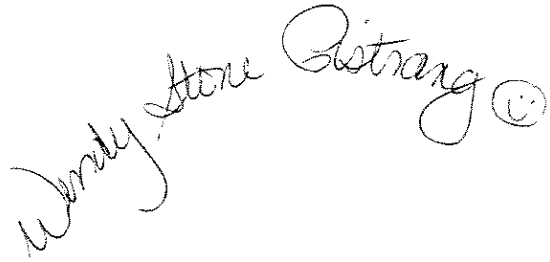












Lower Cispus East Watershed Analysis

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Chapter 1 - Overview

Purpose

The purpose of watershed analysis is to provide watershed scale estimates of the direct, indirect, and cumulative effects of management activities and guide the general type, location, and sequence of appropriate management activities within a watershed.

Management Direction

Management direction for conducting watershed analyses is found within the Northwest Forest Plan [Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Document Within the Range of the Northern Spotted Owl (USDA, USDI 1994)]. Watershed analysis is one of the principal analyses for implementing the Northwest Forest Plan Aquatic Conservation Strategy (ACS). It sets the stage for subsequent decision making processes, including project planning, project development, and regulatory compliance within the watershed context.

Analysis Process

The process used to conduct the Lower Cispus East Watershed Analysis (LCE WA) involved characterizing the watershed's physical, biological, and human elements; identifying the relevant issues and key management questions; describing the current and historic/reference conditions; interpreting the information and evaluating the capability of the system to achieve key management objectives (ACS objectives, biodiversity, and late-structural habitat); and developing management recommendations responsive to the watershed processes identified in the analysis.

The LCE WA Team utilized existing data and information, documented assumptions and data gaps, and referenced analyses for adjacent watersheds: the Lower Cispus West Watershed Analysis, and the Middle and Upper Cispus River Pilot Watershed Analysis. No attempt was made to assess the damage, or update existing information relative to the November 1995 and February 1996 flood events, except where stated.

Chapter 2 - Watershed Characterization

Purpose

The purpose of watershed characterization is to identify the dominant physical, biological, and human processes and features of the watershed.

Physical

Location

The Lower Cispus East Watershed Analysis area is located in southwest Washington State, approximately seven miles southeast of the town of Randle, Washington, within the Gifford Pinchot National Forest on the Randle Ranger District. It primarily lies south of the Cispus River, west of Juniper Ridge, east of Forest Road 25, and north of Yellowjacket Pass. See Regional and Local Vicinity Maps.

Climate

Climate within the LCE WA area is typically warm and dry during the summer, and cool and wet during the winter. Annual precipitation ranges from 60 to 100 inches, with greater amounts of precipitation falling at higher elevations. Elevations within the watershed range from 1200 feet above sea level along the Cispus River, to 5892 feet above sea level at the crest of Sunrise Peak.

Geology

Bedrock and accompanying soils within the analysis area are almost entirely volcanic in origin, representing eruptions from at least 30 million years ago to ash deposits from the 1980 eruption of Mount St. Helens. Bedrock made up of alternating layers of volcanic ash (tuffs and tuff breccia) and lava flows (andesite and dacite) is found north of the Cispus River and along the western portions of the watershed (Greenhorn Butte, French Butte, and Pinto Rock). In the south and east portions of the watershed, these same deposits are found along the upper portions of Juniper and Langille Ridges. However, Pinto, Yellowjacket, and McCoy Creeks have eroded down into older volcanic rocks, and intrusive rocks such as quartz diorite. In McCoy Creek, numerous faults have exposed some of the intrusive rocks that are responsible for the sulfide and gold deposits. The landscape has been greatly modified by repeated episodes of glaciation over the past 2 million years; all of the higher ridges and the Cispus River valley have been effected by alpine glaciation. The age and nature of different volcanic deposits, and modification by glacial activity, have had a profound effect on a number of other ecological features in the watershed such as hydrology, soil development, human population, and vegetation types.

Hydrology

The analysis area includes mid-reaches of the Cispus River, located in the general vicinity of Tower Rock and Cispus Learning Center. The Cispus River is the largest tributary of the Cowlitz River. It supports an anadromous fishery, and is a nominee to the National Wild and Scenic River System, Washington's Scenic River program, and Northwest Power Planing Council's Protected Area Program. Hydrologically, the analysis area is fairly typical of watersheds on the west slope of the Cascade Range in terms of drainage pattern and density, flow regimes, and run-off processes.

Biological

Fisheries

This watershed contains most of the available spawning habitat along the entire Cispus River, and has been used for several decades by the Washington Department of Fish and Wildlife as an index area to assess chinook spawning potential. Other anadromous streams include Yellowjacket, Greenhorn, and Camp Creeks. Of these, Yellowjacket Creek is an important anadromous tributary to the Cispus. Approximately 47 miles of streams in the analysis area are fishbearing, of which 19 miles are utilized by anadromous species.

Vegetation

Approximately 89% of the analysis area is classified as productive forest land. Vegetation zones found within the area include the Western Hemlock, Pacific Silver Fir, and Mountain Hemlock zones. The remaining 11% of the analysis area is classified as non-forested which includes rock outcrops, meadows, shrublands, lakes, ponds, avalanche chutes, and similar features. Coniferous trees common in the watershed include: Douglas-fir, western hemlock, western red cedar, Pacific silver fir, noble fir, and mountain hemlock. Hardwoods commonly found in the watershed include: red alder, bigleaf maple, and black cottonwood.

Wildlife

The vegetative communities and habitats found within the analysis area potentially support 290 wildlife species, including numerous threatened, endangered and sensitive, and "survey and manage" species such as the spotted owl, gray wolf, bald eagle, wolverine, and peregrine falcon. The northern end of the watershed provides winter range for deer and elk, and the riparian areas and ridgetops provide corridors for many species traveling within the watershed. Specialized habitats such as cliffs, talus slopes and lakes provide nesting sites, foraging and home range sites for some species that would otherwise not occur in the watershed.

Human

Ownership

The LCE WA area encompasses 68,220 acres of land, of which 749 acres are privately owned. The privately owned lands are located primarily within the Cispus River valley, and make up the rural community of Cispus. The remaining 67,471 acres are federally owned lands managed entirely by the U.S. Forest Service.

Land Use Patterns

The Cispus community consists of approximately 100 permanent and 100 seasonal residents (population information provided by Richard Core, a community resident). Within the community is the Cispus Learning Center, an outdoor educational center for grade school students, operated by the Association of Washington State Principals and the Education Service District 113. The Learning Center is located on Forest Service lands which are leased to the Association under a special use permit.

The federally owned Tower Rock Campground, and the privately owned Tower Rock U-Fish Trout Farm and RV Park are the only developed recreation camp sites within the analysis area. This area also includes Layser Cave, a prehistoric archaeological interpretive site; Burley Mountain Fire Lookout, presently used for both administrative and recreational purposes; a traditional huckleberry patch, presently used by enrolled Yakama tribal members; Yellowjacket Ponds, a day-use fishing site; and several historic mining sites and a number of active mining claims.

Primary access within the analysis area includes Forest Roads 23, 28, 29, 76, and 77, and a number of trails along the Cispus River valley and area ridge tops.

Gifford Pinchot National Forest land management allocations within the analysis area include Matrix and Administratively Withdrawn Areas throughout the southern portion, the Cispus Adaptive Management Area in the northeast, and Greenhorn Late-Successional Reserve in the northwest. Riparian Reserves lie throughout the analysis area, and the Cispus Tier 2 Key Watershed lies in the north. See Forest Plan Allocations map.

Chapter 3 - Issues and Key Questions

Purpose

The purpose of issues and key management questions is to focus the analysis on key elements of the ecosystem that are most relevant to the management questions, human values, or resource conditions within the watershed.

The issues and key questions utilized for this analysis include those used for the Lower Cispus West Watershed Analysis, and additional questions relevant to the Lower Cispus East watershed. The Randle and Packwood District Rangers established the initial list of issues and key management questions, and the LC West WA Team identified the pertinent analysis questions. The issues identified as most relevant to the management, values, and conditions within the LC West watershed were: water quality, economic outputs (timber and recreation); threatened, endangered, and sensitive, and "survey and manage" plant and animal species; and ecosystem function. The LC East WA Team identified additional questions relative to mining under the issue of economic outputs.

The organization of this analysis, as with the analysis of LC West, does not incorporate enumerated answers to issues and questions. Answers are presented as findings within various statements, tables, and maps throughout the document relative to the ecosystem element they address i.e. terrestrial or aquatic systems, vegetation, wildlife, and human uses.

Issues and Key Questions

Issue 1 - Water Quality

Most of this watershed drains into the Cispus Tier 2 Key Watershed. Tier 2 Key Watersheds are considered important sources of high quality water. They may not contain at-risk fish stocks as do Tier 1 Key Watersheds.

The main water quality issue to be addressed by this analysis is to determine if impacts to vegetation, soils, and aquatic features in the LCE watershed are having dramatic or cumulative impacts on water quality. Resources and processes relevant to evaluating these conditions include channel migration and widening, presence of amphibians, condition of fish habitat, amount and frequency of soil disturbance, rates of human caused sediment input as compared to natural rates, and continuity of late structural forest in riparian areas.

Water Quality - Key Management Questions

Are cumulative human impacts preventing the attainment of ACS objectives anywhere in this watershed?

In riparian reserves, are there road crossings needing reconstruction for repair or prevention of flood damage?

Which roads have restoration needs?

Where is restoration of streams needed to improve aquatic habitat?

Water Quality - Analysis Questions

How does the existing landscape compare to the historic/reference landscape with regard to forest vegetation patch sizes, shapes, and distribution?

What is the extent of past construction and use of crossings, campsites, diking, and floodplain isolation in riparian reserves?

Are road crossings impacting the distribution of aquatic species?

What is the history of flooding and changes in peak flows and what is the influence of land use on water available for runoff?

Do forest management activities create or contribute to slope instability in the watershed?

How have channels changed from historic/reference conditions?

How, when, and where have management activities caused or contributed to mass wasting or surface erosion?

What is the erosion potential from roads?

Are sediment levels above historical/reference levels in any streams of the watershed?

How does sediment delivered to streams naturally compare to sediment caused by management activities?

Are Policy Implementation Guidelines (PIG) desired conditions being met?

Are habitat conditions adequate for resident species of fish?

What are the dominant channel and habitat forming processes in the channel network?

Issue 2 - Economic Outputs (Timber, Recreation, and Mining)

Timber harvest is a primary economic resource to be considered in the LCE watershed. Approximately 65% of the land area is within the matrix land allocation. Matrix lands are where most vegetation management (timber harvest) is to occur.

Recreational opportunities are another primary economic resource in the LCE watershed. By car, the Cispus watershed is within three hours of Portland and Seattle. The Cispus River and its tributaries within the analysis area host important areas for camping, hunting, fishing, and hiking, and a variety of other recreation pursuits. Mining opportunities also exist within the watershed along McCoy and Yellowjacket Creeks.

The main economic issues to be addressed by this analysis include an evaluation of the ability of resource conditions to support the economic demands for timber, recreation, and mining. Water quality conditions, existence of TES species, amount and distribution of forest vegetation seral stages, and the ability of the ecosystem to function normally will be evaluated relative to potential timber harvest, recreational developments, and mining activities.

Economic Outputs - Key Management Questions

In riparian reserves, where and under what circumstances is regeneration harvest appropriate in both Critical and non-Critical Habitat Unit (CHU) areas?

Outside of riparian reserves, where and under what circumstances is regeneration harvest appropriate in both CHU and non-CHU areas?

In riparian reserves, where and under what circumstances is stocking manipulation, pre-commercial and commercial thinning appropriate?

Outside of riparian reserves, where and under what circumstances is stocking manipulation, pre-commercial and commercial thinning appropriate?

Where and under what conditions can habitat be satisfied by stocking levels?

Under what conditions will vegetation management affect the physical integrity of the aquatic system, including shorelines, banks and bottom?

Under what conditions will vegetation management affect water quality, including temperature, turbidity and sediment regime and large woody debris?

Under what conditions will vegetation management affect the sediment regime?

Under what conditions will vegetation management affect in-stream flows?

Where are the wetlands and meadows where vegetation management should be avoided?

Under what conditions can vegetation management be implemented and still maintain structural diversity of riparian area in terms of structural stage?

Under what conditions will vegetation management affect riparian dependant species?

What is the proportion of various riparian reserve areas including wetlands, streams, and unstable areas?

Under what conditions will roads and trails affect the physical integrity of the aquatic system, including shorelines, banks and bottom?

Under what conditions will roads and trails affect water quality, including temperature, turbidity, sediment regime and large woody debris?

Under what conditions will roads and trails affect in-stream flows?

Where are the wetlands and meadows that should be avoided in the construction of new roads and trails?

Under what conditions can roads and trails be constructed and still maintain structural diversity of riparian area in terms of structural stage?

Under what conditions will roads and trails affect riparian dependant species?

What standards should be developed for human uses in riparian reserves?

Where and under what circumstances can mining be conducted to minimize impacts to surface resources?

In riparian reserves, where or under what circumstances can roads or trails be constructed without preventing the attainment of ACS objectives?

What human use sites, dispersed or developed, are preventing attainment of the ACS objectives? How can these be addressed in the short and long term?

Economic Outputs - Analysis Questions

What is the current distribution and amount of early, mid, and late successional forest vegetation seral stages?

What is the vegetative Range of Natural Variability (RNV)?

Are current conditions within vegetative RNV?

What were the results of past management activities in terms of forest types, spatial distribution, amounts, and temporal distribution?

What is the distribution and amount of non-forest vegetation and non-vegetated areas?

What is the distribution and size of the Forest Vegetation Zones in terms of Potential Natural Vegetation (PNV)?

What are the current stand stocking levels?

Where are the nutrient deficient soils located which have resulted in poor growth?

Issue 3 - TES and S&M Plant and Animal Species

The main Treatened, Endangered, and Sensitive (TES), and Survey and Manage (S&M) species issue to be addressed by this analysis is to determinine whether impacts to vegetation, soils, and aquatic features in the LCE watershed are having cumulative impacts on habitat for TES and S&M species. Resources and processes relevant to evaluating these conditions include population levels, habitat distribution and use, vegetation diversity and continuity, and riparian conditions.

TES and S&M Plant and Animal Species - Key Management Question

Are habitats for TES and S&M species adequately protected under matrix standards and guidelines?

TES and S&M Plant and Animal Species - Analysis Questions

Where are there habitats present for TES and S&M species in the watershed?

What are the known and suspected sites of TES and S&M species within the watershed?

How does the current condition of this habitat affect species viability?

How much nesting, roosting, and foraging habitat exists for spotted owls, and what is its condition?

What are the habitat needs for TES and S&M species?

How much of the watershed is in dispersal habitat?

Where are the spotted owl, goshawk, and great grey owl centers?

Where is the summer/winter range for the prey species of wolves, grizzly bears, and other forest carnivores?

How well are late-structural habitats linked within the watershed?

What are the road densities within the watershed?

What is the current level of coarse woody debris in the uplands

What is the quality and quantity of TES and S&M species within the watershed?

Issue 4 - Ecosystem Function

One of the primary issues affecting management within the basin is the necessity of maintaining a properly functioning, self-sustaining ecosystem. This includes ensuring that all plant and animal species are retained, distribution of the species is adequate, and suitable habitat is abundant enough to maintain populations. Also, the interrelationships between resources must be in balance, and similar to that which evolved naturally.

The main ecosystem function issue to be addressed by this analysis is to determine whether impacts to vegetation, soils, and aquatic features in the LCE watershed are having dramatic, or cumulative impact on overall ecosystem functions. Resources and processes relevant to evaluating these conditions include changes in aquatic condition, loss of populations, presence of riparian and overland migration corridors, amount and frequency of soil disturbance, continuity of late structural forest in riparian areas, and rates of human caused sediment input.

Ecosystem Function - Key Management Questions

Where are there particularly sensitive or special areas within the matrix land allocation which need protection beyond what matrix standards and guidelines provide?

Does there appear to be a natural cumulative effects problem anywhere in the watershed?

Given adjacent land ownership, what can we assume about future management of private lands within the watershed?

What are the unique functions of National Forest lands?

Which riparian corridors need protection from human use such as road and trail construction?

Ecosystem Function - Analysis Questions

Are there any particularly sensitive or special areas within the watershed?

Are any Survey and Manage species present within the watershed? If so, what is the quality and quantity of these species?

Which species, populations and communities are uniquely adapted?

Which riparian areas are critical for fulfilling life history requirements of aquatic and riparian dependant species?

Where are areas of key aquatic habitat in need of protection?

What is the age class for each particular successional stage?

What were historical peak flows?

Has channel widening occurred?

What past natural conditions would suggest a need for standards and guidelines beyond current direction?

What past natural conditions would affect management decision space in this analysis area?
Where is there evidence of dam-break floods within the watershed?

What is the hill slope erosion potential?

What are the landscape conditions on adjacent private lands?

What major issues are being faced on adjacent private lands?

Within the riparian corridors, what is the degree of canopy closure, large woody debris recruitment, shading, and stream bank stability?

What is the current distribution of structural stages within riparian corridors, and how does this compare to the range of natural variability?

Currently, how well are riparian corridors functioning with regard to connectivity of late-successional refugia and late successional reserves?

Chapter 4 - Historic/Reference and Current Conditions

Purpose

Historic/reference conditions are used to explain how ecological conditions have changed over time as the result of human influence and natural disturbances when compared with current conditions and management activities.

"Historic" in this analysis, as in the LC West and Middle and Upper Cispus River Watershed Analyses, refers to conditions in the Cispus River valley prior to use by Euroamericans, which began sometime after 1880. "Reference" describes conditions for a particular point in time for which there is documented information or data.

Historic/reference and current conditions are presented as bullet statements for the following ecosystem elements: terrestrial and aquatic systems, vegetation, wildlife, and human. These elements address various aspects of the four analysis issues in Chapter 3. The condition of each element is based on the condition of indicators commonly used to measure or interpret the element. Data gaps and assumptions are documented where applicable.

Terrestrial System

Volcanic Eruption and Seismic Activity

Assumptions

Information regarding volcanic and seismic activity was taken from the literature, and is given a high degree of reliability at the scale of the total project area.

Historic/Reference and Current Conditions

Mount St. Helens has deposited ash and pumice across the Lower Cispus watershed at least three times over the last 3,500 years; the last two episodes were in 1480 AD (Yamaguchi, 1983) and Spring/Summer, 1980. Fine pumice and ash covered the entire study area to a depth of 3 to 5 inches (Waitt and Dzurisin, 1981); the erosion of this ash into streams accounts for a large proportion of the fine sediment delivered to streams for several years afterward. Mount St. Helens has erupted about once every century for the last 500 years, and is expected to follow a similar pattern into the centuries ahead (Crandell and Mullineaux, 1978).

Seismic activity in the form of small earthquakes (less than 3.0 magnitude) occurs on the average of approximately 6 to 10 per decade underneath the planning area, with occasional larger earthquakes of magnitude 4 to 5. The very limited information available suggests that larger earthquakes (magnitude 6 and greater) appear to occur in Western Washington on the order of once every several centuries (Alper, 1993).

Mass Wasting

Data Gaps and Assumptions

Due to time limitations, this report is primarily an office exercise, with information derived from existing data sources. Where possible, the writer's past field experience from various projects in the study area was also applied .

A major flood event occurred during 11/30/95 that initiated mass wasting events and stream channel changes not accounted for in this report. Another major flood event occurred during 2/8/96 that caused severe mass wasting events

and changes to stream channel conditions. Severe damage occurred along Forest Roads 25, 26, 28, 29, and 76, the extent of which is still being determined. Other than occasional anecdotes, data from these floods was **not** used in this analysis.

Locations for mass wasting events were produced using a GIS coverage called "GeoHaz". See Mass Failures map. GeoHaz is generally accurate, meaning that most landslides out on the ground have been identified by GeoHaz, and most of the slides shown by GeoHaz will be found out on the ground (prior to November, 1995). A known weakness of GeoHaz is that small failures along stream channels and roads are under-represented; more of these small failures exist on the ground than are shown on the coverage. However, some errors were discovered in GeoHaz that involve the edge-matching and labeling of polygons. In addition, the acreage for Avalanche Tracks is greatly exaggerated for the McCoy and Yellowjacket drainages (quadrangle McCoy Peak: MCPK). Some of these errors were noted on a mylar overlay, but time did not allow for a review of the entire watershed or actual input of these corrections onto the GIS coverages. The bullet statements listed below reflect these corrections where applicable.

Air photos taken in 1938 exist for this study area, but were not available for this analysis. Study of these photos would provide a valuable perspective, because of the relative nearness in time to two significant events that happened earlier in the 20th century: the 1902 and 1918 Cispus Burns, and the 1933 flood that was similar in magnitude to the February 1996 flood. Some limited evaluation of these photos was done for the McCoy EIS, and was incorporated into this analysis.

Air photos taken in 1959, 1972, 1979, and 1989/90 are available for use in determining the timing and cause of mass wasting events. Time limitations only allowed for air photo sequencing of one 6th field watershed (04U - Pinto Creek) in order to compare the rate of "naturally occurring" mass wasting events to "human-caused" mass wasting events. However, air photo reviews for previous timber sale projects in this study area has allowed the writer to make qualitative determinations regarding the rate of human-related mass failures compared to naturally occurring mass failures throughout the rest of the watershed during the same time span. **This time span, referred to below as reference conditions, usually refers to the 1973-1990 period of air photo coverage, and sometimes extends back to the 1959 air photos when noted.** This brief time span is entirely too short to use for determining a Range of Natural Variability for mass wasting, so the term Reference Conditions has been used instead. When discussing the comparison of management-related mass wasting events to reference conditions, the following terms were used:

> **Slight** - A few small road and harvest related failures have occurred, separated in both time and space.
> **Moderate** - Several road and harvest related failures have occurred over space, with some of these being repeat failures in the same location through time.
> **High** - Numerous road and harvest related failures have occurred over space, with several of these being repeat failures in the same location through time.
> **Severe** - Numerous road and harvest related failures have occurred over space, with numerous repeat failures occurring chronically at the same location through time.

Historic/Reference and Current Conditions

04 K - Naturally-occurring landslides and earthflows are common in this watershed, particularly along the steep, incised drainage. A large landslide (approximately 1 square mile) is located between Burley Mountain and Greenhorn Creek; portions of this slide have been active since before the 1959 air photos.

Management-related mass wasting has occurred in the forms of road fillslope failures, and shallow debris flows where timber harvest has been conducted on the steep stream banks of Greenhorn and 1918 Creeks. Mass failures related to management activities occur at a **moderate** rate above the reference conditions in this watershed.

04 L - Medium to large, naturally-occurring landslides and earthflows are uncommon in this watershed. Small landslides and earthflows occur somewhat more commonly along the steeper stream banks.

A few small fill failures from roads have been observed in this watershed. Mass failures related to management activities occur at a **slight** rate above the reference conditions in this watershed.

04 M - No naturally occurring landslides are known from this small subwatershed, although a strip of hardwoods mapped along Nash Creek might have been caused by a debris flow.

One or two small fill failures from the 77 Road have been observed in Nash Creek. Mass failures related to management activities occur at a **slight** rate above the reference conditions in this watershed.

04 P - A few small debris flows along stream channels are the only naturally occurring mass wasting events known from this watershed.

Several debris flows initiated by road fill failures, culvert washouts, and timber harvest are known to have occurred since 1973. Mass failures related to management activities occur at a **high** rate above the reference conditions in this watershed.

04 Q - A few small debris flows along stream channels are the only naturally occurring mass wasting events known from this watershed.

Several debris flows initiated by road fill failures are known to have occurred since 1973. Mass failures related to management activities occur at a **moderate** rate above the reference conditions in this watershed.

04 R - Naturally-occurring landslides and earthflows are fairly common in this watershed, particularly along the steep, incised drainage of Yellowjacket Creek. In addition, a very large landslide (approximately 3 square miles), called the Lambert Saddle Slide, is located between Tongue Mountain and Yellowjacket Creek. Small portions of this slide have been active since before the 1973 air photos, but the majority of this slide is considered to be dormant.

Management-related mass wasting has occurred in the form of road fillslope failures, and shallow debris flows where timber harvest has been conducted on the steep stream banks of Yellowjacket Creek. While a large proportion of this subwatershed is mapped as some form of mass failure, little ground verification has taken place, and little evidence of active mass movement has been observed in the air photos. Rather, the most obvious mass wasting events have been related to management activities such as roads. Therefore, mass failures related to management activities is described as occurring at a **high** rate above the reference conditions in this watershed.

04 S - A few naturally-occurring landslides and earthflows occur in this watershed, particularly along the steep, incised drainage of Yellowjacket Creek. In addition, a few avalanche chutes can be seen on the western flanks of Langille Peak. Small portions of these slides have been active since before the 1973 air photos, but the majority of naturally occurring slides appear to be dormant. Natural debris flows have travelled down the avalanche chutes several times since 1973.

Several debris flows initiated by road fill failures, culvert washouts, and timber harvest are known to have occurred since 1973. Mass failures related to management activities occur at a **high** rate above the reference conditions in this watershed.

04 T - Numerous naturally-occurring avalanches occur in this watershed, with a few landslides and earthflows also present. Small portions of these slides have been active since before the 1973 air photos, but the majority of naturally occurring slides appear to be dormant. Many natural debris flows have travelled down the avalanche chutes several times since 1973.

A large number of debris flows initiated by road fill failures, culvert washouts, and timber harvest are known to have occurred repeatedly since the 1973. In addition, gully erosion below outlet culverts is known to occur in deep colluvial soils in the headwaters of Yellowjacket Creek. Mass failures related to management activities occur at a **severe** rate

above the reference conditions in this watershed. These concerns have been addressed in large measure by the Watershed Restoration projects that targeted this area in 1994 and 1995.

04 U - Several naturally-occurring avalanches occur in this watershed, with a few landslides and earthflows also present. Most of these avalanches and slides were revegetating in the 1959 photos, and almost all were further revegetated in the 1979 photos, indicating that little or no activity had taken place during the intervening two decades. Small portions of a few of the avalanche chutes showed some activity in the 1989 photos, but activity had continued to be minimal.

By contrast, several small debris flows associated with road fill failures and timber harvest were visible in the 1959 photos. Timber harvest in the riparian zone of Pinto Creek had also occurred using ground-based systems; numerous skid trails are visible directly adjacent to the stream channel. Many new failures associated with further road construction had occurred in the 1979 photos, and several of the older failures had grown larger and were actively eroding. This continued activity was also evident in the 1989 photos, although to a lesser extent. Therefore, mass wasting related to management activities occurs at a **high** rate above the reference conditions in this watershed.

04 V - Numerous naturally-occurring avalanches occur in this watershed, with two landslides also present. Small portions of these avalanches and slides have been active since before the 1973 air photos, but the majority of naturally occurring slides appear to be dormant. Some natural debris flows have travelled down the avalanche chutes since 1973.

A few debris flows associated with road fill failures and timber harvest have occurred since 1973. In addition, culvert washouts have occurred repeatedly on several stream crossings. Mass failures related to management activities occur at a **moderate** rate above the reference conditions in this watershed.

04 W - Numerous naturally-occurring avalanches occur in this watershed, with one landslide (Jumbo Creek slide) showing continued activity from the 1970's to present. Some natural debris flows have travelled down the avalanche chutes since 1973.

Several debris flows associated with road fill failures have occurred since 1973. In addition, culvert washouts have occurred repeatedly on several stream crossings. Mass failures related to management activities occur at a **high** rate above the reference conditions in this watershed.

04 X - There are several small, natural landslides and earthflows located along the southern banks of the Cispus River, most of which appear to have occurred before the 1973 air photos were taken.

Small cutbank and fillslope failures occur along the 76 and 77 Roads; typically several will be found after an average winter of storms. Approximately half of these deliver coarse and fine sediment to the Cispus River; the volumes of sediment delivered are typically quite small. Mass failures related to management activities occur at a **slight** rate above the reference conditions in this watershed.

04 Y - The Lambert Saddle Slide (see 04R) occupies about 1/2 of this small subwatershed, stretching between Tongue Mountain and Yellowjacket Creek. Small portions of this slide have been active since before the 1973 airphotos, but the majority of this slide is considered to be dormant. In addition, a number of naturally-occurring avalanches and debris flows occupy the steep mountain face at the southern boundary of this watershed.

No landslides or debris flows are known to be associated with management activities in this watershed, although an occasional culvert washout has been reported along the 2904 Road. Mass failures related to management activities occur at a **slight** rate above the reference conditions in this watershed.

04 Z - A few small, natural landslides and earthflows occur in this watershed, as well as one large (1 square mile) landslide just south of the North Fork Cispus confluence that is astride the boundary between this and the Middle Cispus watershed. A few small avalanches have also been mapped on the steep slopes northwest of Tower Rock.

Several small fill failures from roads have been observed in this watershed, primarily on the steep slopes between Dry Creek and the North Fork Cispus Rivers. Mass failures related to management activities occur at a **moderate** rate above the reference conditions in this watershed.

Hillslope Erosion

Data Gaps and Assumptions

Information for hillslope erosion was taken from the forest Soil Resource Inventory (SRI) map, stored as another GIS coverage. Polygons delineating soil types are thought to be accurate at the watershed scale, although details will vary in accuracy at the site level. Interpretations of "surface soil erosion potential" were taken from the SRI handbook, and applied across the watershed as a rating of Low, Moderate, or High. See Erosion Potential map.

No information on hillslope erosion is known to exist for this watershed. It is surmised that hillslope erosion was an important process following the 1902 and 1918 Cispus burns that has become less prevalent as vegetation was reestablished on the hillsides.

Historic/Reference and Current Conditions

Hillslope erosion occurs at low levels when bedrock is hard, sideslopes are shallow (less than 30%), and/or vegetative cover is dominant. Hillslope erosion increases as the sidelsopes increase, when the bedrock is weak and crumbling, when vegetative cover is removed, or when flowing water is routed onto hillsides where water does not ordinarily flow. Based on the SRI map units for this area 6th-field watersheds exhibiting Slight to Moderate hillslope erosion potential include 04: M, P, Q, R, T, V, W, Y, and Z. Sixth-field watersheds displaying Moderate/Severe and Severe erosion potential include 04: K, L, S, U, and X.

Road Conditions

Data Gaps and Assumptions

Road Condition (Access and Travel Management, Phase II) Surveys were conducted during the summer of 1995. Conditions were accurately described at the time, but are expected to become less accurate over time as winter storm events change conditions on the ground. "Red Flag" areas were identified as indicators of where *potential* problems may occur during major flood events. These areas were identified when one or more of the following criteria were met:

1. A crack in the road shoulder is found, $\geq$ 20' length and $\geq$ 0.5' deep
2. A culvert is plugged with gravel and debris >50%
3. A culvert is fractured, crushed, or failed
4. A culvert is dented > 50% of the diameter
5. Erosion of the road surface or ditch has scoured to a depth > 0.5 feet
6. Rill erosion is found on road fills, where rills $\geq$ 0.5' deep and within 50' of a stream
7. Water is found on the road $\geq$ 0.2' deep, and running down the road for a distance $\geq$ 50', and the source was other than runoff (such as a blocked ditch or culvert, a spring, or stream, etc.

The other source of information used was a "Sediment from Roads" model run by Tom Erkert, GIS Coordinator at the Forest Headquarters in Vancouver. The basis and rationale for how this model is used on the GPNF is described in Appendix N of the Middle and Upper Cispus Pilot Watershed Analysis (June, 1995). The data used in this report was provided in late September, 1995. This data is thought to provide a reasonable approximation of sediment produced on roads and delivered to streams, but the writer is not aware of any empirical measurements to date that verify the

results. Therefore, these numbers are currently used as the *best available approximation* of relative sediment delivery rates, but the actual quantities described should continue to be viewed as preliminary.

Historic/Reference and Current Conditions

Erosion and mass wasting associated with roads have been identified as a primary contributor of both coarse and fine sediments above the natural or historic rate to streams in this watershed. Note that there is no reference equivalent for erosion or mass wasting from roads; the natural processes of erosion continue, and all road-related sediment produced is *additional* to the natural rate.

Approximately 241 miles of road currently exist on National Forest land within this watershed; an unknown amount of additional roads are located on private land. There are 376 Red Flags along the existing road system in the LCE watershed. These sites are illustrated on the Red Flags map. The following table displays sediment delivered annually to streams from roads (mass wasting not included) per 6th-field watershed.

Table 1 - Sediment Delivered Annually to Streams from Roads (mass wasting not included)

6th-Field Watershed	Watershed Size (acres) *	Road Length	Rd. Density (mi./sq.mi.)	Total Sediment Routed (tons/yr.)	Sediment (tons/rd.mi./yr)	Red Flags
04 K	5,851	19.6	2.1	238.1	12.1	27
04 L	4,127	17.9	2.8	296.0	16.5	10
04 M	667	2.3	2.2	18.7	8.1	0
04 P	2,037	10.6	3.3	226.4	21.4	30
04 Q	2,543	14.9	3.7	180.6	12.1	19
04 R	5,381	24.2	2.9	387.4	16.0	21
04 S	5,062	16.9	2.1	457.1	27.0	34
04 T	10,527	32.7	2.0	422.0	12.9	92*
04 U	7,555	24.3	2.1	605.1	24.9	53
04 V	7,334	9.9	0.9	191.3	19.3	21
04 W	5,526	10.8	1.3	132.1	12.2	33
04 X	3,499	17.7	3.2	113.7	6.4	0
04 Y	1,164	4.7	2.6	30.8	6.6	9
04 Z	6,949	34.3	3.2	362.7	10.6	27
TOTALS	68,222	240.8	2.5 ave.	3,661.9	39.5	376

* Summer 1995 Red Flag surveys in 6th-field 04T were conducted before the completion of watershed restoration projects on the 2810 & 2810.041 Roads. The majority of these Red Flag areas were improved, upon completion of the Watershed Restoration contract.

Effects of Fire on Forest Environment

Data Gaps

Only high intensity (stand replacement) fires are mapped. Until recently, low to moderate intensity fires could not be traced through stand-age analysis, or other methods for this fire regime. Low to moderate fires are now being detected in pollen core analysis. However this type of analysis does not exist for this fire regime.

Approximately 34,634 acres of this analysis area was burned over in the 1902 and 1918 fires. These fires produced a large mask into seeing the fire history prior to 1918. Historic stand vegetation was classified as follows: early-seral, 0-40 years of age for Western Hemlock (WH), and 0-50 for Pacific Silver Fir (PSF) and Mountain Hemlock (MH); mid-seral 41-150 yrs. for WH, 51-150 yrs. for PSF and MH; and late-seral 151+ yrs. for WH, PSF, and MH.

Fire history must be placed in a 500+ year context in order to account for the majority of fire events. Data or research in this context is minimal, and analysis by necessity is highly extrapolative.

Assumptions

Historic large-scale disturbance fires are not desired, and their effects can only be replicated on small scales.

Potential Natural Vegetation can only be reached in the absence of fire or other disturbances. In most cases the frequency and extent of natural fires precludes the attainment of this potential.

The fire frequencies used in this report are from data collected for the Cowlitz and Riffe Lake Hydrologic Unit Code as reported in 1993. This information is assumed to be more accurate than other Regional estimates.

Historic/Reference Condition

Fire has been the most significant disturbance mechanism in the watershed. Fires are low in frequency but high in severity, and have the potential to be quite large.

Approximately 50% of the watershed was burned by the 1902 and 1918 fires. Both fires were high intensity stand replacing events. As with most fires, they had some areas of fire skip and some areas of low intensity burning, leaving portions of the stand intact.

Fire events since 1880 have probably been equally split between natural and human caused. The 1902 fire was human caused, and the 1896 and 1918 fires were caused by lightning.

Suppression activities since the 1920's has virtually eliminated natural wildfire effects.

Current Condition

The watershed is currently outside the range of natural variation for fire "effects". Past harvest activity in the watershed has been extensive, resulting in the loss of certain structural elements, such as snags, large down coarse woody debris, and possibly duff layers. These structural elements would have remained if the watershed had been affected solely by fire.

The overall successional status of the watershed has been skewed towards an mid-seral condition.

Stand age spatial patterns and features have been greatly altered.

Effects of Nutrient Capital Deficiency on Forest Environment

Assumptions

A cursory review of past and current photos (1979-1990), silvicultural input to the McCoy Draft EIS, and on-the-ground knowledge of the watershed is sufficient to draw some conclusions about nutrient capital deficiency (low site productivity) in the watershed.

Historic/Reference and Current Conditions

Historically (pre-1880) the total amount and location of this phenomenon is unknown. It is believed to have occurred in areas where wildfires repeatedly burned over the area.

Sick and dying trees which have a noticeable yellow tint in conjunction with stunted growth have been noted in all watersheds except 04: M, P, Q, and X. These areas appear to be suffering mainly from soils problems, which are generally shallow, easily erodible, and low in nitrogen. It is believed that these soils problems are at least partially the result of past wildfire activity in the early 1900's.

Effects of Insects on Forest Environment

Assumptions

Insect activity on state and private land is similar to that found on USFS lands, with the exception of the Balsam woolley adelgid, an insect not often found on low elevation state and private lands within this watershed.

Historic/Reference and Current Conditions

Historically (since 1880) insects periodically created small openings, usually less than five acres, within the watershed by killing individual or groups of trees. The total amount, location, or frequency of this disturbance is unknown, but is believed to be minor, relative to fire disturbance.

Known, documented insect activity within the watershed currently involves only Douglas-fir bark beetles attacking Douglas-fir trees, Balsam adelgids attacking Pacific silver fir trees, fir engravers attacking true firs and mountain pine beetle attacking western white pine. Most recently, several small pockets, ranging in size from one to five acres, of Douglas-fir mortality resulting from Douglas-fir bark beetles has been noted in 6th field watersheds 04P, 04Q and 04Z. These buildups in insect activity are attributed to the January windstorm and subsequent blowdown event of 1990.

Insect outbreaks are infrequent and fairly unpredictable, but are often associated with drought situations and environmental stress. In the case of Douglas-fir bark beetles, blowdown events may be linked to dramatic increases in population buildups. Generally, outbreaks are small in size, usually less than five acres, and low to moderate in severity.

Balsam woolley adelgid is a non-native insect introduced into North America in 1900. It probably became a part of this forested ecosystem in the late 1940's or early 1950's.

Effects of Disease on Forest Environment

Assumptions

Disease activity on private lands is similar to that found on USFS land, with the exception of white pine blister rust, a disease associated with a tree species not likely to be found on private land within this watershed.

Historic/Reference and Current Conditions

Historically (since 1880), disease infections created small to large (one acre to over ten acre) openings or mosaics within the watershed by killing individual trees, or groups of trees. The amount or location of this disturbance is unknown, but is believed to be minor relative to fire disturbance.

Currently, known and documented disease in the watershed primarily involves laminated and armillaria root disease, although it is certain that other disease agents are present and active. The existence of root diseases is documented in young managed stands, second growth stands resulting from the Cispus Burn, and occasionally in older, late seral type stands. The presence of laminated and armillaria root disease can be found in all sixth field watersheds within the watershed analysis area.

The severity ratings of these infections within the 6th-field watersheds ranges from very low to severe. Severity ratings are defined as follows:

Very Low - Indicates incidental and insignificant damage.
Low - Indicates that damage is minor but measurable, losses are and will continue to be acceptable.
Moderate - Indicates that damage severity is intermediate between low and high, losses are at the breakpoint of acceptability.
High - Indicates that damage to the stand is significant and increasing, losses are and will continue to be unacceptable.
Severe - Indicates that damage and loss are extreme and completely unacceptable.

Those 6th-field watersheds considered to have a moderate to severe rating tend to be those which have a fairly pure component of Douglas-fir. Generally, these stands are the result of the Cispus Burn. Sixth-field watersheds known to have a moderate to severe rating due to laminated root disease within pure Douglas-fir stands include: 04K, 04P, 04R, 04V, 04X and 04Z. Laminated root disease infections and resulting severity ratings apply to all ages of stands, however most documentation has been on young managed stands and second growth stands.

Sixth-field watersheds known to have a moderate to severe rating due to armillaria root disease include: 04S, 04T, 04V, 04W and 04Y. Armillaria infections and resulting severity ratings refer to managed stands less than 40 years old. White pine blister rust is a non-native disease introduced into North America around 1910. The time of its introduction into this forested ecosystem is unknown.

Effects of Blowdown on Forest Environment

Assumptions

A cursory review of past and current aerial photos (1959-1990) and on-the-ground knowledge of the watershed is sufficient to draw some conclusions about blowdown activity.

Historic/Reference and Current Conditions

Historically (pre-1955), strong winds periodically created small to moderate sized openings (one to ten acres) or mosaics within the watershed by blowing down individual trees or groups of trees. The total amount, location or frequency of this disturbance is unknown. It is believed to be very minor, relative to disturbance by fire.

Current blowdown activity appears to be relatively light. Most recently (Jan. 1990), a windstorm hit the Cispus Valley which blew down several acres of timber primarily within 6th-field watersheds 04P, 04Q and 04Z.

The majority of the blowdown is related to management activities such as edges of clearcuts, second growth thinning areas (commercial thinning), road construction, and pockets of root disease or a combination of commercial thinning and root disease. Most events appear to be less than ten acres in size.

Aquatic System

Peakflow and Flooding

Assumptions

Two methods for predicting peakflow sensitivity for the subwatersheds in this area are utilized for this analysis. The first, entitled WAR, or Water Available for Runoff, is detailed in the Washington State Watershed Analysis Handbook. This method calculates predicted increases in streamflow with changes in vegetative cover based on rainfall, tree size, temperature, antecedent snow accumulation, and elevation. For non-forested areas, including rock outcrops and meadows, this model assumes rapid runoff, and greater snow accumulation and melt.

The other method is entitled ARP, or Aggregate Recovery Percentage. This method is detailed in the Gifford Pinchot Cumulative Assessment Process Final Report. This method calculates a predicted hydrologic recovery for a basin based on stand year of origin, species, and site class, assuming that a stand is 100% hydrologically recovered once it reaches an average diameter at breast height of 8 inches. This method does not rely on rainfall, temperature, or antecedent snow accumulation. For non-forest areas, this model assumes 100% hydrologic recovery.

Neither model accounts for soil compaction, an impediment to infiltration, resulting from such activities as road construction and skid road use, or for the interception of subsurface flow and increased drainage density caused by road construction. Thresholds for each model are noted below.

> **WAR** - 10% or greater - possible downstream flood damage and scour damage to fish spawning and rearing areas.
> **ARP** - 70% threshold for seeing adverse effects including water quality and stream channel degradation.

Regional flood-frequency regression equations, including their explicit estimates of confidence, provide a reasonable framework for evaluating the effects of forest harvest on peak flows over basin-scale areas.

For the purpose of this analysis, it is assumed that the regression equations predict flows under predominantly hydrologically mature (pre-disturbance) conditions. The equations were based on data collected under a variety of land uses and forest patterns, including undisturbed, disturbed, and mixed conditions. The effects of historically changing forest characteristics on the regional regression equations cannot be evaluated.

It is assumed that the snow regression equation is derived from the measurements representing hydrologically mature conditions. Snow measurements, recorded by Cooperative Snow Survey and the National Weather Service, are made under a variety of forest stands, although the climatic and topographic conditions of most stations are unknown.

The U.S. Army Corp of Engineers snow-melt equation is appropriate for estimation of melt under rain-on-snow conditions.

For the areas of private land, the current condition modeled was immature.

Flood data used is from the USGS station within the planning area.

Historic/Reference and Current Conditions

Historic information is generally lacking although a 1936 survey (Bryant 1949) noted that Greenhorn Creek is subject to large fluctuations in flow. (04K and 04L)

The majority of maximum flood events have occurred between November and February. (All 6th fields)

Annual maximum floods for the Cispus River have ranged from as little as 2460 cfs (December, 1973) to 21,700 cfs (January, 1974) This does not take into account the February 1996 flood event. (04X, 04Z)

Four of the top ten recorded floods for the Cispus occurred in the 1970's. In order of magnitude (highest to lowest for 1970 floods only): 1974, 1978, 1976, and 1973. (04X, 04Z)

The following table displays current road and stream densities with road and stream length per subbasin.

Table 2 - Comparison of road density with stream density by subbasin.

Subbasin	Road length (mi)	Stream length (mi)	Road density (mi/mi^2)	Stream density (mi/mi^2)
04K	19.62	50.52	2.1	5.5
04L	17.85	30.43	2.8	4.7
04M	2.25	2.71	2.2	2.6
04P	10.64	12.31	3.3	3.9
04Q	14.86	15.79	3.7	4.0
04R	24.22	41.14	2.9	4.9
04S	16.94	41.52	2.1	5.2
04T	32.65	101.59	2.0	6.2
04U	24.3	56.67	2.1	4.8
04V	9.92	72.84	0.9	6.4
04W	10.75	61.68	1.2	7.1
04X	17.66	20.19	3.2	3.7
04Y	4.74	12.37	2.6	6.8
04Z	34.34	35.43	3.2	3.3

Subbasins 04: K, S, T, V, W, and Y have high stream densities, with Upper McCoy Creek subwatershed (04W) having the highest density within the analysis area. Nash Creek (04M) has the lowest stream density.

The following table displays WAR and ARP percentages per subbasin.

Table 3 - Comparison of WAR and ARP for each subbasin (6WS).

Subbasin (6WS)	WAR (%)	ARP (%)
04K	4.1	87
04L	8.9	75
04M	4.5	67
04P	11.2	83
04Q	13.0	68
04R	11.2	95
04S	3.5	85
04T	4.9	85
04U	6.7	90
04V	3.8	96
04W	4.3	87
04X	1.4	89
04Y	9.5	85
04Z	5.5	95

Subbasins showing a **low** potential for adverse effects to peakflow are 04: K, S, V, W, and X.

Subbasins showing a **moderate** potential for adverse effects related to peakflow are 04: T, U, and Z.

Subbasins showing a **high** potential for adverse effects related to peakflow are 04: L, M, P, Q, R, and Y.

Potential peakflow rating definitions:

High - All subwatersheds with a HIGH predicted potential for adverse peakflow effects are also experiencing a High Concern in many reaches along the mainstem stream. These subwatersheds should be further investigated and management activity carefully scrutinized for potential degradation before further disturbance is allowed.

Moderate - Subwatersheds with a MODERATE predicted potential for adverse peakflow effects have stream reaches experiencing some degradation, but to a lesser degree than above, or for more natural reasons. These watersheds should also receive some further investigation before introducing new disturbances.

Low - The subwatershed with a LOW predicted potential for adverse peakflow effects. Some reaches may be experiencing streambank instability, pool, LWD, and width to depth ratios problems, and could be connected to upstream adverse effects. Further analysis is warranted.

Aquatic Organism Distribution

Data Gaps and Assumptions

Historical fishery and habitat information is scarce for the area.

Current habitat conditions are assumed to have changed little since stream surveys were conducted, the oldest surveys were done in 1987. No field collection, or validation was done for this analysis.

Fish species and distribution coincides with actual survey, or historical sources; a large amount of potential habitat and unknown populations may exist in the watershed. No field collection, or validation was done for this analysis.

Historic/Reference Condition

Historically, spring and fall chinook (*Oncorhychus tshawytscha*), coho (*O. kisutch*), steelhead (*O. mykiss*)and sea-run cutthroat (*O. clarki*)were known to inhabit this section of the Cispus (Bryant 1949). (04X, 04Z)

Greenhorn Creek was used primarily by steelhead and possibly sea-run cutthroat trout since morphologically the stream is not suitable for use by other anadromous species. (04K)

Cutthroat trout is the predominate resident species in Greenhorn both currently and historically. (04K, 04L)

Coastal cutthroat trout was most likely the predominate resident species in Pinto Creek, however, this race has been replaced by a non-native westslope cutthroat race of unknown origin. (04U)

Brook trout (*Salvelinus fontinalis*) were noted in Yellowjacket Creek in a 1936 survey, this species no longer occurs in this system (Bryant 1946). (04R)

Spring and fall chinook, coho, steelhead and possibly sea-run cutthroat trout had occurred in Yellowjacket Creek (Bryant 1946). (04R)

Coastal cutthroat was most likely the predominate resident species in Yellowjacket Creek. Rainbow trout (*O. mykiss*) were once stocked here, however in the absence of stocking, species predominance is going back to cutthroat. (04R)

Origin of rainbow trout in anadromous reaches is the result of past stocking efforts or residualized steelhead. (04X, 04Z, 04Q, 04R, 04K).

Coastal cutthroat trout was most likely the predominate resident species in Yellowjacket Creek. Rainbow trout were once stocked, however, in the absence of stocking, species predominance is going back to cutthroat. (04S, 04T)

McCoy Creek was stocked in the past with Twin Lakes cutthroat trout. (04V, 04W)

The lower reach of Yellowjacket has been used historically as a spawning index area set up by WDFW (Stockley 1955). (04R)

Current Condition

Currently, both coho and spring chinook as well as steelhead will be used in the salmon reintroduction effort and are known to inhabit this section of the Cispus and Lower Yellowjacket. The same species of resident fishes are found

now as they were historically including: whitefish (*Prosopium williamsoni*), rainbow trout, cutthroat trout and brook trout (BPA 1993). (04X, 04Z, 04R)

A healthy population of brook trout occurs in the spring-pond area at the Tower Rock campground. (04Z)

Excellent rearing pools occur in Lower Yellowjacket with large patches of spawning gravels, but less than historic levels due to gravel mining operations (Easterbrooks 1979). (04R)

Juvenile coho have been recently stocked at the Tower Rock campground. (04Z)

Anadromous reaches in Greenhorn are used primarily by steelhead, with possible use by coho at the Cispus confluence. (04K)

Cutthroat trout is the predominate resident species in Greenhorn both currently and historically. (04K, 04L)

The anadromous barrier on Greenhorn Creek is a 50' falls at Road Mile 2.0. (04K)

Forest Road 77 culvert is a fish passage barrier on Greenhorn and possibly Soldier Creek. (04L)

Pinto Creek has a population of westslope cutthroat trout as opposed to the coastal race normally found in these systems, origin of this population is unknown. (04U)

Yellowjacket ponds are stocked every two weeks with 2,000 fish from Memorial Day to Labor Day weekends to maintain a recreational fishery. (04R)

Tongue Pond is approximately 1/2 acre in size with one inlet tributary and one outlet which feeds into Yellowjacket Creek. The lake has a small population of rainbow trout, origin unknown. (04R)

The lower reaches of Yellowjacket Creek have good spawning and rearing habitat. This historical spawning index section will be used as a study site in future salmon reintroduction efforts. (04R)

The anadromous barrier on Yellowjacket is a series of falls up to 15' high near RM 5.2. (04S)

A general shift in species predominance from rainbow to cutthroat trout has occurred in Yellowjacket Creek since 1984. (04T)

A WDFW resident fish monitoring site is established in reaches 17, 24 and 29 in subwatershed 04T of Yellowjacket and in reaches 21 and 22 of McCoy Creek within subwatershed 04W.

Fishing pressure in McCoy Creek may be higher than normal due to mining activity. (04V, 04W)

Black Lake has a small population of cutthroat trout, origin unknown. (04Q)

The anadromous barrier is a 60' falls at RM 0.5 on Camp Creek. (04Q)

The following table displays is a summary of fish distribution within the LCE watershed. Also see Fish Distribution map.

Table 4 - Fish Distribution within LCE watershed

Stream	Subbasin	Anadromous	Resident	Comment
Cispus	04X, 04Z	All reaches, including Tower Rock springs.	All reaches, including Tower Rock springs.	Includes anadromous spawning index area.
Nash	04M	Assumed no use	Unknown	
Falls	04X	Falls barrier at mouth	Unknown	
Greenhorn, Monroe, 1918, Trapper, Jefferson, Soldier	04K, 04L	50' Falls at RM 2.0 on Greenhorn	To the 77 Rd. of Greenhorn and Soldier. Only in confluence area of others.	High gradient, very little spawning habitat. The 77 Rd. culvert is a barrier.
Stump	04N	Assumed no use	Unknown	
Dry	04P	Assumed no use	Unknown	
Camp	04Q	60' Falls at RM 0.5	Up to RM 1.5.	
Yellowjacket, High Bridge, Galena, Veta, Badger	04A, 04S,,04T	15' Falls at RM 5.2 of Yellowjacket. Assumed no use in High Bridge or Galena.	In Yellowjacket to the 2810.150 Rd. High Bridge to pond source. To RM 0.5 in Badger. Only in confluence area of others	Excellent spawning and rearing in Yellowjacket for anadromous
Lambert	04Y	Assumed no use	Unknown	
McCoy, Kid, Granite, Camp, Langille, Stamp, Sunrise, Bear, Jumbo	04V, 04W	Falls at RM 0.5 on McCoy	To 1 ½ miles above Bear Creek Bridge. Only in confluence area of others	Past stocking of Twin Lakes cutthroat.
Pinto, Pumice, Stepladder	04U	None	To 1 mile above the 7713 Rd. crossing. Only in confluence area of others	Westslope cutthroat, origin unknown

Water Quality and Channel Conditions

Assumptions

Much of the information found in this section is from stream surveys conducted within the last 15 years, and other sources. Information is not necessarily current, especially since the Feb. 1996 record-breaking flood, but it is the best available information at the time of this analysis. Information on the watersheds from the 1996 flood should be added to this evaluation. Data gaps exist for streams that were not surveyed.

Historic/Reference Condition

Greenhorn Creek has much less large woody debris (LWD) than historical levels (Bryant 1949). (04K, 04L)

Stump and Dry Creek were noted as "small and steep with beds composed of large rubble" (Bryant 1949). (04P)

Camp Creek has experienced severe debris torrents (1978 and Nov 1995) causing excessive channel scour. In contrast, these same areas were identified as silt and sand meanders in 1961. (04Q)

Camp Creek currently flows subsurface before reaching the Cispus, a condition that began sometime between 1961 and 1979. Historic anadromous habitat is degraded and unavailable in Camp Creek. (04Q)

The lower 1/4 mile of Camp Creek from the Cispus was noted as "quite swampy", while the upper 1/4 mile above this was noted as having excellent coho spawning gravels (Meekin 1961), this condition no longer exists on Camp Creek. (04Q)

Many road fill failures are related to decaying logs and debris that were incorporated into the road fill when the roads were built. Examples of this include the 29, 2810, 2810.041 Roads. (04T, 04V, 04W)

Many secondary roads were overbuilt, made wider in the 1960's and 1970's compared to today's standards. Examples of this include the 2810 and 2810.041 Roads. (04T, 04V, 04W)

Lambert Creek was noted as "steep and of no value to salmon" (Bryant 1949). (04Y)

Nash Creek was noted as "small and inaccessible for salmon because of cascades and falls" (Bryant 1949). (04M)

Dredging of the lower reaches in Yellowjacket in 1958 resulted in a decline of spawning counts (Meekin 1961). (04R)

Re-current salvage of wood from the channel has occurred in both Yellowjacket and the Cispus over the years. (04X, 04R)

In the alluvial fan section of Yellowjacket Creek, 21 large pools per mile existed in a 1936 survey, whereas only 7 per mile exist currently. The current situation is most likely the result of less LWD occurring in the channel to force pool formation (Bryant 1949). (04R).

Current Condition

Subwatersheds 04: L, P, Q, R, X, Y, and Z have high road densities. See Table 2.

Mass wasting and debris torrents are occurring in Camp Creek, particularly reaches C2 and C3. (04Q)

Sediment is filling in the pools throughout Camp Creek. (04Q)

Erosion from roads is contributing elevated rates of fine sediment to many streams. Stream surveys for Badger, Pinto, Yellowjacket, McCoy, Greenhorn, 1918, and Camp Creeks all noted pool filling, sediment in spawning gravels and deposition.

Reaches of Yellowjacket generally lack fish habitat complexity. (04R)

Anadromous habitat is rather limited in lower McCoy because of stream morphology. (04V)

Road fill failures and mass wasting were commonly found in many subbasins. ALL stream surveys for Lower Cispus-East noted streambank cutting, debris torrents, landslides and other forms of mass wasting that were effecting the streams. Severe examples of this are found in 1918 Creek (04K), Greenhorn Creek (04L) and Upper Yellowjacket Watershed (04T).

Coarse sediments were found in many of the streams that were surveyed. In particular, several reaches of stream are experiencing stream widening (aggradation) and 3 streams, upper Yellowjacket Creek (Reach #Y-32), 1918 Creek (Reach # N-7 & N-8) and Camp Creek (Reach # C-1) are going subsurface. Several intermittent tributaries in upper Yellowjacket subbasin are also subsurface.

Severe erosion potential occurs along mainstem of lower and upper Greenhorn and 1918 Creeks. (04K, 04L)

Sediment deposition is occurring in large quantities within transport reaches of lower Greenhorn Creek. (04K)

Macroinvertebrate samples taken at the 76 and 77 Road crossings on Greenhorn Creek noted that the riparian condition is somewhat degraded as well as having excess sediment in the system. (04K, 04L)

Bedrock near surface is capped with thin unstable soils along upperbanks of 1918 Creek (04K) and lower McCoy Creek (04V). This is causing man-related mass wasting to occur.

Severe mass wasting is occurring along upper Greenhorn Creek. Sediment deposition is occurring in large quantities within transport reaches. (04L)

Mass wasting and bank cutting occurs along most of Pinto Creek. Soils in this subbasin have moderate to severe erosion potential. (04U)

Macroinvertebrate analysis conducted 9/21/89 on Pinto Creek indicates sedimentation could be limiting macroinvertebrate biomass and aquatic production. (04U)

Debris torrents, road failures, and landslides are causing coarse sediments to deposit in reaches in upper Yellowjacket Creek. Effects from this are causing perennial and intermittent streams to go subsurface in small headwater streams, causing reach Y-32 of Yellowjacket Creek to go subsurface and causing stream widening to occur in reaches Y-25 to Y-32 of Yellowjacket. (04T)

Major mass wasting is occurring in reaches B2 and B9 of Badger Creek. (04T)

Debris torrents and avalanche chutes occur throughout lower and upper McCoy watersheds. (04V, 04W)

Mass wasting occurring along Jumbo Creek causing severe problems in stream. (04W)

Channel Widening

Assumptions

Only Cispus River, Yellowjacket Creek and McCoy Creek were analyzed for changes in channel widths. All other streams were not analyzed and are therefore a data gap. Channel widening could be occurring in these other streams.

Historic/Reference and Current Conditions

From 1938 to 1979, Yellow jacket Creek was decreasing overall in stream width. This was found in both transport reaches and response reaches. (04R, 04S, 04T)

Yellowjacket Creek shows a trend of increased stream widening (1979-1985) within response reaches (Reach #'s Y-1, and Y-27 to Y-32). (04T, 04R)

From 1959 to 1994, Cispus River has been increasing in stream width 30 to 70% every 20 years. (04X, 04Z)

From 1938 to 1985, McCoy Creek has been decreasing in stream width with its transport reaches (Reach # M-1 to M-11) and increasing in width within its response reaches (Reach # M-25 to M-28).

Riparian Condition and Wetlands

Data Gaps

A formal riparian inventory, including growth, age, species and disturbance mechanism for riparian vegetation.

Assumptions

Forest structural stage was used to evaluate Large Wood Debris (LWD) recruitment potential based on the IVEG data base. Delineation of riparian forests is quite rough in this data base; most times the riparian area was not broken out from adjacent upland forests. Riparian tree growth rates were based on professional judgement.

Recruitment potential is based on the following:

Structure	Size	Recruitment Potential
Non-forest	Wetlands, Rock, Talus, Lakes	No foreseeable contribution
Grass/Pole	<9" diameter	No contribution for many decades
Small Tree	9" to 20.9" diameter	Near term, 1 to 7 decades
Large Tree	>21" diameter	Can currently contribute

Historic/Reference Condition

It is assumed that riparian corridors in the Lower Cispus East watershed had the following forest size-class ratios by Forest Zone during the reference period (pre-1880). This was based mostly on professional judgement, relying on

LCE fire history and information from adjacent watershed analysis areas.

Forest Zone	Large Tree	Small Tree	Grass/Pole
Western Hemlock	80%	10%	10%
Silver Fir	60%	20%	20%
Mountain Hemlock	40%	40%	20%

Predicting the historic spatial arrangement of forest size classes in riparian reserves would be tenuous at best. Riparian structural class is based on a number of factors including, forest health, valley form, disturbance patterns, tree species, windthrow and channel migration among others. Therefore, any activity involving vegetation manipulation, adjustments to riparian widths or other projects proposed within riparian reserves should be done through an interdisciplinary, site specific analysis.

Current Condition

Figure 1 shows a comparative ratio between sub-watersheds of forest structural class currently existing in riparian reserves. Riparian condition for each sub-watershed was evaluated and summarized below. Since the last stand replacement fire was in 1918, grass/pole structure occurring in sub-watersheds is a result or combination of timber harvest, mass wasting, or areas above timberline. Also see the following maps: Forest Stand Structure, Potential Vegetation, and Riparian Connectivity.

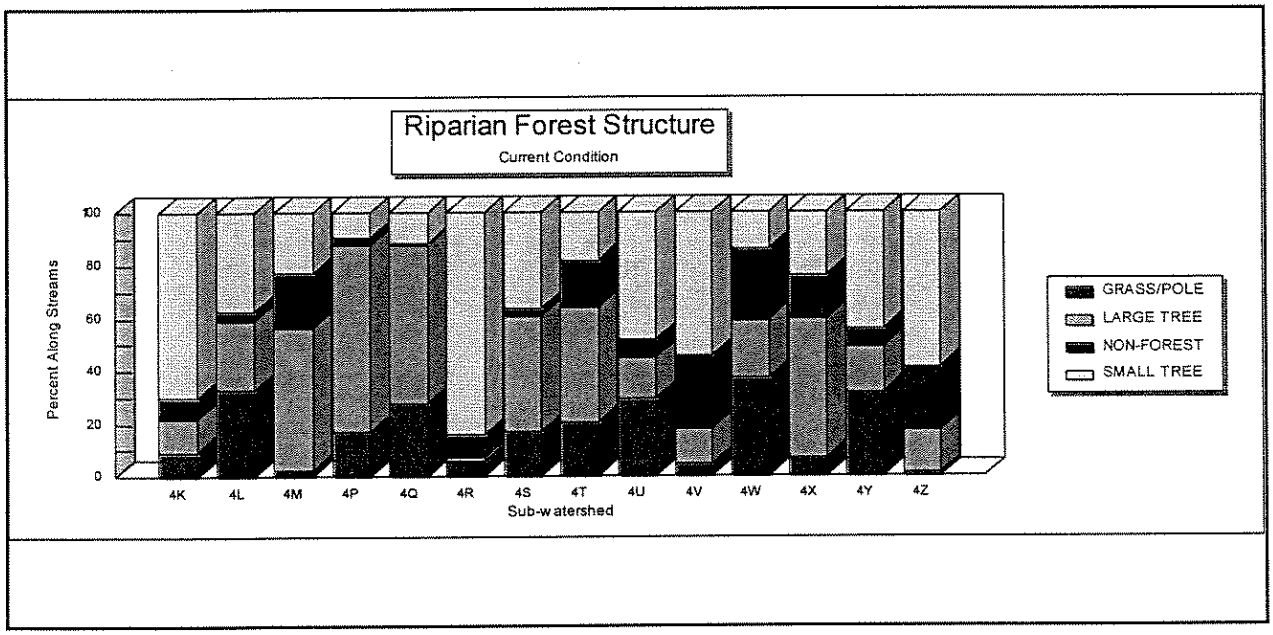

Figure 1.

Riparian corridor along Cispus and most tributaries is primarily late seral and continuous. (04X)

Riparian corridors along Cispus valley floor is mostly late and mid seral which is fragmented in places by early seral patches mostly occurring in private lands. (04Z)

Riparian corridors in side tributaries are primarily mid seral and continuous. (04Z)

With the exception of the lowest reaches which are comprised of older hardwoods, a fairly continuous mid seral riparian corridor exists along Greenhorn Creek up to the 1918 Creek confluence area. (04K)

Moderate to severe riparian fragmentation is occurring on the riparian corridors along 1918 Creek. (04K)

Riparian planting is needed in upper reach of 1918 Creek. (04K)

Riparian corridor along Jefferson Creek and its tributaries is highly fragmented and not connected. (04L)

Mainstem Greenhorn and Soldier Creek are experiencing riparian corridor fragmentation. (04L)

Significant windfall has occurred in the riparian buffer in reaches 10 and 11 of Pinto Creek, the buffer is becoming ineffective here. (04U)

Mainstem of Pinto Creek riparian corridor is fragmented and not connected as is the Pumice Creek riparian corridor. (04U)

Riparian corridor is generally continuous and mid seral along mainstem of lower Yellowjacket and tributaries. (04R)

Riparian corridor is fairly continuous late and mid seral along middle Yellowjacket subbasin. (04S)

Riparian fragmentation occurring in upper reaches of middle Yellowjacket subbasin, especially the Veta Creek area. (04S)

Riparian fragmentation is fairly widespread in upper Yellowjacket, many tributaries disconnected from mainstem. (04T)

High concentration of riparian fragmentation in the higher areas of the Badger subbasin. (04T)

Riparian fragmentation is occurring in headwater tributaries of upper Yellowjacket. (04T)

Riparian connectivity is continuous mid seral, but becomes fragmented above Camp Creek within McCoy subbasin. (04V)

Fragmentation in riparian area along the mainstem of McCoy Creek is causing side tributaries to be unconnected from mainstem. (04W)

The riparian buffer in Camp Creek is deteriorating from windfall. (04Q)

Riparian areas are highly fragmented relative to subbasin size, this fragmentation is apparent along Camp Creek as well as its tributaries. (04Q)

Lambert Creek riparian corridor is fragmented above the 29 Road. (04Y)

Riparian corridors along Stump and Dry Creeks are fairly continuous late and mid seral. (04P)

Vegetation

Forest Zones

Data Gaps/Assumptions

The IVEG database is up-to-date and fairly accurate.

It is assumed that the classification of current vegetation into early-, mid-, and late-structural forest is basically accurate, but it is known that in some cases it is not totally accurate. The inaccuracies are due to a combination of data errors and the inadequately tested method of classification. The time allotted to this analysis does not allow for verification of this classification or the correction of mistakes, known and unknown.

Riparian vegetation is often different than upland vegetation in size, structure, and species composition, but for the purpose of this analysis, it will be considered the same. Riparian vegetation, unless obviously different on the aerial photo, was not delineated as being different from the IVEG database.

Fire activity before 1902 was caused by lightning or Native Americans and was not controlled.

Before 1918, fire and volcanic eruptions were the most significant disturbances causing stands to revert to an early-structural stage.

It is assumed the classification of historic vegetation into early-, mid-, and late-structural forest is reasonably accurate regarding the areas where management activity such as timber harvest has taken place within the last 50 years, but there are undoubtedly errors. The classification method for historic vegetation was different than that used for current vegetation. It is more general because there is no 1880 vegetation data base to query. The information is based on stand year of origin. Although the dates of fires can be inferred from the stand year of origin, there is no information available regarding what type of stand existed in a particular location prior to fire setting back its structural stage. There is also a lack of data about how long it took a burned site to develop into a new stand. In the area where fire appears to be the factor for setting back the structural stage, some broad assumptions were made regarding early-, mid-, and late-structural stages. Rather than map where each of the structural stages exist, a percentage was assigned to each structural stage within the potential vegetation zones based on a combination of photo interpretation, Forest Service personnel's knowledge of the area, fire frequency and history of the area, and the information from the Pilot and Lower Cispus West Watershed Analyses. The following percentages of forest vegetation were assigned to unknown areas (area burned by the large fires of 1902 and 1918) and the private land:

Potential Vegetation Zone	% Early-Seral	% Mid-Seral	% Late-Seral
Western Hemlock	10	10	80
Pacific Silver Fir	20	50	30
Mountain Hemlock	40	40	20

Historic/Reference and Current Conditions

Vegetation Amount

Historically (1880), late-structural forest (40,793 acres) dominated the watershed, with mid- (12,915 acres) and early-structural (9,035 acres) being a relatively minor component.

Currently, early- (14,166 acres) and late-structural (15,268 acres) forest are roughly equal in the watershed while mid-structural forest (32,492 acres) dominates the watershed.

The watershed is approximately 89% forest land and 11% non-forest land, which includes rock outcrops, meadows, shrubland, agricultural lands, lakes, ponds, avalanche chutes and similar sites.

The watershed is composed of three forest zones (Potential Natural Vegetation) in the following amounts: Western Hemlock Zone (22,186 acres or 32%), Pacific Silver Fir (34,611 acres or 51%), and Mountain Hemlock (11,423 acres or 17%). Acres within zones include non-forest land. See Potential Vegetation map.

Vegetation Pattern

The late-structural forest vegetation in 1880 was predominantly comprised of large, contiguous blocks. The early- and mid-structural forest vegetation is comprised of smaller, more dispersed blocks.

Historically, within the Western Hemlock Zone, which occupies the lower elevation area within the watershed, late-structural vegetation is estimated to be 81%, early-structural is estimated at 11%, and mid-structural is about 5%. The remaining 3% is considered non-forest land. The late-structural stands within the Western Hemlock Zone generally occupied the lower slopes along drainages while the early- and mid-structural stands would generally be located on the more exposed aspects at the upper elevations of the Western Hemlock Zone.

Within the Pacific Silver Fir Zone late-structural stands occupy an estimated 57% and are generally found along the drainages and on the more protected aspects. The early- and mid-structural stands comprise about 10% and 26%, respectively, and are generally located on the more exposed southerly and westerly aspects. The remaining 7% is considered non-forest.

Within the Mountain Hemlock Zone, which occupies the higher elevation ridgetops and colder sites, late-structural stands occupy an estimated 26% and are generally associated with streams, moist areas and protected aspects where snowpack is heavy and stays well into the summer. The early- and mid-structural stands comprise about 28% and 24%, respectively, and are generally located on the more exposed southerly and westerly aspects where lightning strikes often occur. The remaining 22% is considered non-forest.

Currently, the overall spatial pattern of forest vegetation is varied and complex in portions of the watershed where late-structural stands exist, especially those areas dominated by timber harvest done in small scattered patches. These areas include 6th field watersheds 04: L, M, P, Q, S, T, U, V, W, X, and Y, (Jefferson, Monroe, Pinto, Upper Yellowjacket, Badger, Pumice, Veta, Upper McCoy, Lambert, Siler Creeks and Lone Tree areas, respectively). No large, contiguous blocks of late-structural forest remain in the analysis area.

Nearly half the watershed is in mid-structural forest, most of which is relatively contiguous with a few stand-replacing regeneration harvest units placed in subwatersheds 04R and 04Z.

Some smaller relatively contiguous blocks of early-structural forest exist near the ridgetops near Pinto Rock (04U) and Jumbo Peak (04W). Two other fairly contiguous blocks of early-structural forest resulting from harvest activities can be found near Jefferson Creek (04L) and Lambert Creek (04Y).

The following table displays the historic/reference and current vegetation pattern per vegetation zone.

Table 5 - Vegetation Pattern

Potential Vegetation Zone	Historic/Reference (1880) Percent Age Class				Current (1995) Percent Age Class			
	Early	Mid	Late	Non-Forest	Early	Mid	Late	Non-Forest
Western Hemlock	11%	5%	81%	3%	12%	56%	27%	5%
Pacific Silver Fir	10%	26%	57%	7%	24%	45%	23%	7%
Mountain Hemlock	28%	24%	26%	22%	28%	39%	11%	22%

Vegetation Distribution

Historically, the majority of known early-structural stage forest was located in Lower Greenhorn Creek (04K and 04X) and in Upper Badger and Yellowjacket Creeks (04T) at the higher elevations. It was also assumed that within the large burned over area where no data or year of origin exists, 10 percent of the Western Hemlock Zone was early-structural but exact locations are not known, but are expected to occur on the drier aspects where fires are more likely to occur on a more frequent basis. Within the Pacific Silver Fir Zone and Mountain Hemlock Zone the percent of early-structural is 20 and 40 percent, respectively. Again, the exact locations are not known but assumed to be located on the more exposed aspects much like in the Western Hemlock Zone.

Historically, the majority of known mid-structural stage forest was located on Lone Tree Mountain (04Q) with a minor amount located near Iron Mountain (04L, 04M, and 04X) at the higher elevations. It was also assumed that within the large burned over area where no data or year of origin exists, 10 percent of the Western Hemlock Zone was mid-structural but exact locations are not known, but are expected to occur on the drier aspects where fires are more likely to occur on a more frequent basis. Within the Pacific Silver Fir Zone and Mountain Hemlock Zone the percent of mid-structural is 50 and 40 percent, respectively. Again, the exact locations are not known but assumed to be located on the more exposed aspects much like in the Western Hemlock Zone and similar to those assumptions made for the early-structural areas.

The majority of known late-structural stage forest was located in the Iron Creek Buttes area (04L, 04M, and 04X), 4S, in the Upper Yellowjacket, Badger (04T) and Pinto Creek (04U) areas, in the Upper McCoy Creek area (04V and 04W) and in the Siler (04P) and Camp Creek (04Q) areas. Much of this late-structural seems to be associated with stream drainages. It was also assumed that within the large burned over area where no historic data or year of origin exists, 80 percent of the Western Hemlock Zone was late-structural and expected to occur along streams and moist areas where fires are least likely to occur on a frequent basis. Within the Pacific Silver Fir Zone and Mountain Hemlock Zone the percent of late-structural is 30 and 20 percent, respectively. Again, the exact locations are not known but assumed to be located on the more protected aspects and within stream drainages much like in the Western Hemlock Zone.

Currently, some smaller relatively contiguous blocks of early-structural forest exist near the ridgetops of Pinto Rock (04U) and Jumbo Peak (04W). Two other fairly contiguous blocks of early-structural forest resulting from harvest activities can be found near Jefferson Creek (04L) and Lambert Creek (04Y). Other small blocks of early-structural forest can be found within all 6th-field watersheds to some extent but are most predominant within watersheds which have undergone extensive timber harvest associated with late-structural stands. These areas include 6th-field watersheds: 04L, 04M, 04P, 04Q, 04S, 04T, 04U, 04V, 04W, 04X and 04Y, (Jefferson, Monroe, Pinto, Upper Yellowjacket, Badger, Pumice, Veta, Upper McCoy, Lambert, Siler Creeks and Lone Tree areas, respectively).

Nearly half the watershed is in mid-structural forest, most of which is relatively contiguous with large blocks being located in watersheds 04K, 04L, 04U, 04V and 04Z. All 6th field watersheds contain some mid-structural forest, whether created naturally from fires or from management activities such as timber harvest.

The majority of late-structural stands are located within 6th field watersheds: 04K, 04L, 04P, 04Q 04S, 04T, 04U, 04V, 04W, 04X and 04Z, (Jefferson, Monroe, Upper Yellowjacket, Badger, Veta, Upper McCoy, Siler Creeks and Lone Tree areas, respectively). No large, contiguous blocks of late-structural forest remain in the watershed which have not been at least partially fragmented. All watersheds contain at least some late-structural forest.

Botany

Data Sources

The primary data source used in determining historic and extant populations of threatened, endangered, and sensitive (TES) plant species for this project is the Biological and Conservation Database (BCD) managed by the Washington Department of Natural Resources Natural Heritage Program. No such comprehensive databases exist for Survey and Manage and noxious weed species, although interim databases have been developed that catalogue some location information on these species groups. Habitat information used in this report comes from maps and data produced and stored in Geographic Information Systems (GIS) and National Wetland Inventory maps.

Assumptions

In most cases, the data stored in the BCD was originally recorded as points on US Geological Survey Quadrangles and thus is only as accurate as the original mapper was. Since these data have been collected by a variety of individuals over a large time span, it is expected that precision of individual locations will vary. It also must be understood that in some cases, individual locations were not reported as the result of a rare plant survey of that area, but were reported by an individual that came across the rare plant while in the course of some other activity. Thus, this data should only be interpreted as the status of our current knowledge, and in no way infers that intensive surveys have been completed within the analysis area unless otherwise stated. Likewise no specific surveys have been conducted within the analysis area for Survey and Manage and noxious weed species. It is assumed that many undocumented sites exist for these three species groups within the analysis area.

The use of GIS layers for predicting special habitat areas is limited by the accuracy of the methods and data used in creating those layers. The GIS vegetation layer is based heavily on photo-interpretation and since small areas of special habitats are easily overlooked on aerial photographs they may not be well represented in GIS. While the methods used are considered to generate a good approximation of habitat areas, there is no substitute for actual field work to verify these locations.

Historic/Reference and Current Conditions

Threatened, Endangered, and Sensitive Plant Species

No information on the historic condition of this species group was available for this report. It is assumed that viable populations existed within some areas of suitable habitat.

There are currently 51 species of Threatened, Endangered, and Sensitive (TES) plants on the Regional Forester's list for the Gifford Pinchot National Forest. Of these species, 31 are potentially found on the North Zone of the forest and thus possibly within the analysis area. Those species that have been documented on the North Zone (Packwood and Randle Ranger Districts) of the Forest, and those species that may occur there based on their published distributions, are listed in Table 6. At this time there are no federally listed (proposed, endangered, threatened) plant species known

to occur on the Forest, however, one federally threatened species (*Howellia aquatilis*) is suspected.

TABLE 6
TES Plant Species Documented or Suspected on the North Zone

STATUS	SCIENTIFIC NAME	COMMON NAME	FS/GS*
Suspected	*Agoseris elata*	tall agoseris	-/s; 4/2
Known	*Botrychium lanceolatum*	lance-leaved grapefern	-/s; 5/3
Known	*Botrychium lunaria*	moonwort	-/s; 5/3
Known	*Botrychium minganense*	Mingan's grapefern	-/-;
Known	*Botrychium montanum*	mountain moonwort	-/s; 3/3
Known	*Botrychium pinnatum*	pinnate-leaved grapefern	-/s; 4?/3
Suspected	*Carex atrata var. erecta*	erect blackened sedge	-/s; 5T4/2
Suspected	*Carex densa*	dense sedge	-/s; 5/1
Suspected	*Carex interrupta*	green-fruited sedge	-/-;
Known	*Carex scopulorum var. prionophylla*	saw-leaved sedge	-/-;
Suspected	*Chrysolepis chrysophylla*	chinquapin	-/s; 5/2-3
Suspected	*Cicuta bulbifera*	bulb-bearing waterhemlock	-/s; 5/2
Known	*Cimicifuga elata*	tall bugbane	C/T; 2/2
Suspected	*Corydalis aquae-gelidae*	cold water corydalis	C/T; 3/2
Known	*Epipactis gigantea*	giant hellebore	-/s; 4/3
Known	*Githopsis specularioides*	common bluecup	-/s; 5/3
Suspected	*Howellia aquatilis*	Howellia	T/E; 2/1
Suspected	*Luzula arcuata*	curved woodrush	-/s; 5/1
Known	*Microseris borealis*	northern microseris	-/s; 3?/2
Suspected	*Montia diffusa*	branching montia	-/s; 3/1-2
Suspected	*Ophioglossum vulgatum*	Adder's tongue	-/T; 5/1-2
Known	*Orobanche pinorum*	pine broomrape	-/s; 4/3
Suspected	*Parnassia fimbriata var. hoodiana*	fringed-grass-of-parnassus	-/s; 3T3/1
Suspected	*Pedicularis rainierensis*	Rainier's lousewort	-/s; 2/2

TABLE 6 TES Plant Species Documented or Suspected on the North Zone			
Suspected	*Platanthera sparsiflora*	canyon bog orchid	-/s; 4-5/1
Known	*Pleuricospora fimbriolata*	fringed pinesap	-/s; 4/3
Suspected	*Polemonium carneum*	salmon polemonium	-/T; 4/1-2
Suspected	*Polystichum californicum*	California swordfern	-/s; 4?/1-2
Suspected	*Saxifraga debilis*	weak saxifrage	-/s; 4/3
Known	*Sisyrinchium sarmentosum*	blue-eyed grass	C/T; 2/2
Suspected	*Utricularia intermedia*	flat-leaved bladderwort	-/s; 5/2

* F/S; G/S refer to federal/state status and global/state rank respectively.
E = endangered; T = threatened; C = species of concern; s = sensitive
#'s refer to standard ranking after the Nature Conservancy

A search of the Biological Conservation Database yielded eighteen known sites of TES plants within the analysis area representing the following six species:

Botrychium lanceolatum
Botrychium minganense
Botrychium pinnatum
Githopsis specularioides
Orobanche pinorum
Pleuricospora fimbriolata.

Additional sites for these species (and others listed in Table 6) are suspected within the analysis area within suitable habitats. Because many of these TES plant species are not confined to one specific habitat type, it is difficult to accurately delineate areas of suitable habitat for them within the analysis area. This was attempted at a broad scale by querying the existing vegetation layer GIS database for all ecoclass codes that represent unique plant habitats (i.e. meadows, red alder wetlands, rocky areas, etc.). Acres of each of these habitat types and number of known sites of TES plant species found within the analysis area are summarized below by sixth-field watershed (Table 7). The distribution of special habitats within the analysis area are shown in the Special Habitat Areas map.

TABLE 7
Acres of Habitats and Number of Known Sites by Sixth Field Watershed

6th field	Rocky Areas	Meadows	Shrublands	Red Alder Wetlands	Lakes, Ponds, Rivers	# of TES sites
04K	53.0	0.0	106.0	29.4	0.0	2
04L	17.6	1.2	96.3	0.0	0.0	3
04M	0.0	0.0	36.4	16.3	0.1	0
04P	37.4	0.0	0.0	0.0	0.0	0
04Q	6.9	3.1	0.0	0.0	0.8	0
04R	262.5	0.0	0.0	223	3.8	0
04S	97.8	5.6	10.7	7.0	0.0	3
04T	1,433.7	7.3	119.0	18.3	0.0	0
04U	127.3	7.4	372.4	4.4	0.5	2
04V	1,177.3	2.3	235.5	0.0	0.5	0
04W	1,204.6	0.0	76.7	0.0	0.0	1
04X	2.1	0.0	0.0	33.9	78.8	3
04Y	68.6	0.0	52.1	6.5	0.0	0
04Z	349.3	0.0	9.1	234.7	79.1	4
Total	4838.1	26.9	1114.2	573.5	163.6	18

National Wetland Inventory (NWI) maps are another useful source of information regarding special habitats. Methods and criteria used in compiling data for the GIS vegetation layer and the NWI maps are different, thus the NWI data is provided here separately from the GIS data shown above. Table 8 is a summary of the NWI data.

TABLE 8 Summary of Acres of National Wetland Inventory Wetland Types by Sixth Field Watershed							
6th field	Palustrine Emergent	Palustrine Scrub-Shrub	Palustrine Forested	Palustrine Aquatic Bed	Riverine (Cispus River)	Other (includes open water)	Total
04K	0.0	0.0	0.0	0.0	0.0	0.0	0.0
04L	0.0	1.1	0.0	0.0	0.0	0.0	1.1
04M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
04P	16.2	11.9	0.0	0.0	0.0	0.0	28.1
04Q	3.0	0.0	0.0	0.0	0.6	1.1	4.1
04R	3.4	47.7	0.0	4.5	18.5	0.0	55.6
04S	0.0	2.8	0.0	0.0	0.0	0.0	2.8
04T	8.8	2.3	0.0	0.0	0.0	1.1	12.2
04U	0.1	23.4	0.0	0.0	0.0	1.2	24.7
04V	0.0	0.0	0.0	0.0	0.0	0.5	0.5
04W	0.0	0.5	0.0	0.0	0.0	0.0	0.5
04X	0.0	0.0	0.0	0.0	57.9	0.0	0.0
04Y	0.0	4.1	0.0	0.0	0.0	0.0	4.1
04Z	4.8	159.3	21.2	0.0	168.5	5.7	359.5
Total	36.3	253.1	21.2	4.5	168.5	9.6	493.2

Survey and Manage Plant Species

Survey and Manage botanical species include those species of fungi, lichens, bryophytes, and vascular plants that are listed in Table C-3 of the President's Northwest Forest Plan. No information on the historic condition of these species groups was available for this report. It is assumed that viable populations existed within some areas of suitable habitat.

No new inventories were conducted for these species as a part of this watershed analysis, and because very little inventory or tracking has been done for these species locally, or on a regional level, a data gap exists regarding the actual distribution and location of many of these species. Many strategy 4 species, especially those in the nitrogen-fixing lichen group, are found within the analysis area, though detailed site information is lacking. Species other than strategy 4, with documented sites within the analysis area include *Botrychium minganense* and *Lobaria halii*.

Without much available data on actual species locations, evaluation of habitat conditions can be useful in predicting which species may be present. Areas that may provide suitable habitat for survey and manage species were derived from the existing vegetation layer in GIS by querying the associated database for parameters that would identify old-growth or late-successional stands. Further stratification of this habitat was achieved by overlaying a map of potential vegetation that indicates the major vegetational zones (i.e. western hemlock, Pacific silver fir, etc.) with a map that shows late-successional stands, and another that shows riparian areas. Information on the habitat requirements for individual survey and manage species is compiled in Appendix J2 of the President's Northwest Forest Plan and is not repeated here. That information can be used in conjunction with the habitat data provided here to predict which species may be present within the analysis area.

Based upon the database query described above, acreage of potential habitat for survey and manage species within the analysis area can be summarized as follows in Tables 9, 10 and 11.

TABLE 9
Summary of Acres of Late-Successional Habitat Outside Riparian Reserves (by Sixth Field Watershed)

6th field (watershed acres)	Western Hemlock	Silver Fir	Mountain Hemlock	Total	% of WA
04K (5,851)	619	186	0	805	13.8%
04L (4,126)	93	368	0	461	11.2%
04M (667)	179	48	0	227	34.0%
04P (2,037)	623	137	0	760	37.3%
04Q (2,543)	65	562	0	627	24.7%
04R (5,381)	0	75	0	75	1.4%
04S (5,062)	216	302	0	518	10.2%
04T (10,528)	46	1500	657	2203	20.9%
04U (7,555)	44	313	25	382	5.1%
04V (7,333)	0	335	87	422	5.8%
04W (5,526)	0	369	115	484	8.8%
04X (3,498)	884	15	0	899	25.7%
04Y (1,164)	10	42	0	52	4.5%
04Z (6,949)	612	119	0	731	10.5%
Total (68,220)	3391	4371	884	8646	12.7%

TABLE 10 Summary of Acres of Late-Successional Habitat Within Riparian Reserves (by Sixth Field Watershed)					
6th field (watershed acres)	Western Hemlock	Silver Fir	Mountain Hemlock	Total	% of WA
04K (5,851)	166	118	0	284	4.9%
04L (4,126)	121	186	0	307	7.4%
04M (667)	71	0	0	71	10.6%
04P (2,037)	256	101	0	357	17.5%
04Q (2,543)	106	371	0	477	18.8%
04R (5,381)	0	27	0	27	0.5%
04S (5,062)	328	542	0	870	17.2%
04T (10,528)	83	1274	313	1670	15.9%
04U (7,555)	62	277	16	355	4.7%
04V (7,333)	6	305	16	327	4.5%
04W (5,526)	0	382	73	455	8.2%
04X (3,498)	1032	0	0	1032	29.5%
04Y (1,164)	26	54	0	80	6.9%
04Z (6,949)	265	43	0	308	4.4%
Total (68,220)	2522	3680	418	6620	9.7%

Table 11 Summary of Acres of Late-Successional Habitat Within the Analysis Area					
Analysis Area Acres	Western Hemlock	Silver Fir	Mountain Hemlock	Total	% of Area
68,220	5,913	8,051	1,302	15,266	22.4%

Noxious Weeds

No information on the historic condition of this species group was available for this report though it is assumed that these species have invaded the area concurrently with human disturbance. The history of road and trail development within the analysis area would likely provide an interesting look into the historic invasion of weeds into the area.

No surveys were conducted for noxious weeds within the analysis area in conjunction with this watershed analysis. Noxious weed species commonly encountered in large populations on the north end of the Gifford Pinchot National Forest and likely to occur within the analysis area are shown in Table 12.

TABLE 12 Noxious Weeds Likely to be Found in Large Populations Within the Analysis Area	
Scientific Name	**Common Name**
Chrysanthemum leucanthemum	oxeye daisy
Cirsium arvense	Canada thistle
Cirsium vulgare	bull thistle
Cytisus scoparius	Scotch broom
Hypericum perforatum	St. John's wort
Phalaris arundinacea	reed canary grass
Senecio jacobaea	tansy ragwort

Primary corridors for noxious weed dispersal within the analysis area include roads, trails, and riparian areas. Disturbed sites, including parking areas, log landings, trail heads, quarries, etc., provide potential population centers for these species.

Wildlife

Habitat Conditions

Data Gaps

This analysis is based on "office information" only, including a variety of GIS maps (current vegetation, riparian areas, roads, allocations, and others), aerial photos, district wildlife databases, historic sighting records, literature references, and other sources. The wildlife report prepared by Barb Behan for the Lower Cispus West Watershed Analysis area was referenced frequently for this effort. No field reconnaissance was done for this project.

Assumptions

The following assumptions were made for this analysis:

If suitable habitat is present, then the wildlife species that can potentially occupy the habitat are assumed to be present, regardless of sighting records.

All 290 species that are potentially occupying the watershed were also present prior to European settlement with the exception of introduced species such as the bullfrog, starling, and Norway rat.

Indigenous people's utilization of wildlife did not limit wildlife populations.

Interior and late-successional habitat-oriented species were more common prior to 1940 than at present.

Snag and coarse woody debris-dependent species were more abundant historically than at present.

Riparian-oriented species, such as, river otter, fisher, and tailed frog were more common prior to 1940 than at present.

Opening and edge-oriented species are more common at present than they were prior to 1940.

Large predators such as grizzly bear, gray wolf, and wolverine were more abundant prior to 1940 than at present.

Prior to 1940, non-native species were not present in any significant numbers.

Habitat conditions determine wildlife distribution.

Fire, timber harvest, and roading have had the greatest influence on wildlife distribution.

Wildlife species abundance is determined by several interacting factors, including habitat conditions, human use (i.e. hunting and trapping, both legal and illegal), and, in the case of wide-ranging migratory species, habitat and human factors far from the watershed area.

Historic/Reference and Current Conditions

General Species

There are 290 wildlife species potentially present in the LCE area. This is one species less than the LCW analysis area, due to the probable absence of the marbled murrelet, whose range (55 miles from saltwater) does not extend into this watershed.

Wildlife "guilds" (groups of species with similar habitat requirements) were created for LCW analysis by Barb Behan, and her effort also applies to the LCE analysis area. There are 17 terrestrial and 14 riparian guilds. Also, 44 species of the 290 did not fit into these guilds due to their dependence on special or unique habitats.

SUBWATERSHEDS: ALL

Listed Threatened, Endangered and Sensitive Species (TES)

The following proposed, threatened, endangered, and sensitive species have been documented (D) or are suspected (S) in LCE:

Species	Endangered	Threatened	Sensitive
American peregrine falcon (D)	X		
Gray wolf (S)	X		
Northern spotted owl (D)		X	
Grizzly bear (S)		X	
Northern bald eagle (D)		X	
California wolverine (S)			X
Larch Mountain salamander (S)			X
Pacific western big-eared bat (D)			X
Northwestern pond turtle (S)			X
Spotted frog (S)			X
North American lynx (S)			X

In addition, there are several "Species of Concern" (SOC) animals for federal listing that are documented or suspected in the watershed. These species include: Cascades frog (D), Pacific fisher (S), olive-sided flycatcher (D), tailed frog (D), northern goshawk (D), long-eared myotis (S), long-legged myotis (S), and Columbia pebblesnail (S). Some of the

previously mentioned sensitive species are also on the SOC list, such as the California wolverine and Larch Mountain salamander. One "Candidate" species, the spotted frog, may occur in the watershed.

SUBWATERSHEDS: ALL

Survey and Manage Wildlife Species

Table C-3 in the ROD lists "survey and manage" species. The species that are known or suspected to occur in the LCE analysis area include:

Larch Mountain salamander
Van Dyke's salamander
Numerous mollusk species
Several bat species
Possibly great gray owl and North American lynx, although habitat is marginal for these two species.

SUBWATERSHEDS: ALL

Northern Spotted Owl (NSO)

There are 15,520 acres of NSO habitat in the LCE WA area. Only 2,466 acres of this are "nesting and roosting" quality habitat (16%), the remainder being lower-quality "foraging" habitat, which is a result of the Cispus burn. Nesting spotted owls therefore are confined to a relatively small amount of habitat within the watershed.

Seventeen pairs and three territorial single birds are known to occur within the WA boundary. Habitat within 0.7 miles and 1.8 miles from the pair/single activity centers has been calculated for 16 pairs and one single bird. Of these 16 pairs, 13 (81%) are below the habitat "take thresholds" established by the U.S. Fish and Wildlife Service, as is the one single bird. In most cases, they are well below these thresholds, which may present a high risk for their long-term survival in the area.

Of the 17 pairs, four occur in a Late Successional Reserve. The remaining 13 pairs occur in the Matrix or Adaptive Management Area. As such, it is assumed that they will be "taken" per the ROD guidelines (unless modified in the AMA by the Landscape Area Design). These pairs and singles receive 100 acre core areas around their activity centers. Only two of these core areas have been established so far for the pairs and single birds.

A high-density cluster of six spotted owl pairs occurs in the middle and upper Yellowjacket Creek drainage (SUBWATERSHEDS: 04U, 04T). The reason for this cluster is not known- it may be due to very productive habitat conditions, or perhaps due to "packing" of owl pairs into remaining habitat patches.

Dispersal habitat in the WA area for juvenile owls is not limiting at this time due to the large amounts of mid-seral habitat of fire origin.

Critical Habitat Unit WA-38 is found in the western part of the analysis area. (SUBWATERSHEDS: 04L, 04K, 04M, 04X, 04Z, 04P). The analysis area contains approximately 14,820 acres of critical habitat. Any project located in this CHU will need to be evaluated for it's effect on the CHU in a biological evaluation or assessment.

There are no current spotted owl surveys in the WA area to protocol standards. The last survey to protocol was done in the McCoy EIS project area in 1991 and 1992.

Amphibians and Mollusks

Amphibian surveys (mostly aquatic) were conducted in the WA area in 1994 and 1995 by the Randle Ranger District. Sample sites are scattered throughout the watershed area, with the most commonly observed species being the tailed frog, Pacific giant salamander, Cascades frog, western red-backed salamander, Cope's giant salamander, and the Cascades torrent salamander.

Several sample sites were found to be poor amphibian habitat due to sedimentation in streams. These sites are located in the western, and northwestern sections of the WA area. One sample site at the junction of Camp and McCoy Creeks was found to be trashed by campers.

Limited terrestrial mollusk surveys occurred in the area by Tom Burke, regional invertebrate expert, in 1995. These surveys were mostly confined to the Layser Cave vicinity (SUBWATERSHED 04P). Species located were:

Vespericola columbiana	Striatura pugetensis
Columella edentula	Punctum sp.
Monadenia fidelis *	Haplotrema sportella
Haplotrema vancouverense	Cryptomastix devia *
Prophysaon vanattae	Econulus fulvus
Hemphillia dromedarius	Ariolomax columbianus

Many of these mollusks were found in association with deciduous trees, particularly big-leaf maples.

* survey and manage species

Deer and Elk Biological Winter Range (BWR)

Part of the LCE area is BWR for deer and elk. This BWR occurs in the Late-Successional Reserve, AMA, and Matrix allocations, and includes private lands in the Cispus River Valley.

An "Amendment 11" goal is to maintain 44% of the BWR in optimal cover on a watershed basis; the Lower Cispus Watershed (includes Lower Cispus West and East) contains 23,260 acres of BWR, of which 5990 is optimal cover, or 26%. Considering Lower Cispus East alone, there are 11,910 acres of BWR with 3105 acres in optimal cover, which also comes to 26%. Commercial thinning or other silvicultural treatments may help to accelerate the development of mid-seral stands towards optimal cover in this area.

Over the watershed, forage is abundant at 26%, compared to a desired level of about 12%. Also, much private land is used by foraging big game animals, so forage cannot be considered limiting for big game populations over the short-term.

SUBWATERSHEDS CONTAINING WINTER RANGE: 04X, 04P, 04Z, 04K, 04R, 04M, and 04Y

Pileated Woodpecker and Pine Marten Network

Two pileated woodpecker allocations (LX), and five pine marten allocations (PX) were placed in the LCE area under the Gifford Pinchot Forest Plan. The ROD (1994) amended individual forest plans to eliminate these allocations, and replace them with LSRs, riparian reserves, etc.. Individual areas could be retained however, if a need was documented for their continuance.

Of these seven areas, one PX is in the LSR, and thus protected. Five allocations are in the Matrix, but these are essentially fully protected with riparian reserves, or 100 acre owl core areas. **It is recommended that the one PX**

allocation in the AMA (located south of Lone Tree Mountain in subbasin 04Q) be retained to help provide late-seral connectivity between the LSR to the south, and the Pompey roadless area north of LCE. Part of this allocation would be protected via a riparian reserve along Camp Creek.

SUBWATERSHEDS WITH ALLOCATIONS: 04Q, 04R, 04S, 04T, 04U, 04Z.

Connectivity and Habitat Fragmentation

Connectivity in the LCE area is provided predominately by riparian areas and ridgetops (for high-elevation species).

Major north-south riparian travel and movement corridors are Yellowjacket Creek, Pinto Creek, and McCoy Creek (SUBWATERSHEDS 04W, 04V, 04S, 04T, 04U, 04R, 04Y). Greenhorn Creek provides some connectivity, but is likely of secondary importance. North-south ridgetop connectivity is provided by the Languille-McCoy Peak-Holdaway Butte system (SUBWATERSHEDS 04T, 04W, 04V, 04S), as well as the ridges bordering the planning area on the east and west edges.

East-west connectivity in the area is limited, provided only by the Cispus River and the North Fork Cispus (SUBWATERSHEDS 04X, 04M, 04Z, 04Q, 04P).

Late-successional habitat has been greatly impacted in the riparian corridors by logging, particularly in the upper sections of Yellowjacket, Pinto, and McCoy Creeks. Most of the lower sections of these streams are in mid-seral habitat, which has been impacted to a much lesser degree.

A variety of disturbances have lowered the effectiveness of the Cispus riparian zone as a travel corridor for wildlife, including private land utilization.

Large, unfragmented blocks of mid-seral habitat remain in the area, however late-successional habitat has been highly fragmented, particularly in the upper drainages. This pattern is distinctly different than that produced historically by natural disturbances.

Isolated, late-successional patches surrounded by mid-seral habitats are highly important as "genetic centers" where some species persist until the surrounding habitats again become suitable. Several of these areas exist in LCE (e.g. stands north of Burley Mt.).

Roads

Road densities in LCE range from 0.9 miles/square mile in sub-watershed 04V (McCoy) up to 3.7 miles/square mile in sub-watershed 04Q (Camp). Overall road density in LCE is 2.26 miles/square mile.

Road densities in deer and elk winter range should not exceed 1.7 miles of open road per square mile (Amendment 11). The sub-watersheds containing winter range (see previous listing) have some of the highest road densities in LCE, although some roads are gated during the winter. Open road densities are approx. 2.5 miles per square mile on the winter range.

With the current road density situation in the watershed, habitat capability for species such as gray wolf, grizzly and black bear, wolverine and other predators is low.

SUBWATERSHEDS: ALL

Special Habitats

Special habitats are critical for a variety of species, including neotropical birds, amphibians, mollusks, nesting raptors, several mammals, and others. Important special habitats in LCE are wet and dry meadows (i.e. Mosquito Meadows, alpine areas), cliffs, talus slopes, caves, lakes (Black and Tongue Lakes), shrublands, avalanche chutes, alder patches, and riparian zones.

SUBWATERSHEDS: ALL

Snags and Down Wood

Due to past logging practices, as well as fires, levels of snags and down wood are reduced from historic levels. This is especially true in heavily impacted areas like Upper McCoy Creek (04W), Upper and Middle Yellowjacket Creek (04S, 04T), Pinto Creek (04U), and subwatersheds 04K, 04L, and 04M.

Human

Human Uses

Historic/Reference Condition

Native Americans

Early occupations at Layser Cave, a prehistoric archaeological site near Dry Creek, indicate that human use of the analysis area began approximately 7,000 years ago. Initial human use of the area may have been in response to shifting ungulate populations.

Early human populations practiced a broad-spectrum foraging subsistence strategy. Groups were highly mobile, and camps were moved frequently to take advantage of seasonally available plant and animal resources. This pattern persisted, with little use of storage technology or established settlements until about 3,500 years ago (radiocarbon years B.P.)

Deer were probably the most important food resource during the period from ca. 7,000 to 3,500 years B.P. Elk, snowshoe hare, grouse, bighorn sheep,, and possibly mountain goat were hunted less frequently, and salmonids (salmon and steelhead) also eaten. Huckleberries, wild cherries, hazelnuts, and acorns were among the plant foods gathered.

The Smith Creek eruptive phase of Mount St. Helens significantly disrupted human land use in the area ca. 3,500 years ago.

Native Americans virtually abandoned the area until about 1,400 years ago. By this time, populations may have adopted a more sedentary lifeway, one with a greater reliance on stored foods. There is local evidence for increased emphasis on salmonid fishing during this period, a pattern consistent with regional trends.

Deer continued to be an important food source, but elk, rabbits, raccoon, beaver, bighorn sheep, and possibly mountain sheep were also hunted. Archaeobotanical remains indicate that elderberry, trailing blackberry, and hazelnut were collected. Cedar bark was used to manufacture cordage, and probably basketry.

During the 19th century, the analysis area was home to the *cicpaclama*, a band of the Sahaptin-speaking Taidnapam, or Upper Cowlitz Indians. A small village may have existed in the Cispus valley. Subsistence included heavy reliance on deer and salmonids, but a variety of plant foods were also collected and processed in quantity from both lowland and

upland settings. Camas, other root foods, hazelnuts, and a variety of berries were among the most important. Several fishing sites were used in the general area, including one near the mouth of Yellowjacket Creek. Mountain goats were reportedly hunted on Tongue Mountain.

The *cicpaclama* were likely absorbed by other Taidnapam bands by about 1890. Taidnapam families in the Randle area continued to use traditional huckleberry patches on Burley Mountain throughout this century. By the 1940's, the use of these berry patches by enrolled Yakama tribal members became common.

Euroamericans

Historic use by Euroamericans began after the area was set aside as part of the Pacific Forest Reserve in 1893. The lands came under the jurisdiction of the Forest Service in 1905. Mineral prospecting and commercial cutting of cedar shingle bolts were the most important activities in the period prior to settlement.

Homesteads were established in the Cispus River valley between 1910 and 1915 on lands totalling about 400 acres withdrawn from federal ownership. Early settlers include a Mr. Coval, Thomas, Charles, and Daniel Music, and Hattie Whaley. Efforts at agricultural development were minimal, but about 50 acres were under cultivation in the valley during the 1930's.

Mining

Mineral prospecting began in the McCoy and Yellowjacket Creek basins in the 1890's. Initially, miners came to the area by trail from White Salmon and other settlements to the south. Many claims were filed prior to 1908 in response to discoveries of gold. A second peak in prospecting and mineral development occurred during the Great Depression of the 1930's.

Grazing

Four sheep grazing allotments were used in the period ca. 1920-1968, and included the Pinto Rock allotment, at the headwaters of Pinto Creek, the Sunrise allotment, on Juniper Ridge, and Badger Peak allotment, which included Langille Ridge. The allotments were established on ridges burned by a 1902 wildfire. Forest succession eventually reduced available forage and led to the closure of grazing.

Forest Management

In 1902 and 1918 significant portions of the analysis area were burned by wildfires. Subsequent to the 1918 fire, Forest Service management was oriented toward fire protection and reforestation of burned areas. Extensive tree planting was done in the Yellowjacket Creek drainage and on French Butte in the 1920's.

Commercial harvest of forest resources began with cedar shingle bolt cutting along the Cispus River after the 1902 fire. In 1909 a shingle company from Kelso established a camp near Tower Rock and sent cedar bolts to their mill by river drives.

The Forest Service established Tower Rock Ranger Station in the Cispus valley. A Civilian Conservation Corps (CCC) camp, housing nearly 200 men, was established near the ranger station in 1933, serving as the base of operations for a variety of forest development and conservation projects until 1942. Cispus Learning Center today occupies the site of the CCC camp. Fire lookout stations were built atop Burley Mountain, Badger Peak, French Butte, and Tongue Mountain. Only Burley Lookout, built in 1934, remains today.

Access

Prior to 1905, access to the Cispus valley was by an "old Indian trail" from Siler Creek. Native Americans also used Juniper ridge as a route to the Lewis River basin. Early prospectors followed old trails to the area from the White Salmon River drainage. About 1905 the McCoy Creek Mining Company widened an old Indian trail to the Cispus valley into a sled road for hauling machinery.

A wagon road was built from present-day Randle to the Cispus valley in 1909-1910 along the route of the Indian trail. Access to the upper Cispus River basin was by the "Cispus Trail", enlarged to a wagon road as far as the North Fork Cispus in 1921. Forest Road 23 follows the route of these wagon roads.

The principal access routes in the high country included portions of the Boundary Tail and Juniper Ridge trail, used by prospectors before 1900, but later serving as sheep driveways and patrol routes for Forest Service personnel. Trails to French Butte and Pinto Rock were probably constructed as sheep driveways ca. 1920-1925. Trails on Langille Ridge and Burley Mountain were constructed by Forest Service personnel for administrative access.

Current Condition

Recreation (Including Trails)

Developed recreation is the dominant human activity near the Cispus River within the area. Tower Rock Campground, the only National Forest Campground in the area, receives low use (50% - 75% of capacity on weekends). A nearby private campground also provides overnight camping and U-pay fishing.

Yellowjacket Ponds, prior to the February 1996 flood, received 27,000 visitations during fishing season and provided a unique "family fishing" area.

Cispus Learning Center is statewide attraction for education related users (approximately 20,000 per year) who come to the Learning Center for classroom and field lessons. Yellowjacket Ponds, Layser Cave, Tower Rock Campground and the adjacent Burley Mountain and Covel Creek Trails are popular field sites.

Vegetative conditions adjacent to the Cispus River area mostly natural in appearance.

In a majority of the watershed area south of the Cispus River dispersed recreation activities such as driving forest roads, hunting, trail travel, stream fishing, dispersed camping, and recreational mining occur. Other than minimally improved trailhead facilities there are no developed improvements.

Evidence of past road construction and timber harvest below the ridgetops is evident in the watershed south of the Cispus River.

The original administrative trail system has been fragmented by roading, especially up the McCoy and Yellowjacket drainages. Ridge trails that were not affected remain as popular recreation trails such as on Langille and Juniper Ridges.

With the exceptions of Burley Mountain, lookouts that were once used for fire detection on as many as five peaks in the area now provide interesting interpretative features. The sole remaining lookout on Burley Mtn. provides both a summer and winter attraction for visitors. The site is staffed by volunteers in summer for fire detection and visitor services and rented in the winter.

Dispersed camping occurs throughout the area, usually adjacent to water sources. Most of the sites occur along or at the end of roads and are used sporadically throughout the year.

Some commercial and recreational rafting occurs on the Cispus River from April to mid summer. Kayaking interest is increasing on the district as a whole, but use of this area is unknown.

Built during the CCC era, Forest Roads 7605 and 2816 provide unique driving challenges into the Burley and Badger roaded recreation areas.

Mining (Including Special Uses)

Thirty-nine formal active mining claims (lode and placer), are mostly located within the McCoy Creek drainage with a few located along Yellowjacket Creek, just north of junction with McCoy. (04V, 04S, 04R)

Of the 39 formal mining claims, 15 are lode claims and 24 are placer claims. The placer claims typically involve working the old and current river deposit materials by use of suction dredges, portable sluices and simple panning. Suction dredging is only allowed during the summer months of July through January along McCoy Creek. (04V, 04R, 04S)

Seventy-five additional people possess Washington State Department of Fisheries and Wildlife Hydraulics Permit Approval (HPA's) for sluicing and/or suction dredging operations along Cispus River, McCoy Creek and Yellowjacket Creek. No formal mining claim is needed for this. (04X, 04Z, 04R, 04S, 04V)

Recreational panning most likely occurs along the Cispus River. These people do not need permits and no records are kept or required. (04Z, 04X)

Mining laws are a century and a quarter old (since 1872) and basically allow mining or mineral development to occur in most places. Small scale mining activities have been a part of the analysis area throughout this same time period.

Current levels of mining are of small scale and most impacts to the streams are not seen after high winter flows.

Potential FERC (hydropower) projects occur within Yellowjacket and Pinto Creeks. (04R, 04U)

Special use permits can occur in almost any subbasin. Examples include: 1) for access with utility projects, 2) road and trail access to private lands, 3) site specific (i.e. Cispus Learning Center), 4) recreational outfitter guides (white water rafting, backpacking etc).

Chapter 5 - Interpretations/Areas of Concern

Purpose

The purpose of interpretations, or areas of concern, is to explain differences, similarities, or trends and their causes, between existing and historic or reference conditions; and anticipated changes, or trends that could have ecosystem management imiplications.

Interpretations, or areas of concern, are presented as bullet statements for each of the five ecosystem elements: terrestrial and aquatic systems, vegetation, wildlife, and human.

Terrestrial System

Volcanic Eruption and Seismic Activity

Areas of Concern

See discussion on volcanic eruption and seismic activity in Chapter 4, Historic/Reference and Current Conditions.

Mass Wasting

Areas of Concern

A number of management-related slope failures are contributing sediment to the Cispus River directly, and via major tributaries *(A Reminder: the 1995/96 flood events are not evaluated in this report - the damage is much more extensive than reported here)*. While a few debris flows have been identified as being related to timber harvest, the vast majority of mass wasting events associated with management activities are connected directly or indirectly to roads. In particular, roads sytems within the Greenhorn, Dry, Camp, McCoy, Yellowjacket, and Pinto Creek watersheds are in need of reconstruction and/or decommissioning efforts to reduce sedimentation. Specific roads in need of some type of restoration to reduce sedimentation, ranging from simple maintenance, through drainage structure improvements, all the way to complete decommissioning, are identified in the Road Conditions section below, and in Chapter 7, Management Recommendations.

Hillslope Erosion

Areas of Concern

Hillslope erosion is generally a concern only within the steep inner gorges of incised stream channels, and in areas where mass wasting has stripped vegetative cover from the soil and chronic erosion is hampering the development of vegetative cover. The vast majority of these sites are associated with Red Flag areas identified under Road Conditions below and in Chapter 7, Management Recommendations.

Road Conditions

Areas of Concern

A number of roads within the analysis area have been identified as contributors of elevated sediment levels to streams. Listed below, by 6th-field watershed, are roads noted as needing some type of restoration work (* identifies roads needing more extensive work). This listing is not all inclusive, but does identify the vast majority of road restoration projects.

04 K	*7605; 7600-065, -126, -136, -150
04 L	7700-127, correct obstructions of fish passage at 77 Road crossings of Greenhorn and Soldier (?) creeks.
04 M	None
04 P	*2300-083, -091. Recommend net decrease of road density in this watershed.
04 Q	*5500-108, -109, -120; *5508-080, -081. Recommend net decrease of road density in this watershed.
04 R	28 (near Galena Creek); *29; 2900-026, -039, -045, -??? (Rock E Timber Sale road); *2904.
04 S	2800-098; *2809; *7700-152; *7713; 7713-686.
04 T	28; 2800-014, -121. *(2810; 2810-041, -041A, -045, -046, -051, -052, -055 roads already addressed in FY 94/95 Road/Watershed Restoration Project).*
04 U	28, 2800-099, -239, -??? (Patch TS rd.); *2816; *2816-052; 7713; *7713-032. Also, evaluate need for 'restoration' of compacted soils in riparian reserves of upper Pinto Creek where tractor logging occurred in 1950's.
04 V	*29; 2900-059, -115.
04 W	*29; *2900-116, *-149; *2911 (Jumbo Creek slide).
04 X	77
04 Y	2904.
04 Z	23, *2300-095.

Effects of Fire on Forest Environment

Areas of Concern

There are currently no specific areas of concern where natural or activity fuels have accumulated to an extent which would pose the risk of a catastrophic fire.

Effects of Nutrient Capital Deficiency on Forest Environment

Areas of Concern

Approximately 1850 acres of sick and dying trees which have a noticeable yellow tint in conjunction with stunted growth have been noted in watersheds 04S, 04V and 04T. In addition to the 1850 acres of known stunted growth, areas within watersheds 04: K, L, R, U, W, X, Y, and Z have similar characteristics. These areas appear to be suffering mainly from soils problems. The soils are generally shallow, easily erodible, and low in nitrogen. It's thought that this is at least partially the result of past wildfire activity in the early 1900's which may have depleted soils of their nutrient capital or a specific micro-nutrient.

Effects of Insects on Forest Environment

Areas of Concern

Based on the limited information which is available about past and current insect activity, it appears that current insect outbreaks are within the range of natural variability at present, although the limits of that range are unknown, particularly for the non-native Balsam woolley adelgid.

It can be expected that future insect outbreaks will be widely and irregularly distributed in small patches across the watershed occupied by their respective hosts, with attacks often being associated with hosts under environmental stress and blowdown events.

A word of caution should be noted about insect activity, particularly Douglas-fir bark beetle in this watershed. The mid-structural stands resulting from the Cispus burn are now at an age (75 years old) similar to those stands immediately north of the Cowlitz River which had an epidemic outbreak of Douglas-fir bark beetles directly related to an ice storm when the stand was about 80 to 90 years old. Environmental stress such as an ice storm or heavy, wet snow generally occurring within the transition zone of 2500-3500 feet elevation could occur and result in a heavy population increase sufficient to result in heavy mortality beyond the range of natural variability as we know it. Sixth field watersheds which may be affected are: 04P, 04K, 04R, 04V and 04Z.

Effects of Disease on Forest Environment

Areas of Concern

Based on the limited information which is currently available about past and present disease activity, it appears that disease infections are probably within the range of natural variability at present, although the limits of that range are unknown, particularly for the non-native white pine blister rust.

We can expect future disease infections such as laminated and armillaria root disease to increase somewhat in size and severity in some of our young managed stands containing host species where past management practices have exacerbated the problem. Sixth field watersheds known to have a moderate to severe rating due to laminated root disease include 04: K, P, R, V, X, and Z. Sixth field watersheds having moderate to severe rating due to armillaria root disease include 04: S, T, V, W, and Y.

Within the mid-structural stands created by the Cispus burn, disease infections such as laminated root disease can be expected to continue to increase in size because of the nearly pure stands of Douglas-fir which now occupy the area following the burn. Some of these stands were hand planted with Douglas-fir in the late 1920's and early 1930's. The sixth field watersheds where disease may be a concern are: 4K, 04P, 04R, 04V, 04X and 04Z.

Effects of Blowdown on Forest Environment

Areas of Concern

The available evidence indicates that timber harvest activities, mainly clearcutting and commercial thinning, have increased the amount of blowdown and the number of blowdown events above the level which would naturally occur within this watershed.

We can expect that future blowdown events are likely to occur along the margins of existing clearcuts to some degree and along future harvest units. Blowdown events are also likely to occur within and along commercial thinning units,

especially if laminated root disease exists. Areas of moderate to severe root disease should be managed with caution regarding thinning which will exacerbate the windthrow problem. Sixth field watersheds of concern which have known high amounts of root disease which may be prone to blowdown are 04: K, P, R, V, X, and Z. Under certain conditions, such as high wind coupled with saturated soils, these events could impact significant acres.

Blowdown events are most likely to occur during the fall and winter months between November and February.

Aquatic System

Peak Flow and Flooding

Areas of Concern

Sixth-field watersheds rated moderate or high for peakflow potential, in Chapter 4, are of particular concern and need further investigation (04: L, M, P, Q, R, T, U, Y, and Z).

Aquatic Organism Distribution

Areas of Conern

River reaches between Tower Rock and the North Fork, as well as lower Yellowjacket Creek, contain a large proportion of available salmon spawning habitat found in the entire Cispus River. These reaches are very important for anadromous production and have been used since 1950's by WDFW as a spawning index area.

Forest Road 77 culvert is a fish passage barrier on Greenhorn Creek. (04L)

Motorized access and dispersed use along this section of the Cispus River and Yellowjacket Creek are a concern for fisheries. (04X, 04Z)

Fishing pressure may be higher than normal in McCoy Creek due to mining activity.

In-channel large woody debris is much lower than expected in many areas including Yellowjacket Creek and the Cispus River.

Anadromous habitat in lower Camp Creek has been lost due to an increase in bedload material (stream goes subsurface).

Increased sediment is a concern in all fish bearing reaches in the LCE analysis area.

Channelization efforts have affected fish habitat complexity in the Cispus River and lower Yellowjacket Creek. (04R, 04X, 04Z)

Adverse effects of mining on the aquatic environment in 6th-field watersheds 04W, 04V, and 04R are unknown. Future monitoring is indicated.

Water Quality and Channel Conditions

Areas of Concern

Excess coarse and fine sedimentation is occurring in most streams throughout the watershed. This is occurring in transport reaches where one would not expect accumulations. Other examples of excess sediment include Camp and Dry Creeks going subsurface in their lowest reaches, 1918 and Camp Creeks going subsurface in their headwater area, extensive channel widening in lower alluvial valley areas along the Cispus River and lower Yellowjacket Creek, and channel widening occuring elswhere.

High road densities are found in most subbasins, especially within the Cispus Tier 2 Key Watershed corridor.

Roads and bridges are constricting/confining and influencing the natural meander of the Cispus River and lower Yellowjacket Creek.

Mass wasting, from roads or management primarily, is a concern in all 6th-field watersheds because effects are seen in all stream surveys through bankcutting, channel widening, and sediment deposition. Mass wasting and sedimentation levels are higher than natural reference levels (see discussion on mass wasting in Chapter 4).

Channel Widening

Areas of Concern

The Cispus River and Yellowjacket and McCoy Creeks are all experiencing channel widening (see discussion on channel widening in Chapter 4 for locations). Data gaps occur on all other streams. Channel widening is considered a direct result from cumulative impacts upstream.

Riparian Condition and Wetlands

Areas of Concern

Riparian corridors in the upper subbasins are generally fragmented. Some tributaries have been disconnected from mainstem streams through fragmentation. In general, mainstem riparian corridors along most major streams are fairly continuous and functional.

There is a lack of 1996 flood information on in-channel large woody debris and pool to riffle ratios.

Vegetation

Forest Zones

Areas of Concern

The amount, pattern, and distribution of forest vegetation structural stages across this landscape will continue to be influenced by natural and man-caused disturbance. The agents of disturbance most likely to continue to significantly modify the forest vegetation of this landscape are regeneration harvest and fire; with insect outbreaks, disease infections, blowdown, and mass wasting playing a less prominent role. These agents of disturbance will tend to create new early-structural habitat and conditions.

Vegetation Amount

The estimated Range of Natural Variability (RNV) for structural stage across the watershed is as follows: early-structural 2 to 42%, mid-structural 27 to 72%, and late-structural 21 to 60%.

Currently, all three structural stages of forest vegetation are within their ranges of natural variability for this watershed; with early-structural and mid-structural being near the middle of its range and late-structural being in the lower one-third of its range.

From 1880 to 1995, there has been an increase of 5,131 net acres in the total amount of early-structural forest, an increase from 13% to 21% of the watershed. The shift was largely the result of clearcut regeneration harvest over the past 50 years.

Between 1880 and 1995, there has been an increase of 19,577 net acres in the total amount of mid-structural forest, an increase from 19% to 48%. The shift was primarily the result of large fires within the watershed in the early 1900's. Also contributing to this shift is clearcut regeneration harvest which occurred about 40 to 45 years ago. Late-structural forest has decreased by about 25,525 acres or from 60% to 22% of the watershed. The shift can be attributed to the combination of wildfires in the early 1900's and regeneration harvest over the past 50 years.

Over the next few decades, if regeneration harvest levels remain as low as the current trend, and if acres affected by wildfire remain as low as they have over the last several decades, the total amount of early-structural forest should steadily decrease, with the total amounts of mid- and late-structural forest increasing through natural succession and forest management activities, primarily commercial thinning. Private lands are not expected to contribute to the amount of future late-structural forest in the watershed because of their relatively short harvest rotations.

Vegetation Pattern

From 1880 to 1995, there has been a dramatic and significant change in pattern, size and shape of forest vegetation blocks in this watershed due to a combination of wildfire and regeneration harvest activities.

Between 1880 and 1995, the size of late-structural forest blocks has been dramatically reduced from relatively few blocks of several thousands of acres each to about six blocks of about 500 acres each. The loss of the large, contiguous blocks has occurred over the last 90 years although several blocks of one-thousand acres or more were left following the large fires in the early 1900's. These large fires replaced some of the large blocks of late-structural forest with what is now large, contiguous blocks of mid-structural forest. However, within the remaining large blocks of late-structural forest following the fires, the blocks have changed to fragmented, disconnected blocks of forest resulting from harvest activities over the past 50 years. Sixth field watersheds 04: L, M, S, T, U, V, W, X, and Y have been significantly changed by regeneration harvest activities. The overall spatial pattern of forest vegetation has become a much more varied and complex mosaic across the watershed.

Between 1880 and 1995, the shape of the late-structural forest blocks has changed from unfragmented, consolidated blocks usually wider than one mile, to generally long, linear, spindly and narrow blocks usually less than 1/2 mile wide, often less than 1/4 mile wide.

The stand structure of thousands of acres of forest has been simplified over the last 50 years by clearcut regeneration harvest. The acres of early-structural forest created by clearcutting are much less structurally complex than the acres created by wildfire in the past. Clearcutting, in most cases, has left behind none or very few large remnant trees or snags as individuals or in groups, and in most cases, has left behind very little down wood; while wildfires often left behind some components of structural diversity on some parts of the landscape.

In the next few decades, the pattern, size and shape of forest blocks will remain much the same as they are now. Only time (natural succession) and well thought out management activities can restore a more "natural" vegetation pattern to the watershed.

Vegetation Distribution

Between 1880 and 1995, there has been a significant change in the distribution of early-structural forest across the watershed. In 1880 much of the early-structural forest was primarily located, or thought to be located, because much of the area has been masked from previous large fires, on exposed, warmer aspects and along ridges and away from streams where fire starts are expected to be more frequent. Some exceptions to this can be expected such as in the areas of subbasins 04K and 04X along Greenhorn Creek. Early-structural forest is now well represented throughout areas where late-structural forest exists, and to some extent, within the mid-structural forest, especially at the lower elevations.

From 1880 to 1995, the distribution and more significantly, the amount of mid-structural forest has changed dramatically. In 1880 very little mid-structural forest was known to exist. As mentioned above, a large portion of the watershed has been masked by large fires in the early 1900's, but it is estimated that a moderate amount of mid-structural forest was located on some of the more exposed aspects and mid-slopes within the Pacific Silver Fir and Mountain Hemlock Zones, and to a lesser degree within the Western Hemlock Zone. Again, most of this structural class is expected to be located away from major streams and wet/moist areas. Currently, most of the area covered by the large fires in the early 1900's is occupied by mid-structural stands, and to a much lesser degree, some of the first clearcut harvest areas in Yellowjacket Creek and the Cispus River have reached the mid-structural forest size.

From 1880 to 1995, the distribution, and more significantly, the amount of late-structural forest has changed dramatically. In 1880, about 60 percent of the watershed was thought to exist as late-structural forest. As mentioned above, a large portion of the watershed has been masked by large fires in the early 1900's, but it is estimated that a large amount of the late-structural forest was located within the Pacific Silver Fir and Western Hemlock Zones (49% and 44%, respectively), and to a much lesser degree, within the Mountain Hemlock Zone (7%). Much of this structural class is expected to be located within major stream drainages and wet/moist areas. Currently, most of the late-structural forest within the south half of the watershed is located along major creek drainages including Upper McCoy Creek, Middle and Upper Yellowjacket Creek, and Badger Creek. Other significant blocks are located in the northwest corner of the watershed near the Cispus River and Monroe Creek, and in the northern portion of the watershed near Siler and Camp Creeks.

Over the next few decades, early-structural forest will tend to be located where recent regeneration harvest has occurred within Upper Yellowjacket, Upper McCoy, Badger, Pinto, Lambert, Jefferson, and Camp Creeks with some scattered throughout the lower elevations of the mid-structural stands where openings have been created for big game winter range or control of root disease has occurred. Mid-structural forest will tend to be located where the large fires of the early 1900's took place with the addition of past harvest units and high elevation stands which have reached the small-tree size class. These will tend to be located over two-thirds of the watershed area. Some late-structural forest will be scattered throughout the above mentioned drainages where it now exists, but the largest blocks will be located in the northwestern portion of the watershed within the Late Successional Reserve (LSR) where management direction precludes regeneration harvest. Some of the mid-structural forest, especially at the lower elevations with high, productive sites, will evolve into late-structural forest stands. These areas are located along the Cispus River and the lower reaches of Yellowjacket and McCoy Creeks.

Botany

Areas of Concern

Threatened, Endangered, and Sensitive Plant Species

Population dynamics of known sites of TES plant species have not been monitored. Without information on population trends it is difficult to assess how these species are responding to changes within the watershed.

Surveys for TES species within the analysis area have been specific to individual project boundaries and thus do not accurately portray the distribution of these species across the landscape.

Known sites within the analysis area for *Botrychium lanceolatum, B. minganese, B. pinnatum, Githopsis specularioides,* and *Orobanche pinorum* are not located in areas likely to be impacted by timber harvest. Potential threats to these species may come from expansion or new creation of trails and recreation sites.

Of the seven known sites of *Pleuricospora fimbriolata* within the analysis area, five are currently protected by being located within riparian or late successional reserves. The two unprotected sites occur within subwatershed 04S. Subwatersheds with the most acres of western hemlock zone late-seral stands outside of riparian reserves and outside of late-successional reserve designations (04P, 04S, and parts of 04Z) are the most likely to be targeted for future regeneration timber harvest. Habitat for *Pleuricospora fimbriolata* (which includes these late-seral stands) is already fragmented within the analysis area, and while individual populations may be protected in the short-term, additional timber harvest in these areas may create a landscape pattern that may pose a long-term viability problem for the species.

Survey and Manage Plant Species

Population dynamics of known sites of survey and manage species have not been monitored. Without information on population trends it is difficult to assess how these species are responding to changes within the watershed.

No specific surveys for survey and manage species have been conducted within the analysis area. Known sites are not based upon surveys and thus do not accurately portray the distribution of these species across the landscape.

Late-seral habitat is fragmented within the analysis area. While individual populations of late-seral dependent species may be protected in the short-term, this landscape pattern may pose a long-term viability problem for these species. This is especially true for *Allotropa virgata*, a survey and manage species that occupies the same habitats as *Pleuricospora fimbriolata* (see above).

Based upon an analysis of fire patterns over the last 115 years, the watershed analysis team determined that the Range of Natural Variability (RNV) for late-successional habitat within the watershed is between approximately 21-60 percent of the watershed. The current amount of late-successional habitat represents approximately 22 percent of the watershed and is thus within the RNV.

Noxious Weeds

There are currently no control measures in place for these species within the analysis area. Future spread of these species into previously uninfested areas is likely given the variety of dispersal methods and corridors that are available.

Wildlife

Habitat Conditions

Areas of Concern

This section is grouped by subwatersheds. Due to the nature of wildlife habitat and species, several subwatersheds fall within a single "concern category", such as big game winter range, riparian connectivity, etc.. To simplify this presentation, some of these items are abbreviated, as displayed below:

DEWR - Deer and Elk winter range: optimal cover levels are below Amendment 11 goals; road densities are above desired levels.

CONN - Subwatershed contains an identified riparian travel corridor; late-successional habitat is highly fragmented.

FRAG - Late-successional habitat in subwatershed is fragmented, reducing capability for interior l-s species

STOC - Subwatershed contains one or more spotted owl pairs or single birds that are below the "take thresholds" established by the Fish and Wildlife Service.

CLUS - A high-density cluster of spotted owl pairs found in this subwatershed.

TLOC - Subwatershed contains a known nest, den, or occurrence site of a TES, or other protected species that requires site-specific protection.

Subwatershed	Areas of Concern
04K Lower Greenhorn	DEWR; CONN; FRAG
04L Upper Greenhorn	FRAG
04M Nash	DEWR; CONN; FRAG
04P Dry	DEWR; CONN; FRAG
04Q Camp	DEWR; CONN; FRAG; Retain PX allocation
04R Lower Yellowjacket	DEWR; Contains riparian corridor, but mostly in mid-seral habitat.
04S Middle Yellowjacket	CONN; FRAG
04T Upper Yellowjacket	CONN; FRAG
04U Pinto	CONN; FRAG
04V Lower McCoy	CONN, although most of riparian corridor is mid-seral; FRAG
04W Upper McCoy	CONN; FRAG
04X Cispus X	DEWR; CONN; FRAG
04Y Lambert	DEWR; CONN; FRAG (limited area in DEWR, riparian corridor)
04Z Cispus Z	DEWR; CONN

TES, and Survey and Manage Wildlife Species

Subwatershed	Areas of Concern
04K Lower Greenhorn	-
04L Upper Greenhorn	-
04M Nash	-
04P Dry	STOC; TLOC (2)
04Q Camp	STOC
04R Lower Yellowjacket	-
04S Middle Yellowjacket	STOC; TLOC
04T Upper Yellowjacket	CLUS; STOC; TLOC
04U Pinto	CLUS; STOC; TLOC
04V Lower McCoy	STOC; TLOC (2)
04W Upper McCoy	STOC;
04X Cispus X	
04Y Lambert	TLOC (5)
04Z Cispus Z	TLOC (2)

Surveys

Any (FY97 and beyond) timber sales, or other ground disturbing activities in these subwatersheds will require spotted owl surveys, as well as surveys for Larch Mountain and Van Dyke's salamanders (and potentially Canadian lynx for projects greater than 4000 feet in elevation) per page C-5 of the ROD.

Human

Human Uses

Areas of Concern

Prehistoric Sites

This watershed includes Layser Cave, a significant prehistoric archaeological site currently managed as an interpretive site. At least four other prehistoric archaeological sites have been identified in subbasin 04P. Illegal digging has occurred at two of the sites, and the potential for further vandalism is a management concern. Timber harvest activities could make the sites more accessible or more visible. Indirect effects of harvest unit placement should be evaluated in the planning process. (04P)

One prehistoric site has been identified in this watershed. It has not been formally inventoried. Basic documentation is recommended as the first step to management of this site. (04Q)

Mosquito Meadows holds the highest probability for prehistoric site occurrence. (04U)

Two prehistoric sites, both eligible to the National Register of Historic Places (NRHP) have been identified. No present managements concerns exist. (04W)

Four prehistoric sites have been identified. Two of the sites are eligible to the NRHP, one is ineligible, and the fourth site, near Squire Creek, has not be evaluated. (04Z)

Two prehistoric sites in the area have suffered from looting damage. The sites are extremely vulnerable to future vandalism. If possible, timber harvest in the vicinity should be designed to avoid the sites, and the potential indirect effects of increased access and visibility carefully considered. (04Z)

Historic Sites

Four historic sites have been documented in this watershed. Three are related to early 20th century mining, one is a former fire lookout site. None appear to be eligible to the National Register of Historic Places (NRHP). There are no management concerns for these sites. A standing historic structure, Burley Mountain Lookout, is also within the area. The lookout is eligible to the NRHP, and will be managed for continued use. (04R)

Three historic sites are reported in this watershed. Two are former lookout sites that do not appear to meet the legibility criteria of the NRHP, but have not been formally evaluated. The third historic "site" is the Boundary Trail (#1), one of several historic trails on the Gifford Pinchot National Forest listed in the Forest Plan as potentially eligible to the NRHP. (04T)

Kirk Rock was identified by two Yakama consultants as a traditional historic use area. (04T)

No heritage sites have been identified in this watershed. (04U)

Ten historic sites related to mining in the McCoy Creek drainage have been documented and evaluated. Only one, the Primary Gold Bunkhouses is eligible to the NRHP. The site area is an active mining claim. Site management will be closely tied to the claimant's plan of operation. (04V)

One historic cabin site has been identified and found ineligible to the NRHP. No management concerns. (04X)

Five historic sites have been identified in this watershed. Four of the historic sites, including the former site of Lower Cispus CCC camp, have been evaluated and found ineligible to the Natural Resource Heritage Program (NRHP). (04Z)

The north and northwest slopes of Burley Mountain were a traditional huckleberry patch for Taidnapam people and are used today by enrolled Yakama tribal members. The potential for huckleberry management should be explored in this area. (04Z)

Access

Forest Roads 28 and 29 provide vehicle access to five trailheads and several miles of stream fishing. Road maintenance challenges and recent flood damage continue to limit the ability of visitors to utilize the recreation facilities as intended in the Forest Plan.

Portions of Roads 2816 and 7605 are being eroded due to steep grades and poor road drainage. This may be contributing to fine sedimentation in nearby creeks and limits access for passenger vehicles.

Recreation (Including Trails)

Tower Rock Campground and especially Yellowjacket Ponds are within the high water level of the Cispus River valley. Recent flooding removed several feet of bank in three campsites at Tower Rock Campground and covered the roadway and campsites with sediment. The ponds at Yellowjacket Ponds are now filled with cobbles and sediment. One third of the vehicle parking and half of the picnic sites are now inaccessible across the newly formed stream channel. The ability to protect recreation facilities in both sites, but especially Yellowjacket Ponds is in question.

Dispersed sites are not well inventoried in the area. There is a need to identify what dispersed campsite conditions constitute whether a particular site is, or is not complying with ACS objectives. This will help recreation personnel decide when sites that can not be effectively managed should be closed.

Several sections of the Tongue Mountain, Boundary, Langille Ridge and Juniper Ridge Trails are located on steep grades or in wet areas. Current and projected future recreation use will further degrade these trials beyond the intended maintenance standard. Reconstruction and relocation is planned for portions of Langille and Juniper Ridge Trails.

Flooding has damaged two bridge crossings on the Covel Creek Trail and obliterated 1/2 mile of the Valley Trail #270. Repairs are needed on the Covel Creek bridges to minimize future flood impacts. Relocation of the Valley Trail will be necessary and desirable to meet long term recreation facility needs and ACS objectives.

Attention continues to surround the Dark Divide Roadless Area due in part to the decade long battle over whether motorized recreation should continue.

Mining (Including Special Uses)

The largest lode mining claim of the Randle and Packwood Ranger Districts is located in 6th-field watershed 04V. This particular claim has been in existence since the late 1970's. Its operations figure prominently in the annual incomes of at least two families.

All of the placer mining claims are worked to one extent or another during a given year (usually weekends); however, at least one family does derive a substantial portion of its annual income from such operaions. (04V, 04R, 04S)

It is likely that there are other mining claims that are not recorded with the Bureau of Land Management, or the Ranger Districts, which could effect any 6th-field watershed.

This area does figure prominently into many Pacific Northwest guide books and many government agency mining and/or geological resource reports of the last century, therefore this area may continue to be visited by mining enthusiasts for prospecting purposes. Mining is a non-discretionary activity and usually does not require a special use permit. (04V, 04R, 04S)

Chapter 6 - Sixth-Field Watershed (6WS) Condition Evaluations

Purpose

The purpose of evaluating the condition of each subbasin, or 6th-field watereshed, is to identify the level at which each area currently satisfies the key management objectives to facilitate the development of management activity recommendations that are compatable with the objectives. The objectives identified for the purpose of this evaluation include objectives for maintaining late-successional forests and biological diversity, and the Aquatic Conservation Strategy objectives, all of which advance the goals of forest management on federal lands. As identified in the Northwest Forest Plan, the goals of forest management are as follows:

> "...to take an ecosystem management approach to forest management, with support from scientific evidence; meet the requirements of existing laws and regulations; maintain a healthy forest ecosystem with habitat that will support populations of native species (particularly those associated with late-successional and old-growth forests), including protection for riparian areas and waters; and maintain a sustainable supply of timber and other forest products that will help maintain the stability of local and regional economies on a predictable and long-term basis." (ROD, A-1).

The evaluations are presented in table format for each subbasin, and as a summary for all subbasins. Under the individual tables, **the subbasins are evaluated relative to specific criteria and assumptions as identified by the LCE WA Team for each of the objectives**. A general rating of good, fair, or poor is assigned to each subbasin, or a "data gap" is identified. Each rating is assigned a level of confidence for accuracy. Comments are provided in support of the rating and/or level of confidence. Under the summary table, all subbasin evaluations are shown relative to each of the objectives.

Key Management Objectives, Evaluation Criteria, and Assumptions

Aquatic Conservation Strategy Objectives

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

   Evaluation Criteria - Compare historic/reference and current conditions, examine aquatic features:

   a. perenial streams:
   b. intermittent streams:
   c. wetlands:
   d. lakes and ponds:

   Note: This ACS objective speaks to the continued physical existence of the variety of aquatic features from historic or reference times to the present. It does not address the quality of aquatic conditions, these are addressed in the other ACS objectives.

   Assumptions - The overall drainage networks have increased due to roading - roads intercept groundwater which increases the network of channels carrying water. New intermittent and ephemeral streams exist as road cross drains that cause water to flow where channels previously did not exist.

2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal,

and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Evaluation Criteria - Compare historic/reference and current conditions, examine spatial and temporal connectivity of aquatic and riparian systems:

Aquatic Systems		*Riparian Systems*
Floodplains to Wetlands	*to*	*Upslope to Headwater Tributaries to Intact Refugia*

Note: The basis of this evaluation was on *Hydrologic* connectivity; *Riparian* connectivity is addressed in ACS # 8.

Assumptions: Human and natural features which influence hydrologic connections:

a. hydroelectric facilities, or other stream flow diversions
b. road crossings of streams (primarily used to address barriers to fish migration, and does not account for possible barriers for other aquatic species because of data gaps)
c. roads built along floodplains and wetlands
d. Sediment deposits instream (gravel bars) or flow routed subsurface

3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Evaluation Criteria - Compare historic/reference and current conditions, examine the physical integrity of aquatic systems:

a. shorelines (lakes and ponds)
b. stream banks (includes observations regarding channel widening, channel migration, and occurrence of Large Woody Debris (LWD) as it relates to pool formation and stream bank cutting)
c. stream bottom configurations
d. condition of upper banks and inner stream gorges of deeply incised streams.

4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Evaluation Criteria - Compare historic/reference and current conditions, examine water quality of aquatic, riparian, and wetland ecosystems:

a. biological - macroinvertebrate (limited surveys occur in selected streams)
b. physical - stream temperature information occurs on selected streams; turbidity is approximated in ACS #5
c. chemical - pH (limited pH samples taken in McCoy Creek subbasins; background data for water chemistry is not ordinarily collected for streams, unless a particular problem is suspected)

Note: Unless specific statements are made in this section, no data is available with which to evaluate ACS Objective #4.

5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

   Evaluation Criteria - Compare historic/reference and current conditions, examine elements of the sediment regime (input, storage, and transport):

   a. timing (not addressed - data gap)
   b. volume
   c. rate
   d. character of sediment

   Assumptions - Erosion from roads delivers fine sediment to streams. Sediment delivered to streams from mass wasting is both fine and coarse.

   Note: Backgound rates of sedimentation were not modeled for this watershed; background rates were extrapolated from the Middle and Upper Cispus River Pilot Watershed Analysis.

   Amphibian surveys were also used to indicate excessive sedimentation within a stream reach.

6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

   Evaluation Criteria - Compare reference and current conditions, examine the ability of in-stream flows to create and sustain riparian, aquatic, and wetland habitats:

   a. timing
   b. magnitude
   c. duration
   d. spatial distribution

   Assumptions - Aggregate Recovery Percentage (ARP) and Water Available for Run-off (WAR) models were used to evaluate whether a subbasin was meeting this objective.

   Note: If a subbasin had an ARP of 75% or lower, or a WAR of 9% or higher, then subbasin was not meeting this objective. (See discussion on peakflow in Chapter 4).

7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

   Evaluation Criteria - Compare historic/reference and current conditions, examine floodplain innundation and the elevation of water tables in meadows and wetlands:

   a. timing
   b. variability
   c. duration

   Assumptions - A majority of inventoried wetlands are associated with either high ridges and talus slopes or floodplains adjacent to streams. A majority of wetlands under the forest canopy are not inventoried.

   Note: There is no information available about floodplains and wetlands.

8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

   Evaluation Criteria - Compare historic/reference and current conditions, examine the species composition and structural diversity of plant communities in riparian areas:

   a. thermal regulation (summer and winter)
   b. nutrient filtering
   c. rate of surface and bank erosion and channel migration
   d. amount and distribution of coarse woody debris
   e. connectivity and stuctural characteristics of forest in riparian zone

   Assumptions - Late structural habitat provides required components and complexity (horizontal and vertical diversity within plant communities) to achieve the objective. Mid-structural habitat achieves the objectives to a lesser degree; early-structural habitat least achieves the objectives.

9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

   Evaluation Criteria - Compare historic/reference and current conditions, examine the ability of the area to support well-distributed populations of native plants, invertebrates, and vertebrate riparian-dependent species.

   Note: Data on species occurrence and populations in riparian areas are very limited, as is site-specific habitat data.

Additional Objectives

10. Maintain late-successional and old-growth species habitat and ecosystems on federal lands.

    Evaluation Criteria - Compare historic (reference) and current conditions, examine the condition of late-successional habitats *outside* of riparian reserves with respect to:

    a. fragmentation of late-successional habitat patches (i.e. reduction in "interior habitat")
    b. connectivity of late-successional habitat patches
    c. condition of late-successional habitats with respect to insects, disease, windthrow, etc..

11. Maintain biological diversity associated with native species and ecosystems in accordance with laws and regulations. **(NOT RATED IN TABLES).**

    Note: Biodiversity (the number and abundance of native plant and animal species) is a complex, wide-ranging subject that is difficult to evaluate for the watershed for several reasons, including:

    -Very limited historic and current survey data exist for the vast majority of plant and animal species in the area, making any comparisons or evaluations of changes over time tenuous at best.

    - In the absence of the above species data, habitat conditons must be used to estimate trends. However, site-specific information on historic habitat conditions is also very limited, as is current condition data for most habitats in the watershed.

- "Range of Natural Variability" data is extremely limited or absent for species composition and abundance, as well as habitats, adding to the difficulty in assessing long-term trends.

Any evaluation of biodiversity is not valid on a sub-watershed scale, and has limited validity even at the watershed scale for many species. Chapter 4 outlines some broad scale changes and assumptions for the watershed, including a presumed decline in late-successional species (due to both wildfire and timber harvest), a presumed increase in species adapted to early seral conditions, an increase in introduced and weedy species, a presumed decline in some wide-ranging carnivores such as the gray wolf, fisher, and grizzly bear, a decrease in habitat capability for the northern spotted owl, etc.. These observations indicate an overall decline in biodiversity in the Lower Cispus East area from historic levels. These assumptions and data will be utilized as part of the development of recommendations in the following chapter.

Rating Definitions

Evaluation Ratings

The evaluation criteria listed for each objective are rated according to the following scale:

Good (G) Criteria elements have not changed; they are essentially the same as historic (pre-1910)/reference conditions. The 6WS meets the management objective with only minor exceptions.

Fair (F) Criteria elements have changed somewhat from historic (pre-1910)/reference conditions. The 6WS is near the margin for meeting the management objective.

Poor (P) Criteria elements have definitely changed from historic (pre-1910)/reference conditions. The 6WS does not meet the management objective.

Data Gap (D) No information, or not enough information available to assign a rating.

Confidence Ratings

The evaluation ratings are assigned a level of confidence for accuracy according to the following scale:

High (H) High confidence that assigned rating is accurate.

Moderate (M) Moderate confidence that assigned rating is accurate.

Low (L) Low confidence that assigned rating is accurate.

Sixth-Field Watershed Condition Evaluation Tables

Table 13. Sixth-Field Watershed (6WS) 04K - Lower Greenhorn Creek *(5,851 acres - 8.6 % of 5WS)*

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	F	M	**Perennial Streams** - Still there; although 1918 Cr. goes subsurface. **Intermittent Streams** - About the same. **Wetlands** - None known. **Lakes & Ponds** - None known
2) Connectivity between watersheds	F	H	No streamflow diversions present. No road crossing problems identified. No roads cutting floodplain wetlands. 1918 Creek goes subsurface in headwaters due to increased sediment bedload.
3) Integrity of aquatic systems	P	H	Low LWD and pools in reaches 1 and 2 of Greenhorn Cr. Sediment deposition in large quantities (even in transport reaches) of Greendhorn Cr. Debris flows and mass wasting common in 1918 Cr., and confluence of 1918 & Greenhorn Creeks. Channel morphology different than expected in 1918 Cr.. Streambanks being stripped of vegetation by erosion and mass wasting in 1918 Cr.
4) Water quality for healthy ecosystems	D	-	Macroinvertebrate populations indicate elevated sediment levels in Greenhorn Cr., but insufficient data to evaluate.
5) Appropriate sediment regime	F	M	Mass wasting increase moderate level over background. Fines being routed from roads to streams is a major concern. Fine sediment occurring in streams.
6) In stream flow	G	M	Low WAR (4%). Moderate ARP (87%).
7) Floodplain Function	D	-	No information available.
8) Structrual diversity of plant communities	F	M	Vegetation in riparian zone: -good along main stem (mid-seral) of Greenhorn Cr. and up to 1918 Cr. -highly fragmented (late-seral) along 1918 Cr. by early seral blocks. -western half of 6SW mixture of early and late seral. -eastern half is mid seral from Cispus burn.
9) Habitat to support well distributed populations of riparian species	D	-	No information available.
10) Late structural habitat	F	M	14% of 6WS is LSH outside of riparian reserves. LSH is fragmented, some connectivity remains.

Summary: This subbasin has a high natural level of sediment being delivered to the stream. Greenhorn Creek in this 6WS functions primarily as "transport" reaches - transporting sediment through the system to the lower alluvial fan at the mouth and into the Cispus River. (Although Greenhorn Cr. is transporting materials, sediment deposition is commonly found behind all log jams). 1918 Creek is the largest tributary in the subbasin and is experiencing severe mass wasting in the form of bank cutting, natural erosion processes, and debris flows.

Rating definitions: page 6 - 5

Table 14. Sixth-Field Watershed (6WS) 04L - Upper Greenhorn Creek *(4,126 acres - 6.1 % of 5WS)*

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	G	M	**Perennial Streams** - Essentially the same as historic (pre-1910) conditions **Intermittent Streams** - Essentially the same as historic conditions **Wetlands** - Essentially the same as historic conditions. **Lakes & Ponds** - None.
2) Connectivity between watersheds	P	M	No streamflow diversions present. Forest Road 77 crossing is a fish barrier to resident fish migration along Greenhorn Creek, and is suspected to be a barrier along Soldier Creek also. No other road problems known. A large number of tributaries to Greenhorn and Soldier Creeks are crossed by Forest Roads 7700, 7700.104 and 7700.117.
3) Integrity of aquatic systems	P	M	Streambank erosion. Low levels of LWD. Poor wood and pools in response reaches or Greenhorn Cr. Mass wasting occurring in many reaches or Greenhorn Cr.
4) Water quality for healthy ecosystems	D	-	Macroinvertebrate populations indicate elevated sediment levels in upper Greenhorn Creek.
5) Appropriate sediment regime	F	M	Fine sediment routed from roads to streams is major concern. Fine and coarse sediment from mass wasting slight increase over reference levels. Stream survey indicate sediment deposition. Amphibian survey show excess sediment as well.
6) In stream flow	P	M	High WAR (9%). Low ARP (75%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	F	M	Habitat along Jefferson Creek and tributaries is highly fragmented by timber harvest. Mainstem Greenhorn and Soldier Creek are fragmented.
9) Habitat to support well distributed populations of riparian species	D	-	Amphibians absent at junction of Road 77 and Greenhorn Creek-sedimentation noted.
10) Late structural habitat	F	M	11% of 6WS is LSH outside of riparian reserves. Some LS patches are small and isolated.

Summary: Greenhorn Creek primarily functions as a "transport reach" transporting sediments through this subbasin into Lower Greenhorn (04K) and Cispus (04X). It is generally a fast, high gradient stream except for some of the upper stream segments. Jefferson and Soldier Creeks are experiencing riparian fragmentation. Mass wasting along Greenhorn Creek is a concern.

Rating definitions: page 6 - 5

Table 15. Sixth-Field Watershed (6WS) 04M - Nash Creek (*667 acres -1.0 % of 5WS)*

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	G	L	**Perennial streams** - are the same as historic (pre-1910) conditions. **Intermediate streams** - are the same as historic conditions. **Wetlands** - **Lakes & Ponds** -
2) Connectivity between watersheds	D	-	No streamflow diversions present. Road crossings serving as obstructions to fish migration.
3) Integrity of aquatic systems	D	-	Little information available.
4) Water quality for healthy ecosystems	D	-	No information available.
5) Appropriate sediment regime	F	L	Slight concern with fine sediment routed from roads. Amphibian survey indicate excess sediment. Fine and coarse sediment from mass wasting slightly above reference levels. No stream survey information.
6) In stream flow	P	M	Moderate WAR (5%). Low ARP (67%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	G	M	Mature forest is well connected through the riparian corridor. Some regen harvest in upper Nash creek.
9) Habitat to support well distributed populations of riparian species	D	-	No amphibians found at junction of the 77 Road and Nash Creek-sedimentation noted.
10) Late structural habitat	F	M	34% of 6WS is LSH outside of riparian reserves. Past harvest pattern retained some connectivity.

Summary: Little is known about Nash Creek, but peak flow problems within this watershed are a concern.

Rating definitions: page 6 - 5

Table 16. Sixth-Field Watershed (6WS) 04P - Dry Creek *(2,037 acres - 3.0 % of 5WS)*

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	P	L	**Perennial Streams** - Lower reaches of Dry Creek are suspected to have been perennial in 1936. Currently subsurface at Forest Road 23. **Intermittent Streams** - Appear to be the same as historical (pre-1910) conditions. **Wetlands** - None **Lakes & Ponds** - None
2) Connectivity between watersheds	D	-	No streamflow divesions present. Lower reaches of Dry Creek suspected to have been perennial in 1936. Currently subsurface (extent unknown) at Forest Road 23. In Reach 3, road is built across Dry Creek alluvial fan. Natural migrations of the channel will damage Forest Road 23 at regular intervals. No crossing obstruction to fish migration.
3) Integrity of aquatic systems	P	M	Little data available, but observations at 23 Road indicate a concern for this topic. High bedload movement. Subsurface in alluvial fan of Dry Cr.
4) Water quality for healthy ecosystems	D	-	No information available.
5) Appropriate sediment regime	P	M	Fine sediment from roads is major concern. Fine and coarse sediment delivery from mass wasting is moderately above reference levels.
6) In stream flow	P	M	High WAR (11%). Moderate ARP (83%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	G	M	Early seral forest in headwaters of Dry Creek. Otherwise well-connected mature forest in riparian zone of Dry Creek.
9) Habitat to support well distributed populations of riparian species	D	-	Mollusk survey data available for Layser Cave vicinity.
10) Late structural habitat	G	M	37% of 6WS is LSH outside of riparian reserves. Relatively large patch of LSH present.

Summary: Dry Creek watershed is a highly responsive watershed to rain-on-snow events. The lower reach of Dry Creek currently goes subsurface, but historical information states that the creek flowed perennially from its headwaters to the mouth.

Rating definitions: page 6 - 5

Table 17. Sixth-Field Watershed (6WS) 04Q - Camp Creek (*2,543 acres - 3.7 % of 5WS*)

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	P	H	**Perennial Streams** - Headwaters and lower reaches of Camp creek are currently subsurface. Camp Creek no longer a perennial stream. **Intermittent Streams** - A possibility that some intermittent streams may have also gone subsurface (i.e., no longer functioning as streams). **Wetlands** - Lower reach of Camp Creek was historically a swampy floodplain. Currently a gravel bar. **Lakes & Ponds** - No historic (pre-1910) data.
2) Connectivity between watersheds	P	H	No streamflow diversions present. Forest Road 23 crosses the Camp Cr. alluvial fan. Alluvial fan of Camp Cr. channel has been constrained by the 23 Road. Upper and lower reaches of Camp Creek go subsurface.
3) Integrity of aquatic systems	P	H	Subsurface in alluvial fan. Mass wastings and debris torrents. Sediment in pools.
4) Water quality for healthy ecosystems	D	-	No information available.
5) Appropriate sediment regime	P	H	Fine sediment from roads is a major concern. Fine and coarse sediments found through out streams in the 6WS from mass wasting are moderately above reference levels.
6) In stream flow	P	M	High WAR (13%). Low ARP (68%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	P	M	Failing buffer strips (blown down). Riparian forest structure is highly fragmented along main stem of Camp Cr. and all tributaries.
9) Habitat to support well distributed populations of riparian species	D	-	No information available.
10) Late structural habitat	F	M	25% of 6WS is in LSH outside of riparian reserves. Pine marten allocation present- retain for connectivity. Larger LS block present in southern part, but highly fragmented in north end.

Summary: Camp Creek watershed is a highly responsive watershed to rain-on-snow events. The lower reach of Camp Creek goes subsurface and is an alluvial fan that is currently migrating. The upper reaches of Camp Creek also go subsurface. Lack of stream pools, and riparian buffers occur in the upper portion of the subbasin. Historical anadromous habitat has been lost. Fine and coarse sediment is moderately elevated above background rates.

Rating definitions: page 6 - 5

Table 18. Sixth-Field Watershed (6WS) 04R - Lower Yellowjacket Creek *(5,381 acres - 7.9 % of 5WS)*

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	F	M	**Perennial Streams** - Yellowjacket Cr. is confined by the 28 Road and efforts to maintain it in the preferred channel. Other perennial streams the same as historical (pre-1910) conditions. **Intermittent Streams** - Approximately the same as historical conditions with a few additions from drainage along the FSR 28. **Wetlands** - May have decreased over time as a result of channel widening along lower stretch of Yellowjacket Creek. **Lakes & Ponds** - Two man-made ponds recently reclaimed by Yellowjacket Creek during 2/96 flood.
2) Connectivity between watersheds	F	M	No streamflow diversions present. No known road crossings serving as barriers to fish migration. Yellowjacket Cr. is constrained from migrating and is, therefore, cut off from its flood channels. (Migration on its alluvial fan).
3) Integrity of aquatic systems	P	H	Low LWD occurrence in alluvial fan in Yellowjacket Cr. Channel widening in Yellowjacket Cr. (Y-1). High width to depth ratio in Yellowjacket Cr. Reference and current dredging occurring in Yellowjacket Cr. (Y-1).
4) Water quality for healthy ecosystems	D	-	No information available.
5) Appropriate sediment regime	P	H	Fines from roads to streams is major concern. Fine and coarse sediment from mass wasting is high above reference levels. Coarse and fine sediments noted in all reaches. Channel widening in reach Y1 indicates excess sediment from upstream subbasins or sources (cumulative effect).
6) In stream flow	P	M	High WAR (11%). High ARP (95%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	F	M	Riparian zones are almost all mid-seral due to 1902 and 1918 Cispus burns. Mainstem of Yellowjacket Creek has continuous mid-seral in riparian zone. However, riparian zones of High Bridge Creek and Galena Creek are disconnected from mainstem.
9) Habitat to support well distributed populations of riparian species	D	-	Tailed frogs found in Yellowjacket and High Bridge creeks.
10) Late structural habitat	G	M	1% of 6WS is in LSH outside of riparian reserves. LSH exists only in isolated small patches within mid-seral blocks.

Summary: The mouth of Yellowjacket Creek is very important to anadromous production. The mouth is an alluvial fan that has been experiencing channel widening since 1979. The rest of Yellowjacket Creek is transporting sediments from the upper subbasins (04T, 04U, 04S, 04V, 04W) to the mouth of Yellowjacket Creek and the Cispus River. This subbasin also reacts to rain on snow events. The mouth of Yellowjacket Creek has been modified by channelization and salvage repeatedly.

Rating definitions: page 6 - 5

Table 19. Sixth-Field Watershed (6WS) 04S - Middle Yellowjack Creek (*5,062 acres -7.4 % of 5WS*)

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	G	M	**Perennial Streams** - Essentially the same as historic (pre-1910) conditions. **Intermittent Streams** - Little change. Some intermittent streams added below 28 Road. **Wetlands** - Present. **Lakes & Ponds** - None.
2) Connectivity between watersheds	G	M	No streamflow diversions facilities. No known road crossings serving as barriers to fish migration..
3) Integrity of aquatic systems	F	M	Some bank cutting. Mostly transport reach along Yellowjacket Cr. Extent of 1995 and 96 flood impacts unknown.
4) Water quality for healthy ecosystems	D	-	No information available.
5) Appropriate sediment regime	P	H	Fines from roads is a major concern. Fine and coarse sediment from mass wasting is high above reference levels. Most sediment is being transported through stream to mouth of Yellowjacket Cr. and Cispus River. One amphibian survey indicating excess sediment.
6) In stream flow	G	M	Low WAR (3%). Moderate ARP (85%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	G	M	Riparian reserve corridor continuous mid to late seral along mainstem. Riparian reserve fragmentation occurring in upper reaches of watershed especially Veta Creek area. 1950's era clearcuts along YJ creek now mid-seral
9) Habitat to support well distributed populations of riparian species	D	-	No amphibians found at junction of Veta Creek and FR 77-sedimentation noted. Tailed frogs present in YJ creek.
10) Late structural habitat	F	M	10% of 6WS is LSH outside of riparian reserves. Fringed-pinesap present outside of RR.

Summary: Yellowjacket Creek transports fine and coarse sediments from within the subbasin and upper subbasins to the mouth of Yellowjacket Creek and the Cispus River.

Rating definitions: page 6 - 5

Table 20. Sixth-Field Watershed (6WS) 04T - Upper Yellowjacket Creek (*10,528 acres - 15.4 % of 5WS*)

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	P	H	**Perennial Streams** - Portions of Upper Yellowjacket Cr. have gone subsurface. Portions of Yellowjacket Cr. no longer exist as a perennial stream. **Intermittent Streams** - Many streams have gone subsurface. **Wetlands** - Approximately the same as historical (pre-1910) conditions below the 2810 Road, but major alterations of the flood plain in headwaters above the 2810 Road crossing of Yellowjacket Cr. **Lakes & Ponds** -
2) Connectivity between watersheds	P	H	No streamflow diversions present. Roads cross several Class II and IV tributaries. Roads constructed in floodplain areas. Upper reaches of Yellowjacket Creek goes subsurface as does several class III and IV tributaries.
3) Integrity of aquatic systems	P	H	Channel widening in response reaches Y37 to Y32. Channel width decrease in reaches Y15 to Y22 based on 1985 aerial photos. Debris torrents, road failures, mass wasting, bank cutting, causing coarse sediment influx in Yellowjacket and Badger Creeks. Subsurface, channel widening, increase width to depth ratio.
4) Water quality for healthy ecosystems	D	-	Available stream temperatures are within State standards.
5) Appropriate sediment regime	P	H	Fines from roads to streams is major concern. Fine and coarse sediments from mass wasting is an extreme concern. Excessive coarse and fine sediments confirmed in stream surveys.
6) In stream flow	F	M	Moderate WAR (5%). Moderate ARP (85%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	F	M	Riparian Reserve fragmentation widespread, several tributary corridors disconnected from mainstem. Fragmentation of riparian reserve is concentrated in upper Badger Creek area. Many lower tributary reaches in early or mid-seral.
9) Habitat to support well distributed populations of riparian species	D	-	Good numbers of amphibians present including tailed frogs, Cascades frogs and Cope's giant salamanders.
10) Late structural habitat	F	M	21% of 6WS is LSH outside of riparian reserves. Spotted owl cluster present. Fragmentation has produced isolated and disconnected LS habitat patches, with one larger LS patch present.

Summary: Yellowjacket Creek has been experiencing channel widening since 1979 in its upper reaches as well as going subsurface in its upper most reach. Intermittent channels along Yellowjacket and Badger Creeks are also going subsurface due to input of coarse sediments from road related failures. Mass wasting in the form of bank cutting, road failures and debris torrents is a major concern impacting Yellowjacket and Badger Creeks.

Rating definitions: page 6 - 5

Table 21. Sixth-Field Watershed (6WS) 04U - Pinto Creek (*7,555 acres - 11.1 % of 5WS*)

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	G	M	**Perennial Streams** - Essentially the same as historical (pre-1910) conditions. **Intermittent Streams** - Similar to historical conditions with a few additional streams possible. **Wetlands** - Limited information available. Approximately the same as historical conditions. **Lakes & Ponds** - Virtually the same as historical conditions.
2) Connectivity between watersheds	F	H	Several stream crossings along the 7716 and 2800 Roads. No streamflow diversions present. Sediment in excess levels.
3) Integrity of aquatic systems	P	H	Mass wasting and bank cutting throughout. Low complexity (low LWD).
4) Water quality for healthy ecosystems	D	-	Available macroinvertebrate information indicates elevated sediment levels in Pinto Cr. Stream temperatures are within State standards.
5) Appropriate sediment regime	P	H	Fines from roads to streams is major concern. Fine and coarse sediments from mass wasting is high concern. Sediment is noted throughout stream survey. Sediment regime elevated above norms since 1950's.
6) In stream flow	F	M	Moderate WAR (7%). High ARP (90%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	P	M	Windfall in riparian reserve buffers. Mainstem of Pinto and Pumice corridors are fragmented. Upper reaches of tributaries mostly mid-seral.
9) Habitat to support well distributed populations of riparian species	D	-	One tailed frog location in upper Pinto creek.
10) Late structural habitat	P	M	5% of 6WS is LSH outside of riparian buffers. LSH has become isolated and narrow, health of LS stands is poor.

Summary: Pinto Creek subbasin has been experiencing a continuous sediment influx from management activities since the 1950's. Sediment from roads and mass wasting is a concern. Riparian fragmentation is fairly widespread along Pinto Creek.

Rating definitions: page 6 - 5

Table 22. Sixth-Field Watershed (6WS) 04V - Lower McCoy Creek (*7,333 acres - 10.7 % of 5WS*)

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	G	M	**Perennial Streams** - Virtually the same as historical (pre-1910) conditions. **Intermittent Streams** - Same as historical conditions. **Wetlands** - Virtually the same as historical conditions. **Lakes and Ponds** - Virtually the same as historical conditions.
2) Connectivity between watersheds	G	M	No major streamflow diversions; minor diversion on Camp Creek due to mining. Forest Road 29 crosses many Class III and Class IV tributaries. Channel primarily transports sediment.
3) Integrity of aquatic systems	F	M	Bedrock transport channel. Decrease in channel widths between 1938 and 1985. Many upper stream banks are unstable. Probable change due to mining, extent unknown.
4) Water quality for healthy ecosystems	D	-	pH (low pH - acidic conditions) associated with mining activities are found in tributaries of Camp Cr. Tests of McCoy Cr. show pH within State standards.
5) Appropriate sediment regime	F	M	Fines from roads to streams is major concern. Fine and coarse sediments from mass wasting is moderate above reference levels. Sediment mostly being transported to Yellowjacket Creek.
6) In stream flow	G	M	Low WAR (4%). High ARP (96%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	F	M	Continuous mid and late seral in mainstem corridor becoming fragmented above Sunrise Creek.
9) Habitat to support well distributed populations of riparian species	D	-	Tailed frogs and Pacific giant salamanders noted in several locations on tribs to McCoy creek.
10) Late structural habitat	P	M	6% of 6WS is LSH outside of riparian reserves. LSH found in narrow stringers in south end due to timber harvest. Some scattered areas of root disease present.

Summary: Lower McCoy Creek is primarily a bedrock transport reach, transporting materials into Yellowjacket Creek from within the subbasin and upper subbasins. Mining is prevalent within this subbasin.

Rating definitions: page 6 - 5

Table 23. Sixth-Field Watershed (6WS) 04W - Upper McCoy Creek (*5,526 acres - 8.1 % of 5WS*)

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	G	M	**Perennial Streams** - Same as historical (pre-1910) conditions. **Intermittent Streams** - Same as historical conditions. **Wetlands** - Same as historical conditions. **Lakes and Ponds** - Same as historical conditions.
2) Connectivity between watersheds	F	M	No streamflow diversions present. Road crossings exist on all tributaries. Some class III and IV tributaries may be affected by excess sediments.
3) Integrity of aquatic systems	P	M	Channel widening in upper reaches of McCoy Cr.
4) Water quality for healthy ecosystems	D	-	Available water temperatures are within State standards.
5) Appropriate sediment regime	P	H	Fines from roads to streams is major concern. Fine and coarse sediment from mass wasting is high above reference levels. Channel widening and stream survey confirming both fine and coarse sediment in system. Debris torrents and avalanche chutes. Mass wasting in Jumbo Cr. Increased sediment delivery.
6) In stream flow	G	M	Low WAR (4%). Moderate ARP (87%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	P	M	Riparian reserves fragmented along mainstem. Many Tributaries disconnected from mainstem as well.
9) Habitat to support well distributed populations of riparian species	D	-	One tailed frog location present on trib to McCoy Cr.
10) Late structural habitat	P	M	9% of 6WS is LSH outside of riparian reserve. Highly fragmented habitat, very narrow connections exist between old-growth patches.

Summary: Stream widening has been occurring in the upper stream segments of McCoy Creek. Mining is occurring within this subbasin. Riparian reserves are fragmented along McCoy Creek. Mass wasting along Jumbo Creek, and mass wasting occurring throughout this subbasin is a high concern.

Rating definitions: page 6 - 5

Table 24. Sixth-Field Watershed (6WS) 04X - Cispus X (*3,498 acres - 5.1 % of 5WS*)

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	G	L	**Perennial Streams** - Same as historical (pre-1910) conditions. **Intermittent Streams** - Same as historical conditions. **Wetlands** - There may have been some loss of historic riparian wetlands due to channel widening in response reaches of Cispus River. **Lakes and Ponds** - No information available.
2) Connectivity between watersheds	G	-	No streamslow diversions present Road crossings on all streams. Sediment transport occurring.
3) Integrity of aquatic systems	D	-	No stream survey data. Significant channel widening in Cispus River observed in air photos.
4) Water quality for healthy ecosystems	D	-	Stream temperatures available are within range of State standards. No chemical data.
5) Appropriate sediment regime	P	M	Fine sediment from roads to streams is slight concern. Fine and coarse sediment from mass wasting is slightly above reference levels. Channel widening indicates excess sediment from upstream subbasins or sources (cummulative effect). Amphibian survey indicates one site with excess sediment.
6) In stream flow	G	M	Low WAR (1%). Moderate ARP (89%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	G	M	Continuous late-seral riparian reserves along Cispus River.
9) Habitat to support well distributed populations of riparian species	D	-	No amphibians found at jct. of Falls Creek and FR 77- sedimentation noted.
10) Late structural habitat	G	M	25% of 6WS in LSH outside of riparian reserves. Connectivity exists through LS habitat patches.

Summary: This section of the Cispus River is important to anadromous fish production. Significant channel widening has occurred on the Cispus at least since 1959. Cumulative effects from sediment originating within Lower Cispus East, Middle and Upper Cispus 5th-field watersheds are deposited here.

Rating definitions: page 6 - 5

Table 25. Sixth-Field Watershed (6WS) 04Y - Lambert Creek (*1,164 acres - 1.7 % of 5WS*)

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	G	M	**Perennial Streams** - Same as historical (pre-1910) conditions. **Intermittent Streams** - Same as historical conditions. **Wetlands** - Approximately the same as historical conditions. **Lakes and Ponds** - Approximately the same as historical conditions.
2) Connectivity between watersheds	F	L	Road crossings on all tributaries and mainstem. No streamflow diversions present. Channel information unavailable.
3) Integrity of aquatic systems	D	-	No channel data available.
4) Water quality for healthy ecosystems	D	-	No biological, physical, or chemical data available for this watershed.
5) Appropriate sediment regime	F	L	Fine sediment from roads is a slight concern. Fine and coarse sediments from mass wasting is slight concern. No stream survey data.
6) In stream flow	P	M	High WAR (10%). Moderate ARP (85%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	P	M	Riparian reserve corridor mostly early-seral or hardwood along mainstem. Lambert Creek most heavily impacted.
9) Habitat to support well distributed populations of riparian species	D	-	Tailed frogs found in Lambert creek.
10) Late structural habitat	P	M	5% of 6WS is LSH outside of riparian reserves. Most LS habitat has been harvested.

Summary: Little information is known about Lambert Creek subbasin. Lambert Creek subbasin is highly sensitive to rain-on-snow events and riparian reserves are mostly early seral or hardwoods.

Rating definitions: page 6 - 5

Table 26. Sixth-Field Watershed (6WS) 04Z - Cispus Z (*6,949 acres - 10.2 % of 5WS*)

Management Objectives	Rating	Confidence	Comments
1) Existence of aquatic features at landscape scale.	P	L	**Perennial Streams** - Exist today that existed pre 1940. **Intermittent** - Virtually the same on National Forest land. Information is not available on private land. **Wetlands and Back Channels** - These have likely been altered as efforts continue to maintain the Cispus River and larger streams in preferred channels. In addition, roads such as the 23 and 28 isolate the river from old flood channels. 1910 homesteading may have decreased wetland & intermittent streams by conversion of land to cultivation and farming. Human action has constrained the river in the alluvial valley area. Some man-made trout ponds have been created on private land. **Lakes and Ponds** - No information available.
2) Connectivity between watersheds	P	M	Possibly streamflow diversions on private lands; main Cispus connected. Road crossing on all streams. Roads in floodplains are influencing the Cispus meander.
3) Integrity of aquatic systems	P	L	Significant channel widening in Cispus River. Little chanel data available. Aggradation in Cispus River.
4) Water quality for healthy ecosystems	D	-	No macroinvertebrate data available. Stream temperatures are within State standards. No water chemistry data available.
5) Appropriate sediment regime	P	H	Fines from roads to stream is a major concern. Fine and coarse sediment from mass wasting is moderate concern. Channel widening is significant, sediment is being routed from upstream subbasins (cummulative effects).
6) In stream flow	F	M	Moderate WAR (5%). High ARP (95%).
7) Floodplain Function	D	-	No information available.
8) Structural diversity of plant communities	F	M	Side tributaries are continuous and mid-seral. Riparian forest along mainstem unknown. Private lands along Cispus mostly in early seral or non-forest.
9) Habitat to support well distributed populations of riparian species.	D	-	No information available.
10) Late structural habitat	F	M	11% of 6WS is LSH outside riparian reserves. larger LS patches are connected by narrow LS stringers. LS patches in south end surrounded by mid-seral.

Summary: This section of the Cispus River is important to anadromous fish production. Significant channel widening has occurred at least since 1959. Cumulative effects from sediment originating within Lower Cispus East, Middle and Upper Cispus watersheds are deposited here. Roads are limiting the meander of the Cispus River.

Rating definitions: page 6 - 5

Table 27. Sixth-Field Watershed Condition Evaluations Summary

Management Objectives	Sixth-Field Watersheds													
	04K Lower Green-horn	04L Upper Green-horn	04M Nash	04P Dry	04Q Camp	04R Lower Yellow-jacket	04S Middle Yellow-jacket	04T Upper Yellow-jacket	04U Pinto	04V Lower McCoy	04W Upper McCoy	04X Cispus X	04Y Lambert	04Z Cispus Z
1) Existence of aquatic features at landscape scale	F	G	G	P	P	F	G	P	G	G	G	G	G	P
2) Connectivity between 6th fields	F	P	D	D	P	F	G	P	F	G	F	G	F	P
3) Integrity of aquaitc systems	P	P	D	P	P	P	F	P	P	F	P	D	D	P
4) Water quality for healthy ecosystems	D	D	D	D	D	D	D	D	D	D	D	D	D	D
5) Appropriate sediment regime	F	F	F	P	P	P	P	P	P	F	P	P	F	P
6) In-stream flow	G	P	P	P	P	P	G	F	F	G	G	G	P	F
7) Floodplain function	D	D	D	D	D	D	D	D	D	D	D	D	D	D
8) Structural diversity of plant communities	F	F	G	G	P	F	G	F	P	F	P	G	P	F
9) Habitat to support well distributed populations of riparian species	D	D	D	D	D	D	D	D	D	D	D	D	D	D
10) Late-structural habitat	F	F	F	G	F	G	F	F	P	P	P	G	P	F

Rating definitions: page 6 - 5

Chapter 7 - Management Activity Recommendations

Purpose

The purpose of identifying management activities is to bring the analysis to conclusion by focusing on management recommendations that are responsive to watershed processes identified in the analysis.

Management recommendations are identified for each 6th-field watershed, for the entire LCE (5th-field) watershed on a landscape scale, and for specific activities throughout the watershed.

Management Activity Recommendation Tables

Table 28. Sixth-Field Watershed (6WS) 04K - Lower Greenhorn *(Northwest Forest Plan Land Allocation: LSR)*

Activity	Recommendations	Concerns
Regeneration Harvest	**RR and Non RR:** Whole subbasin is in the LSR, regen. harvest not allowed.	
Commercial Thinning	**Non RR:** Moderate to high opportunities exist for next ten years in stands approaching 80 years, to promote late successional character. Thinning opportunities may exist to improve health and growth, and decrease potential insect damage to suppressed stands <80 years old. **RR**: See Blanket Recommendations, page 7-16.	Instability (ACS 3). Nutrient deficient sites and root disease. Three owl pairs present.
Roads	Restoration opportunities exist on Forest Roads 7605, 7700-126, -136, -150, and -065.	Sedimentation is a high concern in this subbasin.
Other Restoration	Riparian plantings in 1918 Creek and stabilizing mass wasting sites. Stabilization of mass wasting near Greenhorn/1918 confluence. Possible fish structures in first reaches near Cispus. Other opportunities may exist from 1995/96 flood damage assessment.	
Recreation and Trails	Evaluate dispersed site at Greenhorn Bridge on 77 Road.	
Special and Sensitive Areas	Consider huckleberry enhancement north of Burley Mtn.	

Abbreviations: RR = Riparian Reserves
Non RR = Areas outside of Riparian Reserves

Table 29. Sixth-Field Watershed (6WS) 04L - Upper Greenhorn Creek (*Northwest Forest Plan Land Allocation: Matrix*)

Activities	Recommendations	Concerns
Regeneration Harvest	**RR:** See Blanket Recommendations, page 7-16. **Non RR**: Some opportunities exist primarily in Silver Fir Zone.	Cumulative effects (peak flows-ACS 6). Integrity of aquatic system (ACS 3). 11% late seral outside Riparian Reserves.
Commercial Thinning	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Low to moderate opportunities in mid-seral forest areas and nutrient deficient areas.	
Roads	Opportunities for restoration, 7700-127 Road, Correct obstructions to fish passage at 7700 Road crossings of Greenhorn and Soldier Creek.	
Other Restoration	Riparian planting opportunity in Upper Greenhorn Creek (Reach G-18) Evaluate mass wasting along Greenhorn Creek. Evaluate for 1995-96 Flood damage.	
Recreation and Trails	Continue to provide dispersed and developed recreation opportunities along Cispus River. Consider extension of French Buttes Trail (#254) for ORV use.	Potential impacts to sensitive plant locations.
Special and Sensitive Areas	Consider huckleberry enhancement along 77 Road.	

Abbreviations: RR = Riparian Reserves
Non RR = Areas outside of Riparian Reserves

Table 30. Sixth-Field Watershed (6WS) 04M - Nash Creek *(Northwest Forest Plan Land Allocation: LSR)*

Activity	Recommendations	Concerns
Regeneration Harvest	**RR:** In LSR, not applicable. **Non RR:** Same as above.	
Commercial Thinning	**RR:** None available. **Non RR:** None available.	
Roads	None - Evaluate 1995-96 flood damage	
Other Restoration	None - Evaluate 1995-96 flood damage.	
Recreation and Trails	No activities planned at this time.	
Special and Sensitive Areas	No activities planned.	

Abbreviations: RR = Riparian Reserves
Non RR = Areas Outside of Riparian Reserves

Table 31. Sixth-Field Watershed (6WS) 04P - Dry Creek *(Northwest Forest Plan Land Allocations: AMA & LSR)*

Activity	Recommendations	Concerns
Regeneration Harvest	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Minor opportunities limited by management allocations.	Peak flow (ACS 6), sedimentation (ACS 5), and integrity of aquatic systems (ACS 3). Visual concerns also.
Commercial Thinning	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Some opportunities in TS MAC, minor in VL MAC. Some opportunities in LSR. Potential to thin around Layser Cave area within next decade.	Biological winter range, one owl pair, one goshawk nest, and mollusk site. Cultural resources.
Roads	Restoration opportunities exist on Forest Roads 2300-083, and -091. Recommend net decrease of roads within watershed.	Private land below 2300-083. High road density.
Other Restoration	Look for opportunities to decrease future coarse sediment delivery within stream system.	Dry Creek going subsurface (ACS 3).
Recreation and Trails	Consider re-opening Dry Creek Trail (#289) to a motorcycle standard.	Disturbance to wildlife species. Sedimentation (ACS 5).
Special and Sensitive Areas	No activities planned.	

Abbreviations: RR = Riparian Reserves
Non RR = Areas outside of Riparian Reserves

Table 32. Sixth-Field Watershed (6WS) 04Q - Camp Creek *(Northwest Forest Plan Land Allocation: AMA)*

Activity	Recommendations	Concerns
Regeneration Harvest	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Defer harvest for one decade.	Cumulative effects (peak flow - ACS 6), and sedimentation (ACS 5), and integrity of aquatic systems (ACS 3).
Commercial Thinning	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Very limited opportunities in mid-seral stands.	Most potential thinning areas have been thinned, presently one active sale (NSH-Polk M).
Roads	Opportunities exist on 5500-108,-109,-020, 5508-080, and -081 Roads. Recommend net decrease of roads in subbasin.	High road density.
Other Restoration	Look for opportunities to decrease coarse sediment delivery to existing streams. Evaluate riparian buffers on C-7 to C-9 of Camp Creek. Evaluate stabilization of mass wasting occurring along Camp Creek.	Loss of anadromous fish habitat.
Recreation and Trails	Consider re-opening Dry Creek Trail to a motorcycle standard.	Disturbance to wildlife species. Sedimentation (ACS 5).
Special and Sensitive Areas	No activities planned.	

Abbreviations: RR = Riparian Reserves
Non RR = Areas Outside of Riparian Reserves

Table 33. Sixth-Field Watershed (6WS) 04R - Lower Yellowjacket ***(Northwest Forest Plan Land Allocations: Matrix, LSR, and Tier 2 Key Watershed)***

Activity	Recommendations	Concerns
Regeneration Harvest	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** No opportunities in late-seral, some opportunities in mid-seral for root disease control. Possible opportunities in nutrient deficient sites.	Cumulative effects (peak flow - ACS 6), sedimentation (ACS 5), and integrity of aquatic systems (ASC 3). Late seral 1.4% outside Riparian Reserves. Biological winter range and one owl pair. Mining and cultural resources. Travel corridor along Yellowjacket Creek.
Commercial Thinning	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Moderate opportunities north of Kind and Galena Creek areas.	Active sale (Tongue H), treated previously with past thinning (10 years). Root disease and nutrient deficient sites. Proposed travel corridor.
Roads	Look for opportunities to decommission roads along alluvial fan of Yellowjacket Creek. Other opportunities exist for restoration along Forest Roads 2800, 2900, 2900-026, -039, -045, and 2904 (Rock E Rd).	Anadromous fish production.
Other Restoration	Encourage formation of mid-channel gravel bars through placement of log jams. Evaluate Yellowjacket ponds and other 1995-96 flood damaged sites.	Impacts from salvage within alluvial channel and floodplain.
Recreation and Trails	Harden trail crossings in wet areas that aren't bridged on portions of Burley and Tongue trails, also reconstruct steep trail sections. Evaluate dispersed site at junction of 28 Road and Yellowjacket Creek. Evaluate proposal to connect Langille Ridge Trail (#259) with Trail #293 across McCoy Creek.	Concern for anadromous fish habitat.
Special and Sensitive Areas	No activities planned.	

Abbreviations: RR = Riparian Reserves
Non RR = Areas Outside of Riparian Reserves

Table 34. Sixth-Field Watershed (6WS) 04S - Middle Yellowjacket (*Northwest Forest Plan Land Allocation*: Matrix)

Activity	Recommendations	Concerns
Regeneration Harvest	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Some opportunities in late-seral stands in the Western Hemlock Zone, more opportunities in the Pacific Silver Fir Zone. Some opportunities in mid-seral for root disease control. Possible opportunities in nutrient deficient sites.	Cumulative effects (sedimentation ACS 5). Mining claims. Goshawk nest, single owl, and proposed travel corridor. Two fringed- pinesap sites outside of Riparian Reserves.
Commercial Thinning	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Low to moderate potential for commercial thinning within this watershed. Some past harvests units may be available along Yellowjacket Creek.	Root disease and nutrient deficient sites.
Roads	Restoration opportunities exist on Forest Roads 2809, 2800-098, 7700-152, 7713, and 7713-686.	
Other Restoration	Evaluate for fish structures in reaches Y-15, Y-17 of Yellowjacket Creek. Riparian planting around reach Y-15 of Yellowjacket Creek.	Stream complexity.
Recreation and Trails	Complete conversion of Pole Patch Campground to dispersed site. Evaluate proposal to connect Langille Ridge Trail with Trail #293 across McCoy Creek.	Potential impacts to sensitive plant locations.
Special and Sensitive Areas	Possible huckleberry enhancement near Pole Patch Campground.	

Abbreviations: RR = Riparian Reserves
Non RR = Areas outside of Riparian Reserves

Table 35. Sixth-Field Watershed (6WS) 04T - Upper Yellowjacket *(Northwest Forest Plan Land Allocation: Matrix)*

Activity	Recommendations	Concerns
Regeneration Harvest	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Low to moderate opportunities exist, most located in Upper Yellowjacket and Badger Creek areas. Patches of poor stand health are priority.	Sedimentation (ACS 5), aquatic integrity (ACS 3), six owl pairs, proposed travel corridor along Yellowjacket Creek, Armillaria root rot.
Commercial Thinning	**RR:** See Blanket Recommendations, page 7-16. Priority areas same as above. **Non RR:** Low to moderate. Some past harvest areas are becoming available and are high priority.	Root disease, nutrient deficient areas. Sedimentation (ACS 5).
Roads	Restoration opportunities exist on Forest Roads 2800, -014, and -121. Monitor the effectiveness of restoration on roads already restored.	
Other Restoration	Look for opportunities in reaches Y-20, Y-27 to Y-29 for in-channel and riparian restoration work.	Much road restoration has already occurred, shift to channel work.
Recreation and Trails	Establish Boundary Trail access (Trail #1A) on Road 2800.051 instead of existing location near end of Road 2810. Evaluate dispersed sites on 2810.041 and 2810.051 Roads.	
Special or Sensitive Areas	No activities planned.	

Abbreviations: RR = Riparian Reserves
Non RR = Areas outside of Riparian Reserves

Table 36. Sixth-Field Watershed (6WS) 04U - Pinto Creek *(Northwest Forest Plan Land Allocation: Matrix)*

Activity	Recommendations	Concerns
Regeneration Harvest	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Not recommended at this time.	Sedimentation (ACS 5), riparian fragmentation, active timber sales at this time, 5% late seral outside RRs, one owl pair and two singles, low channel complexity (ACS 3), late-seral travel corridor.
Commercial Thinning	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Some opportunities west of Pinto Creek.	Sedimentation (ACS 5). Nutrient deficient sites, active timber sale in area.
Roads	Restoration opportunities exist on Forest Roads 7713, -037, 2816, 2800-099, -239, and ? Patch Rd.	
Other Restoration	Continue fish restoration project in reach P-11 of Pinto Creek. Look for riparian planting and mass wasting stability projects. Evaluate potential for restoration of compacted soils along Pinto Creek (upper reaches).	
Recreation and Trails	No activities planned at this time.	
Special or Sensitive Areas	Possible huckleberry enhancement near Pinto Rock and Badger area.	

Abbreviations: RR = Riparian Reserves
Non RR = Areas outside of Riparian Reserves

Table 37. Sixth-Field Watershed (6WS) 04V - Lower McCoy *(Northwest Forest Plan Land Allocation: Matrix)*

Activity	Recommendations	Concerns
Regeneration Harvest	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Not recommended at this time in late seral. Some opportunities to treat root disease and nutrient deficient sites.	Sedimentation (ACS 5), 6% late seral outside RRs, two owl pairs and two goshawk nests, proposed travel corridor along McCoy Creek.
Commercial Thinning	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Moderate to high opportunities west side of McCoy Creek, low opportunity on east side.	Sedimentation (ACS 5). Root disease.
Roads	Evaluate for restoration potential on Forest Roads 2900, -115, and -059. Evaluate 1995-96 flood damage sites.	
Other Restoration	Evaluate riparian area for planting near reach M-19 of McCoy Creek.	
Recreation	Relocate/reconstruct steep sections of Langille/Juniper trails (also 04W). Also evaluate proposal to connect Langille Ridge Trail (#259) with Trail #293 across McCoy Creek.	
Special or Sensitive Areas	Review mining plans of operations within subbasin.	Potential for riparian area and water quality concerns, and road problems.

Abbreviations: RR = Riparian Reserves
Non RR = Areas outside of Riparian Reserves

Table 38. Sixth-Field Watershed (6WS) 04W - Upper McCoy *(Northwest Forest Plan Land Allocation: Matrix)*

Activity	Recommendations	Concerns
Regeneration Harvest	**RR:** See Blanket Recommendations, page 7-16. **Non RR**: Very limited opportunities, all in late-seral leave blocks between harvest units.	Sedimentation (ACS 5) and channel widening (ACS 3). 9% late seral outside RRs, two owl pairs, proposed travel corridor along McCoy Creek.
Commercial Thinning	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** None.	None without activity.
Roads	Restoration opportunities exist on Forest Roads 2900, -116, -149, and 2911.	
Other Restoration	Evaluate the Jumbo Creek slide stabilization project. Look for additional opportunities along Jumbo Creek near reaches J-1 and J-2. Evaluate upper reaches of McCoy Creek for riparian restoration opportunity.	
Recreation	Consider decommissioning last mile of 29 Road and convert to a trail head for Trail #1. Consider small horsecamp at Boundary Trail head. Evaluate dispersed site at 2900.115 Road crossing of McCoy Creek.	
Special or Sensitive Areas	No activities planned.	

Abbreviations: RR = Riparian Reserves
Non RR = Areas outside of Riparian Reserves

Table 39. Sixth-Field Watershed (6WS) 04X - Cispus X ***(Northwest Forest Plan Land Allocations: LSR and Tier 2 Key Watershed)***

Activity	Recommendations	Concerns
Regeneration Harvest	**RR:** Not applicable. **Non RR:** Not applicable.	None without activity.
Commercial Thinning	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Potential in past harvest units.	Root disease.
Roads	Restoration opportunities exist on 7700 Road. Evaluate opportunities to decommission roads within Tier 2 Key Watershed.	Anadromous fish habitat.
Other Restoration	Evaluate 1995-96 flood damage for restoration opportunities.	
Recreation and Trails	Formalize river access for permitted and recreational rafting. Evaluate dispersed and developed recreation opportunities and existing sites along Cispus River corridor.	Potential impacts to anadromous fisheries. Sedimentation (ACS 5).
Special or Sensitive Areas	No activities planned.	

Abbreviations: RR = Riparian Reserves
Non RR = Areas outside of Riparian Reserves

Table 40. Sixth-Field Watershed (6WS) 04Y - Lambert Creek *(Northwest Forest Plan Land Allocation: Matrix)*

Activity	Recommendations	Concerns
Regeneration Harvest	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Not recommended.	Sedimentation (ACS 5) and peak flows (ACS 6). 4.5% late seral outside RRs.
Commercial Thinning	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Low amount in northeast corner of basin.	Sedimentation (ACS 5) and peak flows (ACS 6).
Roads	Restoration opportunities exist along 2900-040 Road.	
Other Restoration	Evaluate for potential riparian improvement (conifer underplanting) project.	
Recreation and Trails	Evaluate proposal to connect Langille Ridge Trail (#259) with Trail #293 across McCoy Creek.	Sedimentation (ACS 5).
Special or Sensitive Areas		

Abbreviations: RR = Riparian Reserves
Non RR = Areas outside of Riparian Reserves

Table 41. Sixth-Field Watershed (6WS) 04Z - Cispus River ***(Northwest Forest Plan Land Allocations: LSR and AMA)***

Activity	Recommendations	Concerns
Regeneration Harvest	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Very few opportunities. Explore potential in areas of root rot near Tongue Mtn. trail head.	Sedimentation (ACS 5), channel widening (ACS 3). Biological winter range. Production reach for anadromous salmonids (key spawning and rearing areas on river).
Commercial Thinning	**RR:** See Blanket Recommendations, page 7-16. **Non RR:** Low amount in southeast portion of subbasin, also north of Burley Mtn. for huckleberry production. Opportunities exist within the LSR along Burley Mtn. Road.	Sedimentation (ACS 5). Cultural resources.
Roads	Restoration opportunities exist on Forest Roads 2300, and 2300-095. Look for opportunities to discourage road access to critical fisheries habitat such as decommissioning roads.	Impacts to anadromous fisheries.
Other Restoration	Evaluate opportunity to add log jams in helping to establish mid-channel gravel bars.	
Recreation and Trails	Formalize river access for permitted and recreational rafting. Repair Yellowjacket Ponds and facilities. Expand trail and interpretive opportunities in Cispus Center and Tower Rock Campground areas. Evaluate dispersed and developed recreation opportunities and existing sites along Cispus River corridor. Consider extensions of Burley Mt. Trail (#256) to the Lookout, and Valley Trail #270 to Kraus Ridge. Consider re-opening Dry Creek Trail (#289) to motorcycle standard.	Disturbance to wildlife. Impacts to anadromous fish habitat. Sedimentation (ACS 5).
Special or Sensitive Areas	Consider huckleberry enhancement north of Burley Mtn. Consider Sasquatch habitat enhancement also.	

Abbreviations: RR = Riparian Reserves
Non RR = Areas outside of Riparian Reserves

Landscape Level Analysis and Recommendations

The following statements, observations, and recommendations place the Lower Cispus East watershed into a landscape-level context, and illustrate unique, or important features in the area.

Historically (prior to 1880), the LCE watershed was comprised largely of late-successional forest estimated to be about 60% of the area. Large fires known as the 1902 Cispus Burn and the 1918 Greenhorn Burn caused a major shift in forest structure from late-seral to the current mid-seral conditions that make up about 48% of the watershed. As a result of these large fires and active regeneration harvest, about 22% of the late-seral forest remains. Much of this late-seral forest is in small, fragmented blocks and stringers scattered across the landscape, including riparian reserve areas.

The watershed provides riparian connectivity for plant and animal species between the Lewis River Late Successional Reserve (LSR) to the south, and the Ames-Woods LSR and Pompey Roadless Area to the north (i.e. north-south connectivity). It also provides east-west connectivity along the Cispus River and North Fork Cispus River drainages. Late-seral conditions in many of the riparian corridors are fragmented, which may pose a long-term, landscape-level viability problem for some species of plants and animals attempting to disperse through the area. It is suggested that management actions be directed toward restoring riparian late-structural corridors, and consider widening these corridors along McCoy, Pinto, and Yellowjacket Creeks, and the Cispus River area to widths greater than the riparian reserves described in the ROD. These increased widths would be determined by topography and site conditions (see Wildlife Corridors map).

As with other streams in the LC West and Middle Cispus watersheds, sediment production in all tributaries of the LC East watershed have increased above naturally occurring (reference) levels. This increased sediment production and delivery is primarily associated with erosion and mass wasting from roads, with minor contribution from harvest-related mass wasting. Road construction in headwater subbasins is a particular concern due to the occurrence of high stream densities (i.e. concerns related to sediment delivered to streams and peak flow increases). In addition, the ability to maintain and improve road conditions will be a concern in the future.

Lower elevation subbasins directly adjacent to the Cispus River are all showing a moderate to high concern for increased peak flows. Cumulative effects of fine and coarse sediment deposition are being observed in a stretch of the Cispus River between the North Fork Cispus River and Iron Creek, with channel widening of 30-70% occurring over the last 40 years in all reaches analyzed along the Cispus River. Similar effects are seen in the lowest reaches of Yellowjacket Creek. In addition, effects from the 1995-96 flood events, which were major for this watershed, were not factored into this analysis. Therefore, the cumulative effects from peak flows, sedimentation, channel widening, and effects to aquatic habitat are likely underestimated in this analysis.

Most anadromous spawning areas in the entire Cispus River basin occur within the LCE watershed. Anadromous fish production in the Cispus River watershed makes up a significant proportion of all production for the Upper Cowlitz River basin above the dams. Sedimentation is affecting fish production in this watershed. Recommendations to improve the cumulative effects problems from peakflows, sedimentation, channel widening and effects to aquatic habitat are comprehensive. All project opportunities should be utilized to address and/or improve conditions related to these concerns - use future projects as opportunities to collaborate project proposals, such as combining road restoration with timber harvest, or combining flood damage road repairs with methods that minimize the long-term input of coarse and fine sediment. Future projects should utilize various practices such as road location to minimize stream crossings, state-of-the art design methods including the use of dips and fords for overflow at culverts, re-sizing culverts to accommodate 100 year flood events; eliminating existing non-system, or temporary roads; fixing road fill stabilization problems; using harvest methods designed to minimize additional road construction such as helicopter, or skyline systems; and avoiding all unstable areas and stream crossings where possible.

Timber harvest activities should focus on large areas of mid-seral habitat to maintain stand health, particularly to protect against potential insect-related losses (i.e. bark beetles). Areas of nutrient deficient soils occur in this watershed; recommend testing various methods aimed at increasing stand productivity on these sites.

Recreation use in this watershed is generally well dispersed throughout the area, with the exception of the Cispus River corridor where it is more concentrated. There are many dispersed recreation sites, several of which should be evaluated for their potential impacts to vegetation, soils, fisheries, hydrology, and other resources.

Blanket Management Activity Recommendations

The following list of blanket recommendations apply to all subbasins, or 6th-field watersheds, in the LCE analysis area. Specific recommendations regarding opportunities and concerns within each subbasin are located in the (above) recommendation tables.

Boundary Changes of Riparian Reserves

This watershed analysis did not identify site specific, or blanket changes in riparian reserve boundaries. Interim riparian reserves, as they exist in the ROD, are recommended based on evaluation of each subbasins relative to ACS objectives 1 through 9. It is further recommended that an ID Team comprised of a hydrologist, soil scientist, botanist, wildlife and fisheries biologist, and silviculturist identify changes to riparian reserves by conducting on-the-ground reviews, and determining that such a change would not affect the maintenance of the Aquatic Conservation Strategy objectives. Any changes to riparian reserve boundaries are to be evaluated and documented as part of the NEPA process.

Timber Harvest Activities within Riparian Reserves

Regeneration Harvest

Page C32 of the ROD describes conditions of acceptable regeneration harvest and salvage activities within riparian reserves. Recommendations other than those identified in the Northwest Forest Plan should be developed through interdisciplinary, site-specific analysis. (See Potential Timber Harvest Areas map.)

Commercial Thinning

Commercial thinning is recommended within the riparian reserves when the harvest activities are *specifically designed to improve the aquatic conditions and/or develop late structural corridors.* In the event of such activity, original reserve buffers should be maintained on the ground, and activities within the buffer should be implemented more conservatively than outside the buffer. Site-specific review by an ID Team should occur, and measures to minimize soil, vegetation, biologic, and aquatic disturbance should be identified for implementation. The need for these activities was identified in primarily mid-seral stands where late-seral conditions are desired. (See Potential Timber Harvest Areas map).

Timber Stand Improvement Inside and Outside of Riparian Reserves (Includes Pre-Commercial Thinning, Fertilization, Pruning, and Conifer Release)

It is recommended that hydrology, wildlife, silviculture, and botany, at a minimum, should develop joint proposals for timber stand improvement inside and outside of riparian reserves, and that the ID Team visit represented sites before approval. Within riparian reserves proposals should be designed to improve aquatic conditions and promote the Aquatic Conservation Strategy objectives.

Roads

Given the cumulative effects observed in the Cispus Tier 2 Key Watershed (largely attributed to effects from roads in upstream 6th-field watersheds), seek to reduce effects from existing and new roads, and consider the ability to maintain existing roads before decisions are made to construct new roads.

Developed Recreation and Trails

Many of the trails within the analysis area have sections with either steep grades, or are located in wet areas. Approximately 25 miles of trails are proposed for reconstruction and/or relocation. The remaining 15 miles should be reviewed for improvements to limit tread erosion and fine sediment input at stream crossings.

Long-term management of Yellowjacket Ponds Day-Use Fishing site will depend on decisions regarding management of Yellowjacket Creek. Future capital improvements for existing developed camping or day-use sites need to consider the potential for periodic flooding. Site expansions are not recommended for existing sites within the Cispus River corridor.

Dispersed Recreation

Known dispersed campsites within the LCE watershed were reviewed using a checklist of potential problem site criteria to determine whether they might be preventing attainment of ACS objectives. Those chosen for further site evaluation met several of the following criteria:

- evidence of stream bank erosion
- expanding areas of compaction denuded of soil duff layer
- litter scattered or accumulated within, or along waterways
- damage to vegetation is evident and appears to be spreading (including snags and downed trees)
- erosion and gullying is occurring and may be entering waterway
- evidence of sanitation problems and accumulation of garbage

Some dispersed campsites adjacent to water bodies are recommended for further site evaluation in the 6th-field watershed recommendation tables. Following further site evaluation, improvements will be recommended to bring them in compliance with ACS objectives within riparian reserves.

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Appendix A - Lower Cispus East Watershed Analysis Maps

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Stream	Reach No.	6th Field	Reach Lgth	LWD	LWD/ MILE	LWD Rate	W:D	W:D Rate	Pools	Pools Rate	WAR	ARP	Peak Rate	Chan Wide	Temp	Grav Cond	Grav Quant	Fish	Dom Sub	SubDom Sub	Grad	Ripar	VST	Rating	Rating Reasons
Badger	B1	04T	959	2	11	P	NA	G	16.5	P	5	0.85	F	NA	G			R	RU	BO	5	MID	3	M	bank cutting, poor pools
Badger	B2	04T	841	28	176	G	NA	P	6.3	P	5	0.85	F	NA	G			NO	CO	RU	11	NA	4	H	mw, debris torrents, deposition, bc
Badger	B3	04T	NA	NA	NA	G	NA	F	NA	G	5	0.85	F	NA	G			NO	NA	NA	30	NA	4	C	mass wasting
Badger	B4	04T	NA	NA	NA	P	NA	F	NA	G	5	0.85	F	NA	G			NO	NA	NA	5	NA	3	M	sediment, narrow buffer, bc
Badger	B5	04T	NA	NA	NA	P	NA	F	NA	G	5	0.85	F	NA	G			NO	NA	NA	2	NA	10	M	narrow buffer,poor LWD, restoration?
Badger	B6	04T	NA	NA	NA	F	NA	F	NA	F	5	0.85	F	NA	G			NO	NA	NA	5	NA	3	C	
Badger	B7	04T	NA	NA	NA	F	NA	F	NA	F	5	0.85	F	NA	G			NO	NA	NA	1	NA	10	C	sediment in pools, bars forming
Badger	B8	04T	NA	NA	NA	P	NA	P	NA	P	5	0.85	F	NA	G			NO	NA	NA	25	NA	4	M	sediment in pools,W:D, jam diversion
Badger	B9	04T	NA	NA	NA	F	NA	F	NA	P	5	0.85	F	NA	G			NO	NA	NA	NA	NA	7	H	high deposition, bc, incised channel, pools filling
McCoy	M1	04V	1724	NA	NA	P	NA	G	24.5	F	4	0.96	G	G	NA			A	BR	RU	4	NA	3	C	low LWD, bed rock scour
McCoy	M2	04V	NA	NA	NA	P	NA	F	NA	G	4	0.96	G	G	NA			R	NA	NA	11	NA	4	M	unstable side slopes, mass failures, bdrk scour
McCoy	M3	04V	NA	NA	NA	P	NA	F	NA	F	4	0.96	G	G	NA			R	NA	NA	3	NA	3	M	deposition, mass wasting, bdrk scour, low LWD
McCoy	M4	04V	636	NA	NA	P	NA	F	58.1	G	4	0.96	G	G	NA			R	BO	BR	9	MID	3	M	mw, bdrk scour, low LWD
McCoy	M5	04V	1029	NA	NA	P	NA	F	25.7	G	4	0.96	G	G	NA			R	BO	RU	3	MID	3	C	unstable side slopes, bdrk scour, low LWD
McCoy	M6	04V	612	NA	NA	P	NA	F	0	P	4	0.96	G	G	NA			R	RU	BO	3	MID	3	C	low LWD, side slopes?
McCoy	M7	04V	718	NA	NA	P	NA	F	36.8	G	4	0.96	G	G	NA			R	RU	BO	3	MID	3	C	low LWD, sideslopes?
McCoy	M8	04V	NA	NA	NA	P	NA	F	NA	F	4	0.96	G	G	NA			R	NA	NA	7	MID	3	C	debris torrent, bdrk scour, low LWD
McCoy	M9	04V	NA	NA	NA	P	NA	F	NA	F	4	0.96	G	G	NA			R	NA	NA	7	MID	3	C	mw, bdrk scour, low LWD
McCoy	M10	04V	1391	NA	NA	P	NA	F	26.6	P	4	0.96	G		NA			R	BO	RU	3	MID	3	C	debris torrent, bdrk scour, low LWD
McCoy	M11	04V	1477	NA	NA	P	NA	F	50	G	4	0.96	G	G	NA			R	BR	BO	6	MID	3	C	MW, bdrk scour, low LWD
McCoy	M12	04V	954	NA	NA	P	NA	F	11.1	P	4	0.96	G	P	NA			R	RU	BO	3	MID	3	M	Lucky Break, debris torrents, bdrk scour, low LWD
McCoy	M13	04V	874	NA	NA	P	NA	F	30.2	G	4	0.96	G	G	NA			R	RU	BO	4	MID	3	C	Debris torrent, bdrk scour, low LWD
McCoy	M14	04V	353	NA	NA	P	NA	P	0	P	4	0.96	G	P	NA	P	F	R	BO	RU	3	MID	5	M	MW, deposition
McCoy	M15	04V	1074	NA	NA	F	NA	P	24.6	F	4	0.96	G	G	NA	P	F	R	RU	BO	3	LATE	10	C	bank cutting, deposition
McCoy	M16	04V	513	NA	NA	P	NA	P	10.3	P	4	0.96	G		NA	F	F	R	RU	CO	3	EARL	5	M	low pools, aggradation, bc, bufferstrip,* mining
McCoy	M17	04V	634	NA	NA	F	NA	P	33.3	F	4	0.96	G		NA	F	F	R	BO	RU	4	EARL	10	M	deposition, bufferstrip, bc
McCoy	M18	04V		NA	NA	F	NA	P		F	4	0.96	G		NA	P	F	R	BO	RU	3	late	10	C	unstable area
McCoy	M19	04V		NA	NA	P	NA	P		F	4	0.96	G	G	NA	P	F	R	BO	RU	3	EARL	10	M	bufferstrip, chutes, bank cutting
McCoy	M21	04W	NA	NA	NA	P	NA	P	NA	P	4	0.87	G		G	F	F	R	NA	NA	4	LATE	5	M	bank cutting, low pools, Jumbo Creek enters
McCoy	M22	04W	NA	NA	NA	P	NA	P	NA	P	4	0.87	G	G	G	P	G	R	NA	NA	3	LATE	5	C	deposition, bc
McCoy	M23	04W	758	NA	NA	F	NA	F	20.9	F	4	0.87	G	G	G	P	G	R	RU	BO	3	EARL	5	C	bufferstrip, deposition
McCoy	M24	04W	914	NA	NA	G	NA	P	34.7	G	4	0.87	G	G	G	P	F	R	RU	CO	2	EARL	10	C	bank cut, bufferstrip, deposition
McCoy	M25	04W	597	NA	NA	G	NA	P	53.1	G	4	0.87	G	P	G	P	G	R	CO	SA	2	EARL	7	H	sediment deposition, mw, channel widening, bc
McCoy	M26	04W	NA	NA	NA	F	NA	P	NA	P	4	0.87	G	F	G			NO	NA	NA	2	LATE	7	H	debris torrent, deposition, channel widening,bc
McCoy	M27	04W	714	NA	NA	F	NA	P	42.8	G	4	0.87	G	P	G			NO	CO	RU	3	EARL	7	H	bufferstrip failure, bc, sed, channel widening
Jumbo	J1	04W	300		NA	P		F		F	4	0.87	G		G	G	G	R	RU	BO	12	Early	8	H	based on J2, LWD recruitment
Jumbo	J2	04W	400			P		P		F	4	0.87	G					R	ru	bo	12	early	8	H	bc, mw, erosion, early seral, *continue restor. opport.
Langille	L1	04W	300			P		F		F	4	0.87	G					No	BR	LB	17	early	8	C	early seral, potential debris flows
Bear	B1	04W	300			G		F		F	4		G						GR	CO	12	LATE	8	S	
Pinto	P1	04U	980	4	21.6	P	NA	F	0	G	7	0.9	F		NA			R	BO	RU	3	LATE	3	C	sedimentation/deposition
Pinto	P2	04U	3502	4	6.04	P	NA	P	4.5	F	7	0.9	F		NA			R	BO	BB	4	EARL	3	M	mw, poor LWD
Pinto	P3	04U	2058	29	74.5	G	6.4	G	33.4	G	7	0.9	F		NA			R	BO	BR	5	LATE	4	S	
Pinto	P4	04U	834	16	101	G	NA	P	31.7	G	7	0.9	F		NA			R	BO	RU	3	LATE	3	M	mw, w:d, sediment
Pinto	P5	04U	828	10	63.8	F	NA	F	19.1	F	7	0.9	F		NA	P	G	R	CO	RU	2	LATE	5	M	mw, poor LWD, sediment in gravels
Pinto	P6	04U	1519	0	0	P	NA	F	31.3	F	7	0.9	F		NA			R	BO	RU	4	LATE	5	S	bedrock banks

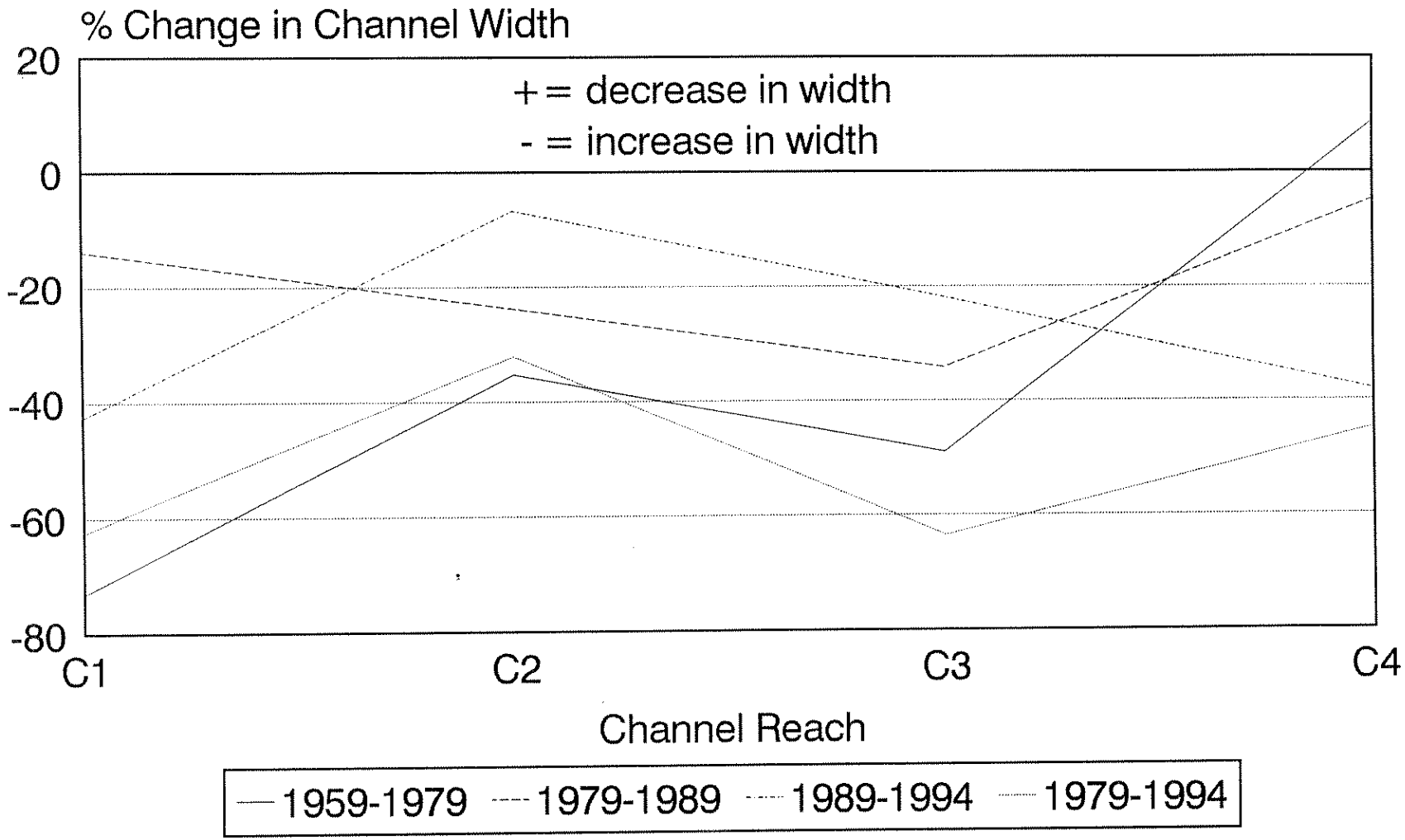
	Reach	6th	Reach		LWD/	LWD		W:D		Pools			Peak	Chan		Grav	Grav		Dom	SubDom					Rating
Stream	No.	Field	Lgth	LWD	MILE	Rate	W:D	Rate	Pools	Rate	WAR	ARP	Rate	Wide	Temp	Cond	Quant	Fish	Sub	Sub	Grad	Ripar	VST	Rating	Reasons
Pinto	P7	04U	1480	0	0	P	NA	F	21.4	F	7	0.9	F		NA			R	RU	BO	4	EARL	5	C	early seral, low LWD
Pinto	P8	04U	2801	4	7.55	G	NA	P	7.5	P	7	0.9	F		NA			R	RU	CO	2	LATE	5	H	sed, limiting macro pops, bc, mw
Pinto	P9	04U	530	0	0	P	NA	P	59.8	G	7	0.9	F		G	P	G	R	GR	SA	1	EARL	7	H	low LWD, bank instability, sedimentation
Pinto	P10	04U	2735	46	88.9	G	4.8	P	17.4	G	7	0.9	F		G	P	G	R	SA	GR	2	LATE	7	M	bank cutting, fines,deposition,
Pinto	P11	04U	2836	20	37.3	P	NA	F	3.7	G	7	0.9	F		G	P	P	R	SA	GR	2	EARL	7	H	sed, bc-meadering,*restoration?, low LWD, early seral
Pinto	P12	04U	1863	37	105	F	NA	F	22.7	G	7	0.9	F		G			R	BR	SA	8	MID	5	C	sediment in pools
Pinto	P13	04U	1584			F		P		F	7	0.9	F					R	BR	BO	4	early	3	M	mw, riparian veg
Pinto	P14	04U	855	6	37.1	F	NA	F	12.4	G	7	0.9	F		G			N	SA	BR	4	LATE	3	C	sediment from roads
Pinto	P15	04U	1353	27	105	G	NA	P	3.9	G	7	0.9	F		G			N	CO	SA	6	LATE	3	M	sediment in pools *needs more investigation
Yellowjkt	Y1	04R	8945	28	16.5	P	44.6	P	7.7	P	11	0.95	P	P	NA	P	G	A	CO	SA	1	MID	1	H	poor LWD, pools, W:D, sed, bc, *restore (jams), cw, pf
Yellowjkt	Y2	04R	7085	16	11.9	P	20.1	P	12.7	P	11	0.95	P		NA			A	RU	BO	2	MID	3	H	sediment deposition,low pools, LWD, peakflow
Yellowjkt	Y3	04R	763	1	6.93	P	NA	G	27.7	G	11	0.95	P		NA			A	BO	BB	2	MID	3	H	sand, poor LWD, peakflow, good fish cover
Yellowjkt	Y4	04R	5926	2	1.78	P	23.2	P	16	P	11	0.95	P	F	NA			A	BO	RU	3	MID	3	H	sediment in pools, bc, mw, channel widening, peakflow
Yellowjkt	Y5	04R	4590	9	10.4	P	15.6	P	26.5	G	11	0.95	P	F	NA			A	BR	GR	4	MID	3	M	sediment, bc, channel widening, peakflow, poor LWD
Yellowjkt	Y6	04S	1069	1	4.94	P	19.4	P	14.8	P	3	0.85	G		NA			A	BR	GR	4	MID	3	C	bankcutting
Yellowjkt	Y7	04S	1276	0	0	P	14.2	P	16.6	P	3	0.85	G		NA			A	BO	CO	2	MID	3	C	mw
Yellowjkt	Y8	04S	1045	0	0	P	NA	F	15.2	P	3	0.85	G	F	NA			R	CO	BR	3	MID	3	S	poor spawning habitat
Yellowjkt	Y9	04S	606	1	8.72	P	NA	P	8.7	P	3	0.85	G	G	NA			R	BO	CO	4	MID	3	M	bc, mw, bufferstrip *hardwood under planting?, sed
Yellowjkt	Y10	04S	1013	1	5.22	P	17.5	G	31.3	G	3	0.85	G	F	NA			R	CO	SA	2	MID	3	C	bank cutting, road failure,
Yellowjkt	Y11	04S	1271	3	12.5	P	13	P	16.6	P	3	0.85	G	F	NA			R	CO	BO	5	MID	3	C	sediment, potential road instability
Yellowjkt	Y12	04S	1506	8	28.1	P	12.2	F	24.5	G	3	0.85	G	F	NA			R	BO	GR	4	early	3	C	deposition
Yellowjkt	Y13	04S	1206	4	17.5	P	15.1	P	26.3	G	3	0.85	G	F	NA			R	BB	BO	3	LATE	3	C	sediment
Yellowjkt	Y14	04S	877	5	30.1	P	11.3	F	42.1	G	3	0.85	G		NA			R	BB	BO	6	LATE	3	C	mw, sediment, Veta?
Yellowjkt	Y15	04S	2334	5	11.3	P	22	P	15.8	P	3	0.85	G	G	NA	P	G	R	GR	SA	2	MID	10	H	bufferstrip, low LWD&pools, sed,*restor.=hardwood,
Yellowjkt	YT6	04S	960	34	187	F	NA	P	16.5	F	3	0.85	G	P	NA	P	P	R	RU	BO	2	NA	10	C	sediment,
Yellowjkt	Y17	04S	4772	0	0	P	11.2	F	10	F	3	0.85	G	F	NA	P	F	R	GR	BO	3	MID	10	H	bc, sediment, LWD,restoration-alder
Yellowjkt	Y18	04T	2072	11	28.1	P	30.3	P	10.2	P	5	0.85	F	F	NA	P	P	R	CO	BO	3	MID	10	H	deposition, bc,,blow down*restoration, Pinto
Yellowjkt	Y19	04T	5160	35	35.8	F	35.3	P	11.3	F	5	0.85	F	F	NA	P	G	R	CO	RU	2	MID	10	H	bc, blow down, sediment, channel migration
Yellowjkt	Y20	04T	4947	5	5.34	P	13.1	F	5.3	P	5	0.85	F	F	NA	F	G	R	RU	CO	2	MID	10	H	bc, restoration-riparian plant, poor LWD, pools
Yellowjkt	Y21	04T	2045	17	43.9	F	9.1	G	15.5	P	5	0.85	F	F	NA	P	P	R	RU	CO	2	LATE	10	M	bc, poor pools, blow down, little fish cover
Yellowjkt	Y22	04T	3970	196	261	F	2	G	13.3	P	5	0.85	F	F	NA	P	P	R	BO	CO	5	LATE	10	H	debris torrents, mw, bc, sediment
Yellowjkt	Y23	04T	1741	36	109	F	1.1	G	15.2	F	5	0.85	F	F	NA	P	P	R	BO	GR	7	LATE	5	H	debris torrents, bankcutting
Yellowjkt	Y24	04T	2354	1	2.25	P	7.2	G	6.7	F	5	0.85	F	F	G	P	P	R	CO	BO	3	MID	5	H	bank cutting, debris torrents, sediment
Yellowjkt	Y25	04T	729	6	43.5	P	NA	F	7.2	P	5	0.85	F	P	G	F	P	R	BO	SA	8	NA	5	M	deposition in pools, bankcutting
Yellowjkt	Y26	04T	1036	1	5.1	P	24.9	P	20.4	P	5	0.85	F		G	P	F	R	SA	GR	1	MID	7	H	sediment, low wood, bank cutting restoration
Yellowjkt	Y27	04T	2195	1	2.41	P	NA	P	4.8	P	5	0.85	F	P	G	P	F	R	GR	SA	1	LATE	7	H	restoration-sediment traps, channel widening, sed
Yellowjkt	Y28	04T	840	10	62.9	F	NA	P	0	P	5	0.85	F	P	G	P	F	R	CO	SA	2	NA	7	H	debris torrents, rd failures, cw, sed, bc, channel migration
Yellowjkt	Y29	04T	1745	13	39.4	P	11.1	F	15.1	P	5	0.85	F	P	G	P	F	R	RU	SA	2	MID	7	H	debris torrents, road failures, channel widening, sed
Yellowjkt	Y30	04T	964	22	121	F	12.7	P	27.4	F	5	0.85	F	P	G	P	G	R	GR	RU	3	MID	5	H	debris torrents, road failures, cw, bc, sediment
Yellowjkt	Y31	04T	1017	26	135	F	NA	F	10.4	F	5	0.85	F	P	G	P	G	R	GR	SA	1	MID	7	H	debris torrnts, rd fail, *sed retention struct., cw, bc, sed
Yellowjkt	Y32	04T	2065	44	113	G	13.3	P	2.6	P	5	0.85	F	P	G	P	F	R	CO	GR	1	MID	7	H	coarse sed, debris torrents, cw, bc
Greenhn	G1	04K	3425	12	18.5	P	NA	G	1.5	P	4	0.87	G		NA	P	P	A	RU	CO	5	hardw	2	H	Poor LWD, pools, bankcutting, silt in pools,
Greenhn	G2	04K	4364	10	12.1	P	4.4	G	12.1	P	4	0.87	G		NA			A	BO	RU	5	hardw	10	C	Poor LWD, bankcutting
Greenhn	G3	04K	2885	19	34.8	P	NA	G	7.3	P	4	0.87	G		NA			A	BR	RU	5	late	3	M	mw, instability, low stream complexity, bdrk scour
Greenhn	G4	04K	1025	18	92.8	G	10.8	F	15.5	P	4	0.87	G		NA			R	BO	RU	7	Late	3	C	sediment (silt in pools)
Greenhn	G5	04K	1061	4	19.9	P	NA	G	19.9	P	4	0.87	G		NA			R	BR	BO	5	LATE	3	C	sediment (silt in pools)
Greenhn	G6	04K	821	9	57.9	F	NA	G	19.3	P	4	0.87	G		NA			R	BO	RU	6	LATE	3	C	sediment (silt in pools)

	Reach	6th	Reach		LWD/	LWD		W:D		Pools			Peak	Chan		Grav	Grav		Dom	SubDom					Rating
Stream	No.	Field	Lgth	LWD	MILE	Rate	W:D	Rate	Pools	Rate	WAR	ARP	Rate	Wide	Temp	Cond	Quant	Fish	Sub	Sub	Grad	Ripar	VST	Rating	Reasons
Greenhn	G7	04K	519	15	153	G	5.2	G	30.5	F	4	0.87	G		NA			R	BO	RU	10	EARL	4	H	mw, deposition, riparian, bc, sediment
Greenhn	G8	04K	1150	15	68.9	F	NA	P	0	P	4	0.87	G		NA			R	BO	SA	10	LATE	4	H	sediment, mw, instability , bc
Greenhn	G9	04K	986	1	5.36	P	NA	F	21.4	F	4	0.87	G		NA			R	BO	CO	13	LATE	4	H	mw, sediment (silt in pools)
Greenhn	G10	04L	2116	7	17.5	P	NA	F	2.5	P	9	0.75	P		NA			R	BR	RU	7	LATE	3	H	mw, sediment/deposition, bc
Greenhn	G11	04L	671	10	78.8	G	NA	F	0	P	9	0.75	P		NA			R	BR	SA	12	NA	3	H	poor bankcutting, mw, bufferstrip,
Greenhn	G12	04L	1826	35	101	G	NA	F	11.6	P	9	0.75	P		NA			R	BR	BO	7	LATE	3	H	mw, bankcutting, depostion/sediment
Greenhn	G13	04L	600	12	106	G	NA	F	8.8	P	9	0.75	P		NA			R	BR	SA	7	early	3	H	bufferstrip, bankcutting, mw, sediment
Greenhn	G14	04L	1807	18	52.6	F	NA	F	23.4	P	9	0.75	P		NA			NO	BR	CO	5	early	3	H	mw, road culvert (77RD) barrier, bankcutting
Greenhn	G15	04L	4163	29	36.8	F	NA	F	0	P	9	0.75	P		NA			NO	CO	GR	4	LATE	10	H	mw, bankcutting, peak flow, sediment
Greenhn	G16	04L	639	0	0	P	NA	F	0	P	9	0.75	P		NA			NO	BR	RU	14	LATE	5	M	bankcutting, poor LWD, peakflow
Greenhn	G17	04L	1161	2	9.1	P	NA	F	0	P	9	0.75	P		NA			NO	SA	GR	2	late	5	H	sedimentation, poor pools, peakflow
Greenhn	G18	04L	1672	9	28.4	P	NA	F	0	P	9	0.75	P		NA			NO	SA	GR	2	early	7	H	no buffer, low pools *riparian planting, peakflow
1918	N-1	04K	1056			G		F		P	4	0.87	G					R	BR	SA	8	buffer	3	H	mw, bufferstrip, deposition,
1918	N-2	04K	1056			P		G		P	4	0.87	G					No	BR	SA	15	mature	4	C	old debris flows, diseased trees, unstable slopes
1918	N-3	04K	1056			F		G		P	4	87	G					No	BR	SA	10	buffer	4	H	debris flow, bufferstrip, unstable slopes
1918	N-4	04K	1056			F		G		P	4	87	G					No	BR	SA	9	mature	3	M	sediment, unstable
1918	N-5	04K	1584			P		P		P	4	87	G					No	BR	SA	15	buffer	4	H	mw, unstable soils, poor LWD,pools
1918	N-6	04K	1584			G		P		F	4	87	G					No	BR	SA	17	early	4	H	sediment, mw, bankcutting,
1918	N-7	04K	1056			F		P		F	4	87	G					No	RU	CO	15	mature	4	H	subsurface, coarse and fine sediment, mw
1918	N-8	04K				NA		G		P	4	87	G					No	Si	SA	2	mature	5	H	subsurface
1918	N-9	04K	2112			P		P		P	4	87	G					No	SI	SA	1	early	7	C	riparian buffer,
Nash	All	04M									5	0.67	P		NA									H	peakflow, debris torrents
Dry	All	04P									11	0.83	P		NA									H	peakflow, debris torrents
Camp	C1	04Q				G		P		F	13	0.68	P		NA	P	P	A	SA	GR	2	LATE	2	H	subsurface, peakflow, channel migration, siltation
Camp	C2	04Q				G		G		F	13	0.68	P					R	BR	CO	3	MID	3	C	mass wasting, peakflow, sediment
Camp	C3	04Q				G		F		P	13	0.68	P					R	BR	SB	3	EARL	3	M	silt, mass wasting, peakflow
Camp	C4	04Q				F		F		P	13	0.68	P					R	SB	LB	10	LATE	3	M	pools, peakflow
Camp	C5	04Q				F		P		F	13	0.68	P					R	CO	GR	13	LATE	2	M	W:D, peakflow, sediment in pools
Camp	C6	04Q				G		F		P	13	0.68	P					R	CO	SB	15	EARL	3	M	silt in pools, peakflow
Camp	C7	04Q				G		F		P	13	0.68	P					NO	CO	SB	12	EARL	4	M	silt in pools, peakflow, bad buffers
Camp	C8	04Q				G		F		P	13	0.68	P					NO	GR	CO	12	EARL	6	H	bad buffers,pools,bank erosion, peak flow, deposition
Camp	C9	04Q				G		F		P	13	0.68	P					NO	GR	SA	12	EARL	6	H	bad buffer,raw banks,sand deposits, subsurface, peakflow
Cispus	All	04X									1	0.89	G	P	P		G	A	GR				1	H	channel widening, anadromous, amphibian
Cispus	All	04Z									5	0.95	F	P	NA		G	A	GR				1	H	
Lambert	L1	04Y	1000		150	G				G	10	0.85	P		NA			NO	SB	RU	9	MID			peakflow, riparian hardwoods
Lambert	L2	04Y	900			G				G	10	85	P					NO	RU	CO	15	MID			peakflow, riparian hardwoods
Lambert	L3	04Y	1000			G				G	10	85	P					NO	RU	CO	7	MID			peakflow, riparian hardwoods
Lambert	L4	04Y	800			G				G	10	85	P					NO	CO	GR	4	MID			peakflow, riparian hardwoods

Stream	Reach No.	6th Field	Reach Lgth	LWD	LWD/ MILE	LWD Rate	W:D	W:D Rate	Pools	Pools Rate	WAR	ARP	Peak Rate	Chan Wide	Temp	Grav Cond	Grav Quant	Fish	Dom Sub	SubDom Sub	Grad	Ripar	VST	Rating	Rating Reasons
		Key	NA		Not available or Data Gap																				
			Reach No.		Reach Number																				
			6th field		6th field watershed number																				
			Reach lgth		Reach length, feet																				
			LWD		Large Woody Debris, number of peices																				
			LWD/Mile		Large Woody Debris per mile																				
			LWD Rate		Rating of LWD per mile (Good=G, Fair=F, Poor=P)																				
			W:D		Width to Depth Ratio (Good=G, Fair=F, Poor=P)																				
			W:D Rate		Rating for Width to Depth Ratio (Good=G, Fair=F, Poor=P)																				
			Pools		Large pools per mile																				
			Pools Rate		Rating for Pools (Good=G, Fair=F, Poor=P)																				
			WAR		Water Available for Runoff, %																				
			ARP		Aggregate Recovery Percentage, %																				
			Peak Rate		Rating for Peakflow analysis (Good=G, Fair=F, Poor=P)																				
			Chan Widen		Channel Widening Rating (Good=G, Fair=F, Poor=P)																				
			Temp		Temperature Rating (Good=G, Fair=Fair, P=Poor)																				
			Grav Cond		Gravel Condition Rating, used only of reach has fish (Good, Fair, Poor)																				
			Grav Quant		Gravel Quantity Rating, used only if reach has fish (Good, Fair, Poor)																				
			Fish		Are fish present? (A-Anadromous, R=Resident, No=None present)																				
			Dom Sub		Dominant Substrate (SA=sand, GR=gravel, RU=rubble, CO=cobble, BO=boulder, BB=big boulder, BR=bedrock																				
			Subdom Sub		Subdominant Substrate (SA=sand, GR=gravel, RU=rubble, CO=cobble, BO=boulder, BB=big boulder, BR, bedrock)																				
			Grad		Gradient																				
			Riparian		Riparian vegetation (Early=early seral, Mid=mid seral, Late=late seral)																				
			VST		Valley Segment Type (1=alluviated mtn valley, 2=alluvial fan, 3=steeply incised valley/mod. gradient, 4=steeply incised/steep gradient, 5=incised glacial till, 7=u-shaped glacial trough, 8=valley wall, 10=alluviated valley)																				
			Rating		Overal rating of reach (H=high concern, M=moderate concern, L=low concern																				
			Rating Reaso		Reasons for giving overall rating (bc=bankcutting, mw=mass wasting, sed=sediment, cw=channel widening, pf=peakflow)																				

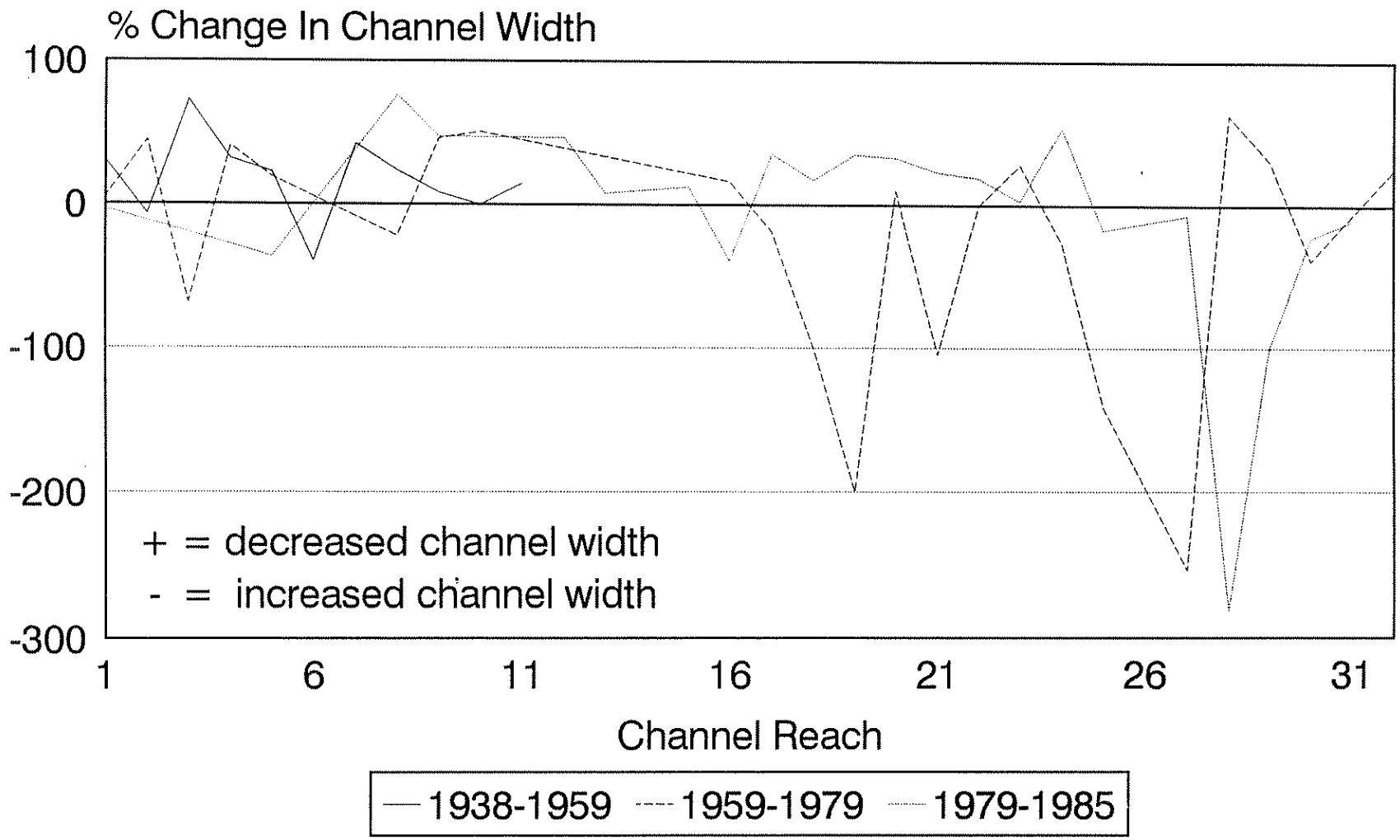
Cispus River

Channel Width Assessment



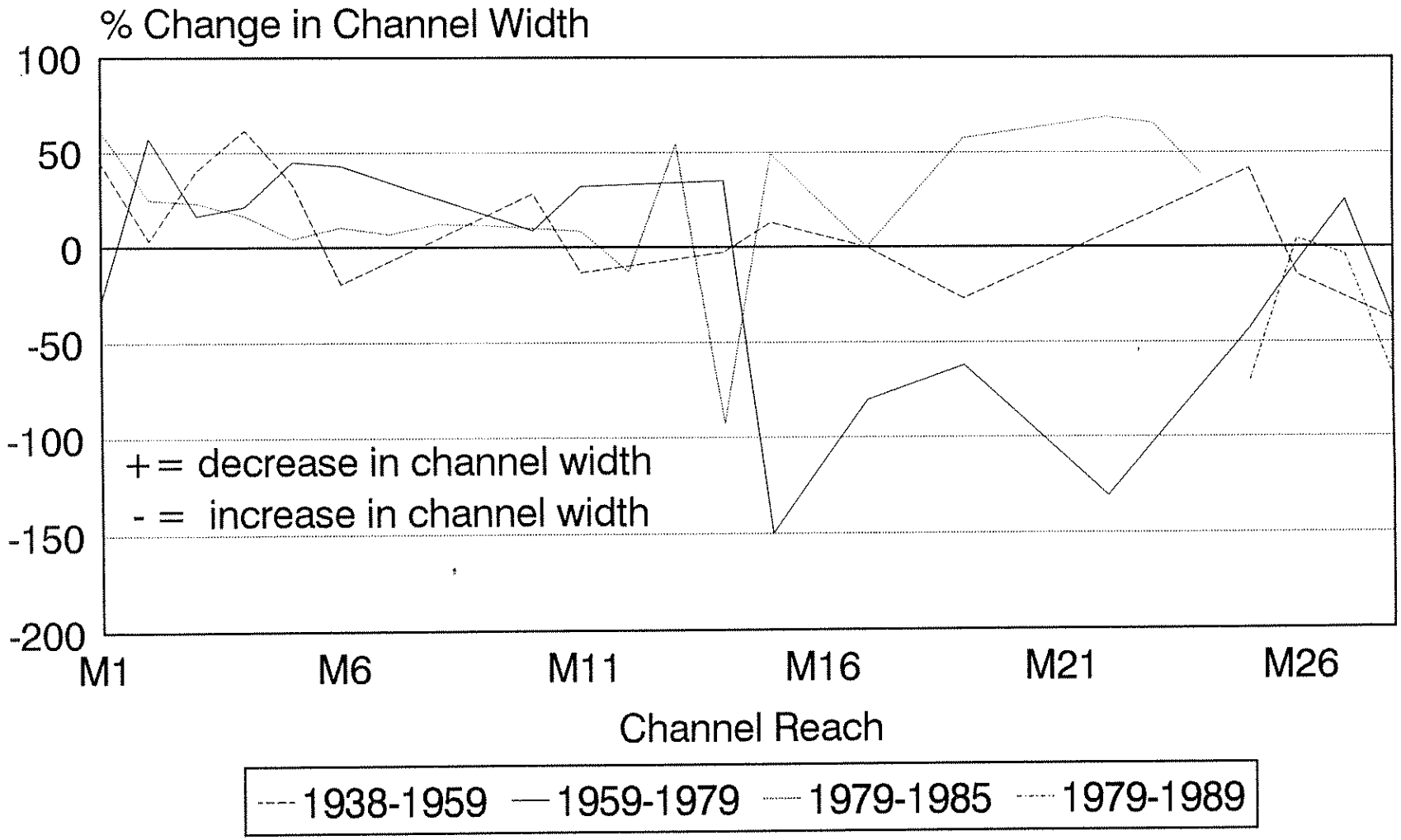
Yellowjacket River

Channel Width Assessment



McCoy Creek

Channel Width Assessment



Appendix C - Lower Cispus East Watershed Analysis Mining Activities

managing surface resources.

B. Unless lands in question have been withdrawn from mineral entry (camp grounds, admin sites, etc.), we cannot deny a mining claimant the right to enter public lands to explore and develop a claim.

C. HOWEVER, we can greatly influence the shape and progress of mining proposals through:

1) Requiring the submission of proposed plans of operation for District Ranger review and approval ("PoO's" have to be approved before "a grain of sand is moved").

a) Submitting a proposed plan of ops is required for proposed operations that involve the use of machinery, building/reopening roads, cutting timber and/or building structures, etc., etc..

2) The NEPA process (proposed plans of operation must be evaluated through this process).

3) Requirement of reclamation bonding as a pre-requisite to approving plans of operation..

4) All mining operations ARE SUBJECT TO ALL OF THE RULES AND REGULATIONS OF THE SECRETARY OF AGRICULTURE.....Items 1 through 4 are our tools for influencing the shape of mining operations....and it is through these means that all but one of the mining operations described have remained at the very, very simple levels which do not require a plan of operation.

3. Comments/Review of Chapter 3 - Issues and Key Management Questions

A. Issue 1, Water Quality: Analysis Questions

1) "How does the existing landscape compare to the historic landscape with regard to forest vegetation patch sizes, shapes and distribution?

a. Comment: the "historic landscape" includes over a century of small-scale mining activities.

2) What is the extent of past construction and use of crossings, campsites, diking, and floodplain isolation in riparian reserves?

a. Same comments as above.

3) How, when and where have management activities caused or contributed to mass wasting or surface erosion?

a) Influence of mining.....good question? Mining's impacts in the LCE WASA has not been as great as timber harvesting and related road building.

4) Are sediment levels above historic levels in any stream or watershed?

a) Current levels of mining are of such small scale, that most of it cannot be seen after the Autumn and Spring flows.

b) Insofar as recreational mining along lower McCoy Creek is concerned, however, we may not want to "encourage" much more activity than is on-going now. Suggestion:

1. Monitor current recreational mining activities, familiarize the WA ST DOF&W with these operations (they don't know much about it), and the State may place limits on areas and times where panning, sluicing and dredging may take place (IF NECESSARY!!!).

B. Issue 2, Economic Outputs (Timber, Recreation and Mining)
1) Third Paragraph
a) The mineral potential, though not great, is present, within the LCE WASA, especially within the McCoy Creek and Yellowjacket Creek drainages....look at the continuing interest in this area over the last century.....especially the recent interest of organized prospecting clubs from nearby urban areas.

2) Fourth Paragraph
1) The last sentence states: "Water quality conditions, existence of T&E species, amount and distribution of forest vegetation seral stages, and ability of ecosystem to function normally to determine (what) opportunities for timber harvest, recreational developments, and mining might exist."
a) As mentioned above, mining is a non-discretionary activity. I'm not sure that were in a position to dictate absolutely where mining may or may not be conducted....we cannot deny mining proposals, but we can help to shape them.....it might be more appropriate to ask ourselves how legitimate mining is to be conducted to minimize impacts to surface resources.....and there are various ways to do so.....we may simply say that mining operations are to be conducted per all pertinent FS mineral resource administration regulations.
1. It is important to be asking these questions, because mining interests should be invited to participate in the LCE WASA's public involvement process...and if we don't ask these questions ourselves, they sure will. It's been my experience that most of these folks do want to cooperate with the FS...they don't have many other places to go anymore other than the NF's (and BLM lands).

3) Where and under what circumstances is mining appropriate?
a) Same comments as above...we're dealing with a non-discretionary activity, not a request for a special use permit.

C. Issue 3, TE & S Species, Etc.: Analysis Questions
1) Which riparian corridors need protection from human use such as road and trail construction?
a) Remember the legal aspects of mining, as discussed above.

4. Subwatershed Recommendation Forms
A. All of these forms, especially those for Camp Creek, Yellowjacket Creek (lower, middle and upper), Pinto Creek, McCoy Creek (lower and upper), should include a comment box for mining.

SPEED MEMO

TO: Brenda Smith, Team Facilitator Marie Tompkins, Information Coordinator Lower Cispus East Watershed Analysis Team NSC, GPNF	DATE: April 1, 1996
FROM: Dick Dinkelmann NSC Realty Specialist GPAC/GRAN GPNF	SUBJECT: **Mining** Activities within the Lower Cispus East Watershed Analysis Study Area (LCE WASA); **Lands and Special Uses - Initial Comments**

MESSAGE:

The McCoy Creek and Yellowjacket Creek drainages account for a substantial portion the LCE WASA. These two drainages have historically also been areas of great interest to mining interests. Attached to this memo is a copy of a 1992 "current conditions" report that I completed for the McCoy Creek EIS; the memo provides a summary of mining history in these two drainages, a description of on-going activities of that time, and a discussion of various mining laws that do affect our how we administer mining claims, and manage surface resources within and adjacent to claims. Most of the information included in that 1992 report is still valid. Below you will find a brief updating and/or restating of that information, plus comments pertinent to matters more specifically concerning the LCE WA and its study area.

1. Current Mining Activities in the LCE WA Study Area
   A. According to our most recent records of claims recorded with the USDI Bureau of Land Management (Portland Office), there are:
      1) 39 active mining claims (lode and placer)
         a) Most of these claims are located within the McCoy Creek drainage; a couple (placer, for panning) are located along Yellowjacket Creek north of that creek's junction with McCoy Creek.

         b) 15 lode (hard rock) claims
            1. One of these lode claims is the NSC's largest mining operation; in normal times, it is operated for one to two months per year. This particular claim has been in existence since the late 1970's. Its operations figure prominently in the annual incomes of at least two families.

         c) 24 placer (unconsolidated materials) claims
            1. These claims usually involve the working of old and current river deposit materials, by use of suction dredges, portable sluices and simple panning.

            2. All of these claims are worked to one extent or another during a given year, mostly by weekend warrior types; however, at least one family does derive a substantial portion of its annual income from such operations.
               a. Any of these placer claimants who engage in suction dredging activities, must (and do) possess Washington State Department of Fisheries and Wildlife (WA ST DOF&W) Hydraulics Permit Approvals (HPA's). In the Cispus drainage, suction dredging is only allowed during the months of July through January along McCoy Creek.

B. There are at least two other possibly active mining claims that are NOT recorded with the BLM; there could be others.
1) Our direction is to deal with these unrecorded claims on the same basis as those that are recorded with the BLM.

C. Past data summaries from BLM, plus District records, indicate that in 1992, in the McCoy and Yellowjacket drainages alone, there were 80 active claims. Based upon historical records, and observations of past and present Randle RD personnel, there probably aren't many areas within the LCE WA Study Area that have not been, and/or won't be again, visited by mining enthusiasts for prospecting purposes. This area of the NSC does figure prominently in many a Pacific Northwest "guide book" for mining, and in many a governmental agency mining and/or geological resource report of the last century.

D. Based upon NSC copies of WA ST DOF&W HPA's, we know that currently at least 75 other people, not associated with formal mining claims, are authorized to conduct motorized sluicing and/or suction dredging operations along the Cispus River and McCoy and Yellowjacket Creeks.

E. Every year we receive numerous inquiries through either NSC front offices, or through the phone, about simple recreational panning and non-motorized sluicing activities, for which no permit of any type is required. A substantial percentage of these people ask about panning, etc., opportunities in the McCoy drainage. A great deal of simple panning (Grandpa, Grandma and the grandkids.....for as long as grandkids' attention spans last, after which they all go somewhere else to pick berries, or take a hike.....), for recreational purposes, probably also takes place along the Cispus River.

E. Two years ago, we came very close to seeing three placer claims for a Tacoma-based prospecting club being established along the Cispus River and Yellowjacket Creek in the vicinity of the Cispus Learning Center.

2. Mining Laws
A. A century and-a-quarter of mining laws are in the statute books, starting with the basic Federal "Mining Law" that dates back to 1872. These laws basically:
1) Make mining a legitimate activity within the National Forests.

2) Make mining a "non-discretionary" activity.
a) Unlike an application for a special use or road use permit ("discretionary" activities), we CANNOT deny a notice of intent to begin mining operations; we cannot really even delay dealing with a mining notice.

3) Recognize the role of minerals development and production as an important issue of national interest.

4) Declare it to be national policy to "foster and encourage" an orderly exploration and development of mineral resources while protecting and

3. Additional Site-Specific Recommendation Forms
   A. There should be comments relating to mining, commercial and/or recreational, in virtually all the charts for the purposes of:
      1) Recognizing that mining is a legitimate activity, but subject to all of the Sec. of Ag's Rules and Reg's, in addition to its own.

      2) As a guide to mineral admin personnel in evaluating, and providing a positive influence on, mining proposals and on-going mineral development operations.

   B. Areas to be dealt with in the Special Uses and Lands chart should at least include:
      1) Mining

      2) Potential FERC (hydropower) projects.

      3) Access for utility projects.

      4) Road and trail access to private lands (we are legally obligated to provide same where such access over National Forest lands is the most reasonable alternative).

      5) Cispus Learning Center (use and development of/in the permit area).

      6) Recreational outfitter/guides (white-water rafting, etc.).

6. Mineral Withdrawals
   1) If the FS, as surface resource manager, feels strongly enough, in the public interest, about the preservation in a specific area's resources for a specific purpose.....that area might, through a long process, be withdrawn from areas subject to mineral entry (areas wherein mining claims for "locatable minerals" may be established). Areas withdrawn from mineral entry typically include:
      a) wilderness areas;

      b) campgrounds;

      c) administrative sites (Cispus Learning Center for instance);

      d) areas subject to hydropower project licenses (for study and construction) issued by the Federal Energy Regulatory Commission (FERC);

      e) public roads;

      f) public rock quarries.

Dick Dinkelmann
NSC Ralty Specialist
GPNF

United States Department of Agriculture | Forest Service | Randle Ranger District | Randle WA 98377

Date: October 28, 1991

Reply to: 1950

Subject: McCoy EIS: Current Conditions for Mining Activities, Mining Laws

To: Analysis Files

This report discusses mining activities past and present within the project area (the McCoy Creek and Yellowjacket Creek drainages). I will also discuss various aspects of current mining laws as they apply to proposed activities being analyzed under the McCoy EIS.

Project Area Mining Activities - A Brief History

For almost a century, there have been varying degrees of interest in the mineral resources of the McCoy and Yellowjacket drainages. The minerals of primary interest have been gold, copper and molybdenum.

The first prospecting in the area took place in 1895. From the latter year through the 1920's, very little development work was completed due to limited access for mining and ore processing machinery. During this same period, the usual activity pattern seemed to be development of interest in the area by individual or groups of prospectors, stakings of claims, explorations and minimal developments of claims, followed by lapsing of claims due to the difficulties in accessing the area, inadequate financing or both. A new wave of mining claimants would eventually arrive to reexplore old claim areas, with the coming of the next national or regional economic downturn.

A modest amount of additional claim development work took place from 1920 through 1940, as road access was improved. The Camp Creek area seemed to be of particular interest to prospectors and claimants. The most advanced claim development work has taken place in the latter area. From 1940 through the present, claimants have continued to come and go, new claimants usually looking over old claims and/or mines for whatever previous claimants might have missed.

There have been small to moderate amounts of money made over the years from area mineral deposits. For the years 1895 to 1934, the total value of gold production from the McCoy drainage area has been estimated at $75,000; primarily from placer operations. Between 1934 and 1940, the most extensive lode claim operation produced minerals with a total value of $2,530. The latter record was not broken until 1978. Annual

production for the years 1940-1955 averaged a value of approximately $360.

Current Activities

While information on specific dollar returns from today's claimants is harder to come by, interest in the area's mineral resources, relatively speaking, has not diminished. A recent review of BLM geographic claim listing data indicates that there are approximately 82 active claims located in the two drainages of the project area.1/ The latter figure includes both placer and lode claims.

I did not find any claims listed for the area between McCoy and Kidd Creeks.

There are, without doubt, additional claims that we don't know about. The claim listing data base mentioned above is based upon the BLM's most up-to-date claim listings, which in turn can be up to six months old. This past summer, at least three new sets of claim notices, dated May through June of 1991, were discovered in various field locations on the Randle R.D.; the latter notices would not yet show up on the current BLM listing. Some recreational panning and dredging for gold also takes place. For the latter activities, neither formal claim procedures must be followed, nor is a permit from the Forest Service required, hence we can only guess at the actual level of such activities.

At this time, even the most advanced of the McCoy project area's mining operations, the Lucky Break Claims 2/, is fairly low key. The Randle R.D. is currently reviewing a proposed plan of operations submitted by LBC's owners which would cover the year's 1992-96. The latter plan, if approved, would allow LBC to continue drilling and extraction activities in an existing adit. Up to 80 feet of additional drilling might occur in a given year. Only existing facilities (two depression era cabins, one-half mile of road, some plastic water lines plus simple machinery) will be used. Much of the proposed plan will actually deal only with reclamation work. LBC operations will probably be active for only about a month or two a year, if that.

A handful of the placer claims along McCoy and Yellowjacket Creeks do appear to be actively worked, however sporadically. As for the rest of the known claims, only as much annual assessment work seems to be accomplished as is necessary under the mining laws to keep an individual claim current. Actual physical evidence of assessment work may be hard to notice on the ground since the definition of "qualifying assessment work" is very broadly interpreted.

There are no patented mining claims within the project area.

Mining Activities - Legal Considerations

Mining activities within the project area may seem to resemble a sleeping midget. However, those individuals engaging in the processes of formulating alternatives and recommending a preferred alternative should be aware that the mining laws are a somewhat more formidable

consideration for the Forest Service resource manager. Some of these considerations are:

1. Mining is not a discretionary activity.

The basic federal "Mining Law," which has been somewhat modified since its adoption, dates back to 1872. Under that law, it is basically still any citizen's right to enter certain public lands to explore for, develop and extract mineral resources. Granted, there are certain restrictions, and indeed prohibitions, applied to such activities, depending upon what lands, minerals and/or managing public agencies are involved, but the fundamental right is still there.

The Mining and Mineral Policy Act, of December 31, 1970, recognized the role of minerals development and production as an important issue of national interest, and declared it to be national policy to "foster and encourage" the orderly development of U.S. mineral resources.

2. The Forest Service role in administering its minerals program is to foster an orderly exploration and development of mineral resources, while protecting and managing surface resources.

Unless lands in question have been withdrawn from mineral entry, we cannot deny a claimant the right to explore and develop. As the managers of surface resources, we can set guidelines for how an operation is to be conducted in order to provide reasonable protection for such resources.

Any proposed mining operation which might involve the potential for surface disturbance of any degree must be conducted subject to a "Notice of Intent" or "Plan of Operation" approved by the appropriate forest officer. Conditions set for Forest Service approval must be reasonable. We have to strike a balance between providing proper protection of surface resources, and not setting operational conditions that would unreasonably, economically hinder a legitimate mining operation.

3. Access - A mining claim operator is entitled to reasonable access to his/her claim area. However, the Forest Service is not obligated to approve access if a proposed means of access, or mode of transport, is not reasonably necessary for work to be performed for prospecting, locating or developing mineral resources. Any claimant who would propose an access route which might result in significant disturbance of surface resources must justify his/her proposal. The primary consideration in evaluating an access proposal is that means and modes of access must be reasonably necessary for a particular situation. See FSM 2817.25 - Access.

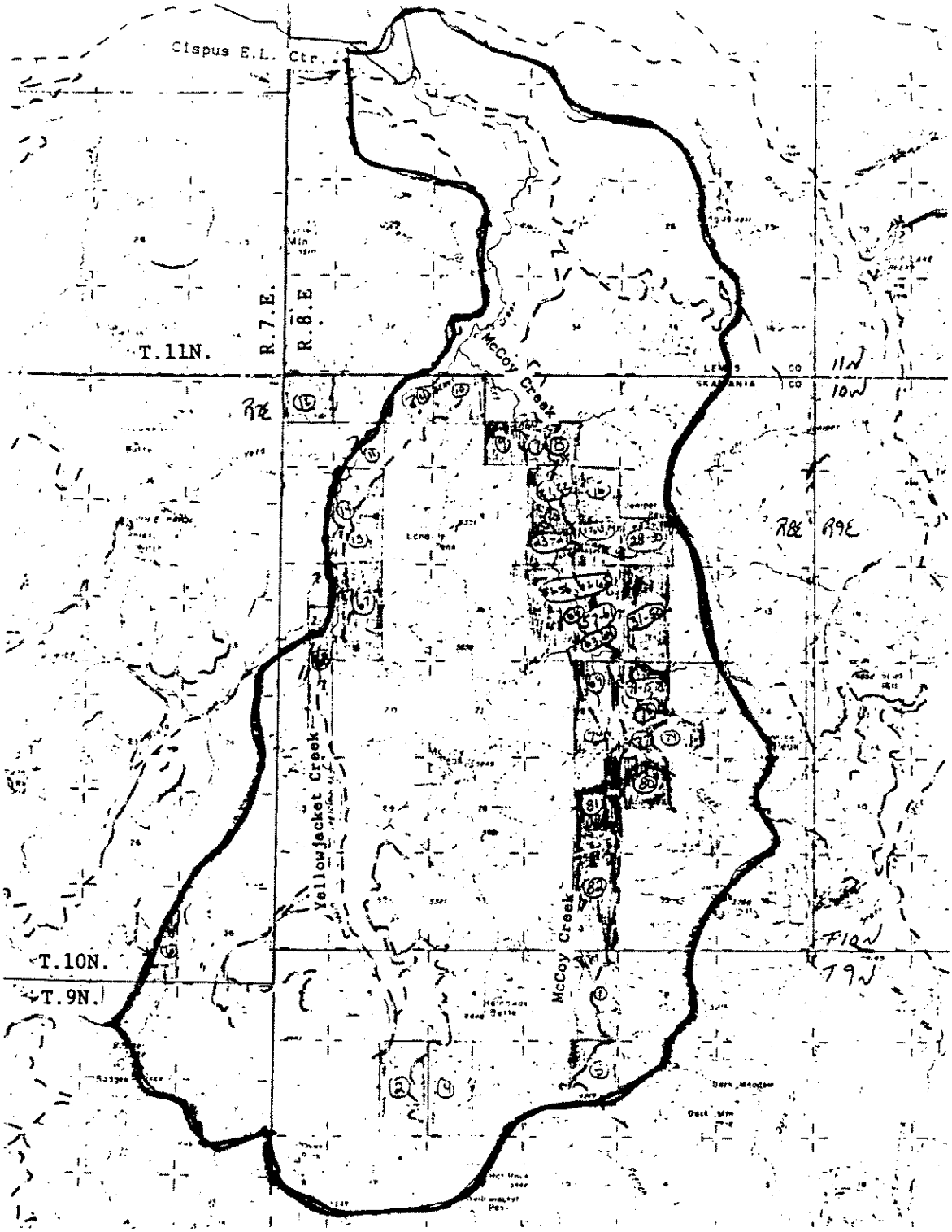
4. Use of Timber - All known claims in the project area were located after 1955, and are therefore subject to the Multiple ~~Surface~~ Use Act of July 23, 1955. Under this act, where timber exists on a mining claim at the time of claim location, the mining claimant is only entitled to use of as much timber as is legitimately needed for mining purposes. Under

this same act however, the Government was given the right to fully manage surface areas of the National Forests and to dispose of vegetative materials. Therefore, it is possible for the Forest Service to plan a timber sale on an unpatented mining claim, though timber sale operations cannot unreasonably interfere with legitimate claim operations.

In cases where standing timber did exist on a claim at the time of location, and where a subsequent FS timber sale removed that timber, a mining claimant may legitimately claim like-timber from adjacent areas if such timber is needed for operation of his mining claim.

Dick Dinkelman
Zone Realty Specialist

1/ In reviewing geographic claim listing data, it was suggested by the Area Mining Engineer that any listed claim should still be considered as current where annual assessment work was last completed as late as 1989. The count of 82 "active claims" is based upon review of the geographic claim listing data base subject to the above-mentioned suggestion.
2/ The Lucky Break Claims are lode claims.



RANDLE RANGER DISTRICT
McCoy EIS

Locations of BLM-Recorded Mining Claims in the Project Area
(as of 7/91)

N

Legend

Project Area Boundary

Approximate Areas within which Claims are Located

(43) Claim Numbers (See attached Geographic Claim Listing printouts.)

Scale: .6" = 1 Mile

RAD, 10/91

Appendix D - Lower Cispus East Watershed Analysis Sixth-Field Watersheds

List of Sixth-Field Watershed Numbers and Names

Sixth-Field Watershed (6WS)	
Number	Name
04K	Lower Greenhorn
04L	Upper Greenhorn
04M	Nash
04P	Dry
04Q	Camp
04R	Lower Yellowjacket
04S	Middle Yellowjacket
04T	Upper Yellowjacket
04U	Pinto
04V	Lower McCoy
04W	Upper McCoy
04X	Cispus X
04Y	Lambert
04Z	Cispus Z