

# **Pacific Northwest Rivers Study**

## *Assessment Guidelines: Oregon*

State of Idaho  
State of Montana  
State of Oregon  
State of Washington

NW Indian Tribes

USDA Forest Service  
USDI Bureau of  
Land Management  
USDI Fish and  
Wildlife Service  
USDI National  
Park Service  
NW Power Planning  
Council  
Bonneville Power  
Administration

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Pacific Northwest Rivers Study:  
Assessment Guidelines

Oregon

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Pacific Northwest Rivers Study:  
Assessment Guidelines  
Oregon

Chapter 1  
Overview

Introduction

This document presents the process that the state and Federal agencies and Indian tribes followed to complete the Pacific Northwest Rivers Study. It identifies assessment guidelines for river resource categories and provides reporting formats for data collection and presentation.

Agency Considerations

The study was organized into four state level studies. State, Federal, Tribal, and interest group participants conducted the assessment using state boundaries as the geographical framework.

It is not the intent of the study to circumvent the management responsibilities of any state, Federal agency, or Indian tribe. The study was a cooperative effort which will benefit all participants. Results do not constitute official policy and by themselves imply no specific action by any participant.

Time Schedule and Products

The Rivers Study is a several year effort by the four Northwest states, Federal agencies, and the Tribes. Funding of about \$1 million was provided by the Bonneville Power Administration (BPA). Concurrently, the Northwest Power Planning Council (NPPC or Council) provided \$540,000 to evaluate anadromous fish resources and Indian cultural/archeological values.

Rivers Study activities and goals, budgets, and time schedules are listed in the September 1984 Pacific Northwest Rivers Study Plan, which is available from BPA.

Applications

The Rivers Study was designed to produce a consistent and verifiable river resource data base. This information may be useful for a variety of applications. The specific purpose of the project was to identify resource considerations that might affect hydropower development.

The objective is to use this information to identify areas where minimal impact is anticipated and thus where development might be appropriate. The

study responds to the expressed need for resource information for the following:

1. Energy Supply Forecasting - NPPC and BPA.
2. Protected Areas - NPPC: 1984 Columbia River Basin Fish and Wildlife Program 1204(c)(1).
3. Site Ranking - NPPC: Northwest Conservation and Electric Power Plan 14.2.

## Chapter 2 Process

The major goal of the process was to identify the significance of river segments and systems for natural, cultural, and recreational resources.

Comparative assessment was a major feature of this process. The process did not, however, result in rivers being ranked in numerical order. Rather, it clustered stream reaches into groups according to their relative resource significance.

Field survey was kept to a minimum. The study relied on currently available information and evaluation by recognized resource experts. Study conclusions are the responsibility of these resource specialists. The states, Tribes, and Federal agencies were represented in the evaluation process commensurate with their legal authorities and management duties.

The following is a detailed description of the assessment process.

### Step 1: Identification of river resource categories.

Categories were chosen to:

- 1) reflect the overall value of rivers and streams as natural resources;
- 2) reflect the interests of public agencies and private interest groups;
- 3) acknowledge the resource responsibilities of the Tribes, states, and Federal agencies; and
- 4) reflect the priorities of the Pacific Northwest Electric Power Planning and Conservation Act [(Regional Act) P.L. 96-501].

The categories are resident fish, wildlife, natural features, recreation, historic features, archeological features, and legal constraints. Tribal, cultural, and archeological values were included through a NPPC contract, as well as regional anadromous fish values.

A senior resource expert and cooperating experts were designated in each state to oversee activities related to each resource category. Cooperating experts provided input into the assessment through the senior resource expert.

### Step 2: Inventory of Information and Identification of Experts

Each state task force inventoried the availability of expertise and information in each of the resource categories. Agencies, groups, individuals, or other sources that had or could produce useful data within the study period were identified.

### Step 3: Developing Standards

For each river resource category, regional staff and senior resource experts identified minimum standards by which data were evaluated. These were adapted to meet the needs of each state. Both quantitative and qualitative standards were used. In developing standards, resource "potential" was taken into account.

This document is an effort to standardize criteria for each state level study and to ensure studywide consistency. The regional and state level project management staff, with input from Federal, Tribal, and private interest group experts, developed the standards shown in this guide.

A separate, yet similar, guide was developed for each of the four Northwest states. The actual assessment method may vary by resource category and by state. Evaluation forms were developed for each resource category to promote efficiency and coordination. Chapters 4-10 describe the methods used for each resource category.

### Step 4: Individual Resource Category Evaluation

An independent inventory of river resources was undertaken for each resource value category. Under the direction of designated senior resource experts, rivers and streams meeting minimum threshold standards were assessed by field level specialists using the identified standards and assessment procedures.

Resource experts assigned a value class to each river segment on maps and data forms.

River segment descriptions and rules governing treatment of tributaries were determined by the state level project management staff. The number of river segments to be included in each value class was determined by resource experts. No regionwide guidelines were given.

Results were compared for consistency, and river segments were grouped according to overall significance.

The resource evaluation findings were reviewed by designated senior resource experts and agency and Tribal participants. Results were revised as appropriate by the senior resource experts in consultation with regional project management. A chance to review results and provide comments was given to private groups and citizens who gave input or expressed interest.

The final result of the category assessment is an identification of:

- all river areas which possess a particular fish, wildlife, natural, recreational, cultural or legal value; and

- the relative significance of each area.

The terms Outstanding, Substantial, Moderate, Limited, and Unclassified or Unknown are used to denote relative significance value. Areas with no resource value are noted.

### Step 5: Display of Category Results

Results were displayed in tabular data forms and also were recorded on base maps at an appropriate scale for each resource value. In most cases, a scale of 1:100,000 was used.

The basis for the judgments of resource experts was recorded in narrative form on data sheets for each river segment or segments. Maps of a scale suitable for public presentation (1:500,000) also were developed.

Public information briefings to present the findings of Step 4 and the graphic displays of Step 5 were conducted throughout the state.

### Step 6: Information Synthesis

Information from resource categories was combined in order to display all resource values of a given stream segment. This synthesis was achieved by means of a computerized data management system. Central to this system is a stream coding system developed by the U.S. Environmental Protection Agency (EPA). By correlating EPA reach codes to information collected for each resource category, a comprehensive data display for each stream segment can be produced.

Information about a number of resources/constraints could not be linked to individual stream segments. They included historic sites, archeological resources, local, state, and federal constraints. Linking this information to specific streams will require digitizing 1:100,000 scale base maps.

### Step 7: Documentation and Presentation

The study's findings have been documented and some graphic representations of data have been prepared. Computer mapping techniques were used.

A special effort was made to document the significance of reaches and streams found to have high and/or unique resource values, as well as those reaches reflecting the priorities of the Regional Act.

Statutory recognition (Wild and Scenic Rivers, National Parks, inclusion in Wilderness Areas, etc.) was included for areas where information was readily available.

Six briefings were conducted around the state to present some early findings and get comments about the Rivers Study. Announcements about the briefings were sent to about 2,000 people. The mailing list included news media, interest groups, and local governments.

Two reports are being prepared - a summary of the study findings and a user's guide to the study's computerized information system.

## Chapter 3 Guidelines

The following chapters identify the assessment guidelines used to conduct the Rivers Study.

The guidelines were derived from the Maine Rivers Study, the Idaho Rivers Inventory, the Montana Fish and Wildlife Valuation Procedures, and the New Hampshire River Protection and Energy Development Project. They have been modified to suit unique state, agency, and Tribal requirements. Although methods varied by state and resource category, an attempt was made to ensure an acceptable level of consistency throughout the region.

For each river resource category listed below, regional staff and senior resource experts identified standards and criteria by which data were evaluated. "Standards" refer to the evaluation measures used to determine "minimum thresholds of significance." "Criteria" refers to those attributes used to critically evaluate specific rivers or river systems meeting the minimum threshold of significance for a given resource category.

Minimum thresholds were set by each state level staff in consultation with regional level project management and participating agency and Tribal resource experts.

As a general rule, thresholds were set to ensure the valuation of all rivers where documented resource data exist. Both quantitative and qualitative criteria were used. In the development of standards and criteria, documented or planned resource potential was taken into account.

Resource experts assigned each river segment to a value class based on the best available information and judgment. The assessment guidelines in Chapters 4-10 were designed to help determine the appropriate class. These guidelines were developed to promote objectivity and consistency.

Factors evaluated include the following:

- ° Resident Fish (Chapter 4)
  - cold water game and nongame fish
  - warm water game and nongame fish
  - spawning, rearing, and migration areas
  - sport fisheries
  - Indian subsistence fishery
  - anadromous fish other than salmonids
  - threatened and endangered species
- ° Wildlife (Chapter 5)
  - migratory birds
  - resident birds
  - big game
  - fur bearers
  - small mammals
  - endangered and threatened species (Federal and state)
  - nongame and species of special concern including Indian subsistence species

- Natural Features (Chapter 6)
  - endangered and threatened plants
  - unique plant communities and other recognized natural areas
  - undeveloped and free flowing segments
  - sensitive riparian wetlands
  - gorges, waterfalls, rapids, miscellaneous geologic features
- Historic Features (Chapter 7)
  - historic trails and sites
  - current Indian cultural use sites (Council responsibility)
- Archeological Features (Chapter 8)
  - archeological sites
  - river related architectural sites
- Recreation (Chapter 9)
  - white water boating
  - flat water boating
  - river camping
  - river related shoreline activities
  - current public use sites
- Legal Constraints (Chapter 10)
  - Federal, including
    - wild and scenic rivers
    - wilderness areas
    - research natural areas
    - national parks
    - roadless areas
    - national fish hatcheries
    - national wildlife refuges
  - State
  - Local

Each river resource category was evaluated separately. Assessments were conducted independently without reference to other resource values. For example, river reaches were evaluated for recreational boating without reference to their value for wildlife or historic features.

Senior resource experts working with state, Federal, Tribal, and user group experts conducted the assessment.

#### Scope of Effort

Initially, any river segment with a significant resource value known to a resource expert was included in the Rivers Study. Perennial streams which appear on 1:100,000 scale maps were included. Generally, values within 1,000 feet of a stream were included.

If stream segments were excluded, usually it was for one of the following reasons:

1. Intermittent streams;
2. Small tributaries;
3. Federal institutional constraints (e.g., National Parks, etc.)

### River Reach Determination

River segments may be of any reasonable length greater than one mile. Normally, segments are 10 miles or more. Each study coordinator identified appropriate reach lengths for his state for each resource category consistent with the budget, time available, and map scales to be used.

### Value Classes

Value classes are the resource significance levels that were assigned to river segments to denote their value.

Participants assigned one of four value classes to each river reach to denote its relative significance to a given resource category. As applicable, an "Unknown or Unclassified" or "Resource Not Present" designation was given in lieu of a rating.

### Value Class Definition

- |   |                                 |
|---|---------------------------------|
| 1 | Unique or Outstanding Resources |
| 2 | Substantial Resources           |
| 3 | Moderate Resources              |
| 4 | Limited Resources               |
| U | Unknown or Unclassified         |
| N | Resource Not Present            |

### Data Presentation

#### ° Data Entry Forms

Senior resource experts prepared river resource rating forms for each state level effort. These forms present pertinent background information and document evaluation decisions.

Individual cells on each data form reflect the scores for each criterion. The form briefly notes features of the segment that give it value, sums values, and assigns value class. The form provides additional descriptive information about individual segments.

As applicable, stream segment descriptions were included on the data forms. State coordinators identified a comprehensive coded list of rivers for each state. Lists were made available to resource experts. Use of these lists helped promote consideration of all reaches and ensured consistency between resource categories.

As appropriate, river segments were identified using physical landmarks, coordinates, or other information and are presented in a downstream boundary to upstream boundary fashion. The terms "mouth" and "to headwaters" or "source" signify the extremes of this segment description system.

If no segment description is given, the entire stream length can be assumed to have consistent resource value.

Sample data forms are included for each resource value. In addition to segment description, forms include a notation of map name to enable input of attributes into a Geographic Information System (GIS).

Preparers developed a coding system in consultation with state level and regional project management to denote the relative certainty of resource characterizations. Stream segment numbers are written on the maps to enable easy cross referencing to the tabular data.

If a resource value was consistent in all upstream tributaries, each tributary was not evaluated separately. In such situations, the values attributed to the larger segment are assumed for all tributaries. An asterisk (\*) placed after the name of the larger segment denotes this situation. If the river list used is hierarchical, a diagonal slash drawn through upstream segments means that the segments are being clustered.

If no notations are on the data form, it can be assumed that the segment is Unclassified or resource value is Unknown. A horizontal line across the form signifies resources Not Present.

◦ Maps

Maps have been used to display river values. Sets of 1:100,000 scale maps and a supply of 1:500,000 scale hydrologic unit maps were provided to each state coordinator by BPA. Labels were supplied for each map to be used as legends. Colored pens also were supplied.

One set of 1:100,000 scale maps was used to depict the significance of each of the following resource values:

- resident fish;
- natural features;
- historic features;
- archeological features;
- recreation; and
- legal constraints.

River Basin maps from the Oregon Water Resources Department were used for wildlife values.

Also, 1:500,000 scale maps were prepared for some resources for ease of presentation and review.

In Oregon, 60 maps of 1:100,000 scale were required per category.

Value significance was recorded in colored pen using the following color scheme.

- Outstanding or Unique - Red
- Substantial - Orange
- Moderate - Gray
- Limited - Green
- Unclassified or Unknown - No mark
- Resource Not Present - Brown

The Unknown or Unclassified designations predominate on any one map. Participants did not color stream segments in this category. Uncolored segments can be assumed to be either Unknown or Unclassified.

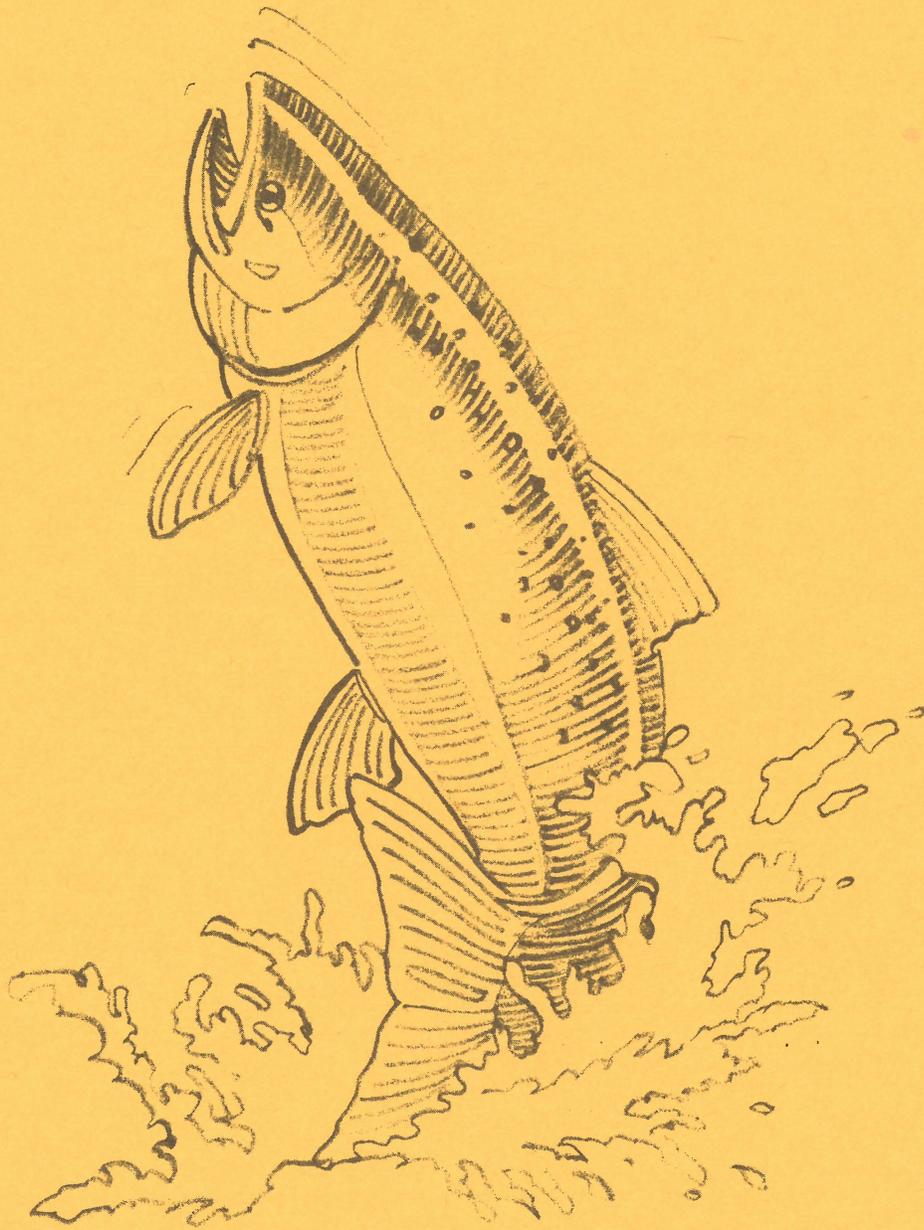
To decrease production time, an arrow at the upstream terminus of a colored section was used to signify that all segments above that point are of consistent value. Upstream exceptions are noted in the appropriate color.

BPA and the state sponsors intend to cooperate to digitize data from the Rivers Study.

° Study Reports

Every three months the study participants under BPA contract provided a letter summarizing study progress and briefly outlined future events. The state coordinator has completed and provided one set of maps, rating forms, and supportive material for river values to BPA staff for review and printing.

## ***Resident Fish***



Chapter 4  
Method for Assessing  
Oregon's Rivers for Resident Fish

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Scope

Thirty-two major species in 14,254 stream segments in the state were assessed for resident fish values. The team reviewed all fish, except for salmon and steelhead, in the state's named streams and rivers. The Northwest Power Planning Council is assessing anadromous fish values.

Stream segments were judged by 97 biologists from state and Federal agencies and two Indian tribes (Appendix 1A). The study team conducted ten two-day meetings around the state to get data.

The study corridor includes the land within 1,000 feet of either side of each stream.

Standards

The team used four standards to judge river segments and stream reaches:

- habitat quality;
- importance of species;
- fishery use; and
- fish abundance.

These standards were used to judge the environmental and recreational value of stream segments. The highest rating for habitat quality and importance of species determined the environmental value. The highest rating for fishery use and abundance determined the recreational value.

## Environmental Value

### Habitat Quality

Habitat quality was determined by the number of species present and water quality. The team also reviewed stream qualities, such as type, nearby land use, diversity, flow regulation, water temperature, riparian cover, and bank erosion.

### Importance of Species

Species of high concern are:

- game fish of regional importance to the ecosystem or to anglers (Appendices 1B and 1C); or
- on the Federal Threatened and Endangered List (Appendix 1C); or
- of limited range (Appendix 1C).

Species of moderate concern are:

- game fish listed in Appendix 1B that are not of high concern; or
- nongame fish that are important to the ecosystem (e.g., are food for fish of high concern).

Species of low concern are all Oregon nongame fish, not noted above.

There are six exceptions to the environmental value:

### Migration Corridors

If a stream reach were a migration route for spawning fish, the rating may have been increased.

### Rare Species

If a stream reach were a low or moderate habitat for a threatened, endangered or limited range species listed in Appendix 4B, the rating may have been increased.

### Research Sites

If a stream reach were being researched, a value of Outstanding may have been assigned.

### Potential Value

If conditions in a stream reach were likely to change soon, potential quality may have been considered. If the importance of a species were likely to change soon, they were rated at the level of their potential concern.

### Stocked Streams

If a stream needed much hatchery stocking to maintain fish quantity, the rating may have been decreased.

### Species Diversity

If a stream reach had several species of high or moderate concern, the rating may have been increased.

### Recreational Value

The standards used for this value were the number (abundance) and catch (fishery use) of game fish in the stream reach.

The team based this assessment on stream surveys, creel censuses, and the knowledge of district biologists.

There are four exceptions to the recreational value:

#### Quality of Fishing Experience

If a stream reach had outstanding scenery or many large fish, the rating may have been increased. If the reverse were true, the rating was reduced.

#### Economic Importance

If the sport fishery were important to the local economy, the rating may have been increased.

#### Fishing Success

If species were unique within a local area, the rating may have been increased.

#### Potential Value

If the value to anglers were likely to change soon (e.g., through habitat improvement/degradation, improved/impaired access, etc.), potential sport fishery value may have been considered.

### Assigning Value Classes

Environmental and recreational values were used to determine stream values classes. Value classes were defined as:

- 1 = Outstanding resources
- 2 = Substantial resources
- 3 = Moderate resources
- 4 = Limited resources
- 5 = Unknown resources
- 6 = Resources not present

The team first determined the major species for each stream reach. Then, the team rated the stream reach by using the standards and matrices below:

I. Environmental Value

1) Importance of Species Standard

	High	Moderate	Low
High	1	2	3
Moderate	2	3	4
Low	3	3	4

2) Habitat Quality Standard

II. Recreational Value

3) Fishery Use Standard

	High	Moderate	Low
High	1	2	3
Moderate	2	3	4
Low	3	3	4

4) Fish Abundance Standard

The highest rating of the first two standards determined the environmental value and the last two standards determined the recreational value. The highest rating of these two values was the value class for the stream reach. These standards and values were recorded on a data form (Appendix 1D).

Other stream characteristics (Appendix 1E) also were recorded on the data form. These helped guide judgments about the habitat quality.

If a rated stream had a tributary with unknown resources, the tributary was either given a value class of Unknown, or if the two streams likely were similar, the tributary may have been assigned the value class of the rated stream. However, if it were known that no resident fish were present in a stream, it was assigned a value class of Not Present.

The following is a hypothetical example that shows how the environmental value was assigned:

A stream has four resident fish species present - rainbow trout, redbside shiner, smallmouth bass, and large scale suckers.

The team determines the level of concern for each species. Trout are "high," shiners are "moderate," bass are "high," and suckers are "low." Next, habitat quality is determined for each species. The team determines that habitat quality for trout is "high," shiner is "moderate," bass is "moderate," and sucker is "low."

Putting those ratings into the matrix produces the following values:

Trout	=	High-High	=	1 or Outstanding
Shiner	=	Moderate-Moderate	=	3 or Moderate
Bass	=	High-Moderate	=	2 or Substantial
Sucker	=	Low-Low	=	4 or Limited

In this stream, the environmental value is Outstanding because it is the highest rating.

#### Mapping the Data

The value classes were color-coded and mapped on BLM 1:100,000 scale maps. The fish data were summarized on a 1:500,000 scale map. These data have been entered into a computer data base.

#### Caution About Using the Data

The data are broad and general. Decisions about specific sites or uses should not be based on these data alone.

Stream resources of one region should not be compared to resources in another. Although streams may have the same rating, the number and variety of resources may be different.

**Wildlife**



Chapter 5  
Method for Assessing Oregon's Rivers  
for Wildlife

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Scope

Fifty-one major species in 14,409 stream segments in the state were assessed for wildlife values.

Wildlife included:

- game and furbearing animals listed in Oregon law;
- Federal and state threatened and endangered wildlife species; and
- nongame wildlife.

Stream segments were judged by 97 biologists from state and Federal agencies and two Indian tribes (Appendix 2A). The study team conducted ten two-day meetings around the state to get data.

The study corridor includes the land within 1,000 feet of either side of each stream.

Standards

The team used four standards to judge river segments and stream reaches:

- habitat quality;
- importance of species;
- recreational use; and
- species abundance.

These standards were used to judge the environmental and recreational

value of stream segments. The highest rating for habitat quality and importance of species determined the environmental value. The highest rating for recreational use and species abundance determined the recreational value.

### Environmental Value

#### Habitat Quality

The team rated habitats high if they were undisturbed and also:

- were of special concern, such as river islands, healthy riparian plants, old-growth cottonwood or coniferous bottoms, or ox-bow sloughs; or
- had diverse and productive plants and wildlife; or
- were used by threatened, endangered, or rare species, or vertebrates of special concern; or
- were a winter range for big game; or
- were used for nesting.

Habitats were rated moderate if they:

- had been disturbed but still were useful for wildlife; or
- were fairly undisturbed, but did not meet the standards for a high rating.

Habitats were rated low if they had been disturbed greatly and plants were unlikely to grow back.

#### Importance of Species

Species of high concern are:

- game and furbearing species of regional importance to hunters or to the ecosystem (Appendix 2B); or
- on the Federal Threatened and Endangered List (Appendix 2C); or
- of limited range (Appendix 2C).

Species of moderate concern are:

- game and furbearing wildlife in Appendix 2B, but not rated of high concern; or
- indicator wildlife listed in the Oregon Nongame Wildlife Plan; or
- important nongame wildlife.

Species of low concern are all other nongame wildlife species not noted above.

There are five exceptions to the environmental value:

#### Migration Routes

If a stream reach were a migration route for wildlife, it may have been rated high.

#### Rare Species

If a stream reach were low or moderate habitat for a threatened, endangered, or limited range species, the rating may have been increased.

#### Research Sites

If a stream reach were being researched, it may have been rated Outstanding.

#### Potential Value

If conditions in a stream reach were likely to change soon, potential habitat quality may have been considered. If the importance of a species were likely to change soon, it may have been rated at the level of its potential concern.

#### Species Diversity

If a stream reach had several species of high or moderate concern, the rating was increased one level.

#### Recreational Value

The standards used for this value were the number (abundance) and harvest (use) of wildlife next to a stream. The team based this assessment on harvest records, recreation records, access to wildlife, and the knowledge of district biologists.

There are four exceptions to the recreational value:

#### Quality of Wildlife Experience

If a stream reach had outstanding scenery or large or trophy animals, the rating may have been increased. If the reverse were true, the rating may have been decreased.

#### Economic Importance

If wildlife recreation were important to the local economy, the rating may have been increased.

### Uniqueness

If wildlife were unique within a local area, the rating may have been increased.

### Potential Value

If the wildlife use in a stream reach were likely to change soon, (e.g. through habitat improvement/degradation, improved/impaired access, etc.), potential abundance or use may have been considered.

### Assigning Value Classes

Environmental and recreational values were used to determine stream values classes. Value classes were defined as:

- 1 = Outstanding resources
- 2 = Substantial resources
- 3 = Moderate resources
- 4 = Limited resources
- 5 = Unknown resources
- 6 = Resources not present

The team first determined the major species for each stream reach. Then, the team rated the stream reach by using the standards and matrices below:

#### I. Environmental Value

##### 1) Importance of Species Standard

	High	Moderate	Low
High	1	2	3
Moderate	2	3	4
Low	3	3	4

##### 2) Habitat Quality Standard

#### II. Recreational Value

##### 3) Recreational Use Standard

	High	Moderate	Low
High	1	2	3
Moderate	2	3	4
Low	3	3	4

##### 4) Species Abundance Standard

The highest rating of the first two standards determined the environmental value and the last two standards determined the recreational value. The highest rating of these two values was the value class for the stream reach. These standards and values were recorded on a data form (Appendix 2D).

Other stream characteristics (Appendix 2E) also were recorded on the data form. These helped guide judgments about the habitat quality.

If a rated stream had a tributary with unknown resources, the tributary was either given a value class of Unknown, or if the two streams likely were similar, the tributary may have been assigned the value class of the rated stream. However, if it were known that no wildlife were present in a stream corridor, it was assigned a value class of Not Present.

The following is a hypothetical example that shows how the environmental value was assigned:

A stream has four wildlife species present - black-tailed deer, raccoon, yellow-bellied marmot, and wood duck.

The team determined the level of concern for each species. Deer are "high," raccoons are "moderate," marmots are "low," and wood ducks are "high." Next, habitat quality is determined for each species. The team determines that habitat quality for deer is "high," raccoons is "moderate," marmot is "low," and wood duck is "moderate."

Putting those ratings into the matrix produces these values:

Deer	= High-High	= 1 or Outstanding
Raccoon	= Moderate-Moderate	= 3 or Moderate
Marmot	= Low-Low	= 4 or Limited
Wood Duck	= High-Moderate	= 2 or Substantial

In this stream, the environmental value is Outstanding because it is the highest rating.

### Mapping the Data

The value classes have been color-coded and mapped on 18 river basin maps. Wildlife data were summarized on a 1:500,000 scale map. These data were entered into a computer data base.

### Caution About Using the Data

Habitats, species, and available data change. This study may need to be updated periodically.

The data are broad and general. Decisions about specific sites or uses should not be based on these data alone.

Stream resources of one region should not be compared to resources in another. Although streams may have the same rating, the number and variety of resources may be different.

## *Natural Features*



Chapter 6  
Method for Assessing the Natural  
Features of Oregon's Rivers

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Scope

The river study corridor for natural features was defined as land within 1,000 feet of each river bank. The study team reviewed botanical, hydrological, and geological features within these corridors.

Botanical features in the study are:

- rare, threatened and endangered plants (Appendix 3A); and
- outstanding examples of native plant associations found in riparian zones (Appendix 3B).

The rare, threatened, or endangered plants listed in Appendix 3A include those that occur in the floodplains of streams or rivers. It also includes plants that are close enough to waterways to be harmed by water development projects.

Appendix 3B includes broadly defined groups of plants that grow along rivers. This list is based on the team's judgment. The team also reviewed some unique upland plant associations inside the study corridor.

The team used two sources to compile the botanical list:

- the U. S. Fish & Wildlife Service Notice of Review for listed and candidate plants in Oregon (November 1983); and

- "Rare, Threatened and Endangered Plants and Animals of Oregon," published by ONHDB (March 1985).

The information about rare and endangered plants came mainly from ONHDB files. Information on riparian plants came from Federal agencies and from ONHDB files. The information packet sent to Federal agencies is in Appendix 3D.

The team relied on the expertise, data, and help of agencies that took part in the study (Appendix 3E). No field work was done during the course of the study.

### Assigning Value Classes

The team assigned value classes by consensus. The value class assigned to a segment was no lower than the highest value class of any natural feature found within it.

Four standards were used to guide judgments about natural features:

- scarcity;
- vulnerability;
- quality; and
- value to science and education.

Scarcity refers to the quantity of the feature in Oregon and throughout the world. In most cases, this was the key factor in assigning a value class.

Any feature that was especially vulnerable, of outstanding quality, or of great scientific interest received the highest rating, regardless of its degree of scarcity.

<u>Degree of Scarcity</u>	<u>Value Class</u>
Features in fewer than five places in the world	Outstanding
Features in 5 to 25 places	Substantial
Features in fewer than five places in the state but more than 25 places in the world	Moderate
Features in more than 25 places in the state	Limited

The team assigned value classes for plants in accordance with lists published by ONHDB in "Rare, Threatened, and Endangered Plants and Animals of Oregon" (1985). Sites that had plants on ONHDB's List 1 were rated Outstanding. Sites that had plants on List 2 or List 3 were rated Substantial.

The lists are defined as:

- List 1 - Classes of plants that are threatened or endangered throughout their range or that may be extinct.
- List 2 - Those that are threatened, endangered, or extirpated in Oregon, but have more stable status elsewhere.
- List 3 - Those with small distribution or that are rare throughout their range, but that are thought to be stable now. These are endemic plants in the region or state that are limited enough to need monitoring.

Vulnerability is defined as the chance that a natural feature might be harmed or destroyed. An impact analysis of potential projects was beyond the scope of this study. The team agreed that natural features in protected areas are less vulnerable than features with no protection.

Quality is the relative physical condition of a natural feature. The team considered the size, diversity, and degree of site disturbance. A site that was among the best known of its kind was rated higher than a common one or one of low quality.

The scientific value of a natural feature or site is its importance for education. The team looked at past, current, and potential use, access, and taxonomic distinctiveness. Protected or known quality study sites are rated Outstanding.

If the quality of plant associations could not be judged, the team assigned the Moderate value class.

An Outstanding riparian zone plant association is one that:

- has not been logged for at least 30 years; or where
- weeds or introduced plants are a small part of the total plant life.

#### Hydrologic and Geologic Features

Hydrologic and geologic features are listed in Appendix 3C. These features included undeveloped stream and river segments and other geologic and riverine phenomena.

The team defined an undeveloped river segment as one without major cultural changes, dams, or water diversions.

Value classes for geologic/hydrologic features are based mainly on quality. The team also considered the value of these features for science and education. Unless a feature was outstanding or important to science and education, a Moderate value class usually was assigned. Unstable soils were assigned a Limited value.

The team evaluated waterfalls or gorges that were at least 30 feet high. Other evaluated sites included areas with:

- fossils;
- geologic formations;
- unique assemblages; or
- sites with scientific and educational value.

### Mapping the Data

The team plotted features on 1:100,000 scale BLM surface feature maps. River and stream segments with shared features are single units on data sheets. The team recorded on data sheets natural features along river and stream segments. The listed status of rare plants and other comments also were recorded.

The two main products of this study are:

- site maps of known natural features; and
- a tabular summary of the natural features along river and stream segments and the value classes assigned to the them.

Stream segments were put onto 1:100,000 scale maps using color-coded value classes. The segments were numbered to match tab information on the data sheets.

Resource experts reviewed the final tables and maps.

### Caution About Using the Data

This work at best is a cursory inventory evaluation done with limited time and money. The status of many features, especially plant communities and rare plant species, changes over time.

Not enough research has been done to substantiate the qualitative values of some features.

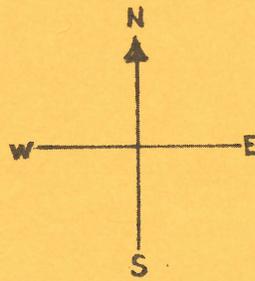
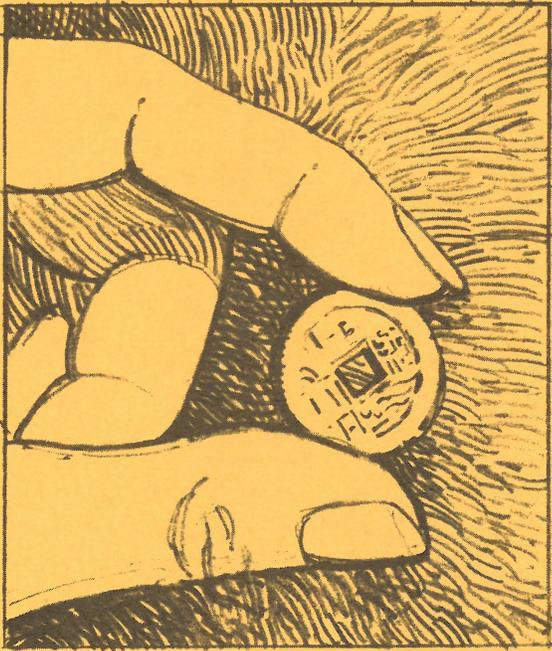
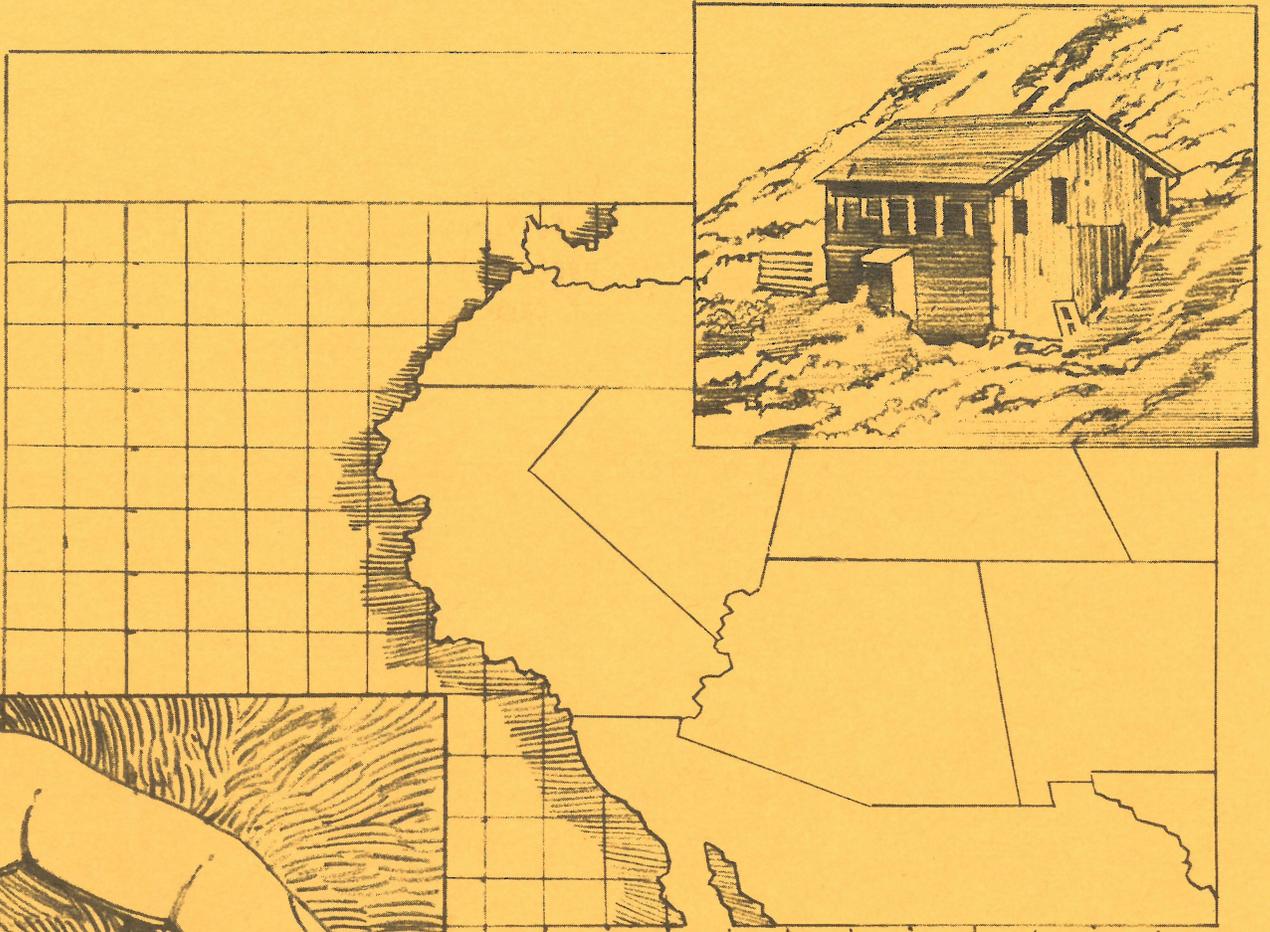
Many areas of the state have not had even cursory botanical surveys done. This is especially true of remote sites in Eastern Oregon on public lands.

Many stream and river segments were assigned a value class of Unknown.

Some of the data from federal land management agencies was received too late to be included in this study.

To protect rare plants and sites, their exact locations were not put on the final set of maps. Such sites were noted on the data sheets as within a stream segment.

# Cultural Features



Chapter 7  
Method for Assessing Oregon's Rivers  
for Historic Features

Lead Agency

Oregon State Parks and Recreation Division, Oregon Department of Transportation  
525 Trade Street SE  
Salem, OR 97310  
(503) 378-6378

Resource Experts and Staff

John Lilly  
Al Cook  
John Allen  
Elisabeth Walton Potter

Consulting Resource Experts

Tommy Thompson, U.S. Bureau of Land Management  
Gene Tomlin, U.S. Forest Service

Scope

Historic resources reviewed in this study are the buildings, sites, and structures from Oregon's early years. These resources reflect the state's development in industry, agriculture, commerce, transportation, and housing.

Four thousand, three hundred (4,300) sites have been surveyed. This includes all national historic sites.

Most historic sites are within 1/4 mile of a river or stream.

Archeological resources are addressed in a separate section of this study.

Assigning Value Classes

Oregon's land use planning process requires cities and counties to survey historic resources, determine their significance, and plan to preserve them. This phase of the land use process is nearly complete.

If a city or county had not finished its survey of historic resources or determined their significance, the team used the list of historic resources kept by the State Historic Preservation Office. Because this list is basically unsifted, these resources defaulted to the highest value class.

The team assigned value classes based on designations derived from counties' land use plans. These plans give three levels of protection to historic resources:

The most strict designation protects the resource from conflicting uses.

The second allows the conflicting use with mitigation. The third allows conflicting uses.

#### Outstanding Value Class

Resource is so important that the resource should be protected and all conflicting uses prohibited.

#### Substantial Value Class

Conflicting uses are allowed to a limited degree so as to protect the resource to some desired extent.

#### Moderate or Limited Value Class

The conflicting use is allowed fully.

All sites on the National Historic Register are rated Outstanding.

Historic sites within the Urban Growth Boundary of all cities are rated Outstanding.

#### Mapping the Data

All sites on county inventories were mapped. Color-coded dots with an identifying number by county were placed at the site of each resource.

This makes it easy to determine the location and significance level of historic resources in a given area. This numbered dot corresponds to a numbered data sheet entry that gives a brief description of the resource, the National Register Status, and the location by township, range, and section.

All data have been entered into a IBM micro-computer. A printout of the data is available.

#### Caution About Using the Data

Historic Resources inside city boundaries were not mapped or inventoried since the scale of mapping was too large to show accurately sites or structures that are affected by rivers or streams.

Chapter 8  
Method for Oregon's Rivers  
for Archeological Features

Lead Agency

State Historic Preservation Office (SHPO), Oregon Department of Transportation  
525 Trade Street SE  
Salem, OR 97310  
(503) 378-6378

Resource Experts and Staff

John Lilly, State Parks and Recreation Division (SPRD)  
Dr. Leland Gilson (SHPO)

Consulting Resource Experts

Jack Witherspoon, U.S. Bureau of Land Management  
Gene Tomlin, U.S. Forest Service  
Mike Gallagher, consultant

Scope

Archeological sites reviewed in this study include known and estimated prehistoric sites in the state. The study covered every township (36 square miles) in the state.

The data base includes this information for each township:

Range  
Number of Sites  
Percent Surveyed  
Value Class  
River Pattern

Assigning Values

The team plotted data on 1:100,000 maps by township/range units. Each township/range unit was examined and the sites counted within that unit. This represented 2792 points of measurement.

The team judged the degree to which township/range units had been surveyed. The units were given a number between zero and one. For example, if 10 percent of the township/range unit had been surveyed, it was noted as .1.

The number of sites expected within the township/range unit was extrapolated from the known number, the survey level, and unit's potential characteristics as follows:

- known site density from the SHPO quads;
- known survey level from the SHPO quads;

- nearest neighbor extrapolation from similar reach systems:
  - physiographic or geomorphic features that suggest the presence of patterned cultural resources, or;
  - plants and animals that suggest the presence of similar cultural patterns.
- a matrix ratio of 1) the number of sites; 2) the survey level; 3) the extrapolated number of sites; and 4) a confidence interval derived from all variables and judgments.

The team used data from SHPO's site file to generate the maps and matrix. The team received permission to use data about Federal lands. No areas were denied by Federal agencies.

Each township/range unit was given a matrix ratio.

### Examples

If 10 percent of the unit had been surveyed and it contained two known sites, the extrapolated site density from the numeric value would be 20 sites, within the 36 square miles (0.66 sites per square mile). If the sites were found along a major river that cuts through the unit, site density was extrapolated from the river data.

2/.1/20/1/20

Translated, this means 2 sites/10 percent inventory/20 extrapolated sites/a "1" means we are confident that this is a true value of 20 based on physiographic, geographic, floral, and faunal variables.

An adjacent unit has no recorded sites and the area has not been surveyed. The river cuts through this unit. A nearest neighbor density may be projected that may look like this:

0/0/20/N/20

Translated this means no sites/no inventory/20 extrapolated sites/N= nearest neighbor...density based on physiographic, geomorphic, floral, and faunal data.

The high and low scores for the units were rated into value classes. The loading factors for the classes were generated after the matrix was completed.

<u>Value Class</u>	<u>Description</u>
1	Highest potential
2	High potential
3	Medium potential
4	Low potential
5	No potential
U	Unknown potential

#### Mapping the Data

Township/range counts and similarities were put on the map.

Color codes indicate the features that were used for extrapolations if they are compared to the data matrix. The colors apply to river/stream corridors.

No site specific data were put onto the maps.

#### Caution About Using the Data

The significance or research value of many of these sites has not been judged. Many areas of the state have not been surveyed systematically.

Each map produced contains the following warning:

"This information is a crude predictive model. It does not preclude the need to proceed with Section 106 consultation as required for all projects that may affect a cultural resource."

# Recreation



Chapter 9  
Method for Assessing  
Oregon's Rivers for Recreation

Lead Agency

Oregon State Parks and Recreation Division, Oregon Department of Transportation  
525 Trade Street SE  
Salem, OR 97310  
(503) 378-6378

Resource Experts and Staff

John Lilly  
Don Eixenberger  
Al Cook  
Jack Remington

Consulting Resource Experts

Jack Witherspoon, U.S. Bureau of Land Management  
Gene Tomlin, U.S. Forest Service

Scope

The study team assessed recreation for 304 river segments throughout the state. All of the state's major rivers and streams are included in the study. The recreation types are:

1. Power Boatings
2. Canoeing/Kayaking
3. Drift Boating
4. Rafting
5. Sailing/Windsurfing
6. Salmon and Steelhead Fishing
7. Resident Trout Fishing
8. Warm Water Fishing
9. Other, such as hiking, swimming, nature study, hunting, camping, biking, or horseback riding

Assigning Values

Recreation value classes are based on averaged ratings of importance for recreation types on or near river segments.

Ratings were obtained from a mail survey (Appendix 4A). This was sent to 165 groups and 235 persons who know about river recreation in the state. Forty-three percent were public agency staff and land managers. Fifty-seven percent were users: outfitters and guides, fishing, boating, and hiking clubs.

Of the 400 surveys mailed, 165 were returned. Ninety-four of the surveys were received from river users and 71 from government managers.

Respondents were asked to rate nine types of recreation on rivers they were familiar with. The team asked groups to confer with their leaders and members to reach consensus on as many rivers as they could.

The scale was:

Very Important  
Important  
Somewhat Important  
Little Importance  
Not Important or Not Present  
Unknown

Ratings from respondents were averaged for each recreation type on each river segment. The ratings were divided into percentiles and given a value class.

<u>Percentile of Averaged Rating</u>	<u>Value Class</u>
81-100	Outstanding
61-80	Substantial
41-60	Moderate
21-40	Limited
0-20	Little or None

Value classes are based on the highest averaged score each river segment received for any of the nine recreation types.

For example, if a river's highest score was Substantial for "Warm Water Fishing," that river was rated Substantial.. It did not matter that lower scores were assigned for other types of recreation.

The survey listed 186 rivers and river segments. The list was compiled from these sources:

- National Park Service's Nationwide River Inventory;
- Oregon Parks and Recreation Division's list of potential state scenic water ways in the State System Plan;
- Local Comprehensive Land Use Plans: Rivers with Recreation Importance;
- Published information on river recreation.

Respondents could add other rivers they thought should be included in the study.

Salmon, steelhead, and resident trout fisheries and "Other" recreation were the major determinants of the value classes. This is because many respondents added small streams to the list of rivers.

### Caution About Using the Data

Many small streams not reviewed in this study may be important for recreation. These streams may be spawning grounds or nurseries for downstream fish. Also, they may add to water flow and quality for downstream boating and other recreation.

The survey group assured broad participation. The rating process ensured that no recreation resource was left out.

Most of the river and stream segments are rated Outstanding. Note that most are major rivers that are used for recreation.

Most of the smaller streams were added by fishing interests. This necessitates a careful reading of the results. None of the smaller streams was judged by all respondents. Fishing interests tended to judge the Fishery and Other category, but marked boating as "Unknown." The table reflects these responses.

Most of the small streams added by respondents likely are too small for most boating. The net result implies that fishing outweighs all other resources. This is misleading. More rivers were judged for fishing and other recreation rather than boating.

Survey respondents have reviewed ratings. Major concerns are identified in the final report.

# *Legal Constraints*



Chapter 10  
Method for Assessing  
Legal Constraints to Hydro Projects  
on Oregon's Rivers

Lead Agencies

Water Resources Department (WRD) - State and Federal Constraints  
3850 Portland Road NE  
Salem, OR 97310  
(503) 378-3671

Department of Land Conservation and Development (DLCD) - Local Constraints  
1175 Court Street NE  
Salem, OR 97310-0590  
(503) 373-7399

Resource Experts and Staff

Lorraine Stahr (WRD)  
Steve Brutscher (WRD)  
Lloyd Chapman (DLCD)

Consulting Resource Experts

Ed Allen, U.S. Forest Service (USFS)  
Jack Witherspoon, U.S. Bureau of Land Management (BLM)  
All National Forests in Oregon  
State Historic Preservation Office  
Sarah Greene, Pacific Northwest Forest & Range Experiment Station  
Jim Kagan, The Nature Conservancy  
Tom Pansky, Bonneville Power Administration  
John Allen and John Lilly, State Parks & Recreation Division  
Garwin Carlson, Winema National Forest  
Sandy Duncan, Oregon Department of Fish and Wildlife  
County Planning Departments

Scope

Legal constraints reviewed in this study are the Federal and state laws and rules and county land use ordinances that affect hydro projects in the state. The study area covers about 112,000 miles of streams and rivers.

State and Federal Constraints

Constraints reviewed in this section include laws and rules administered by WRD and by the Water Resources Commission (WRC).

Some state laws and rules protect land and water resources managed by the U.S. Forest Service (USFS) and U.S. Bureau of Land Management (BLM). State laws and rules that apply to Federal lands were considered a state constraint.

The team used three major sources to assess state constraints to hydro projects:

- Oregon water laws;
- rules set by WRC (Oregon Administrative Rules, Chapter 690, Divisions 74 and 80); and
- orders of the former State Engineer and State Water Resources Board.

The team compiled data for 18 major river basins.

### Assigning Classes

The team used the following standards to judge which constraint class should be assigned to each river segment, watershed, and drainage basin:

#### Constraint Class 1 - Protected Areas

River reaches within any of the areas below are class one.

##### National

Parks  
Monuments  
Wilderness Areas  
Wild and Scenic Rivers  
Estuarine Sanctuaries  
Research Natural Areas  
Areas of Critical Environmental  
Concern

##### State

Parks  
Wildlife Refuges  
Scenic Waterways  
Natural Heritage Areas

River reaches outside these areas, but protected from hydro projects by state laws or rules, also are class one. This includes streams and rivers withdrawn by WRC's river basin programs or by law. It also includes waters withdrawn by the former State Engineer's Office and the State Water Resources Board.

#### Constraint Class 2 - Areas Proposed for Protection

River reaches in areas that have been proposed for protection by the USFS or BLM are class two.

#### Constraint Class 3 - Restricted Special Management Areas

River reaches affected by any of these areas are class three.

##### National

Wildlife Refuges  
Roadless Areas  
National Historic Sites  
Natural Landmarks  
Campgrounds  
Trails

##### State

Waysides  
Wildlife Management Areas  
State Forests

##### Local

County Parks  
City Parks

Waters not affected by a special management area but with other hydro restrictions also are class three. These restrictions apply to siting, capacity, operation, and standards for in-stream flow.

Constraint Class 4 - Case Specific Conditions

River reaches where hydro projects are not banned by state laws are class four. Proposed projects on these reaches still would have to meet state and federal standards.

Constraint Class 5 - Unclassified

Stream reaches not under any state or federal law are class five. No Oregon streams are in class five. All Oregon waters are covered by constraint classes one through four.

Mapping the Data

Data were plotted on standard BLM 1:100,000 scale maps. The Historic Preservation Office mapped national historic sites.

Caution About Using the Data

State constraints listed in this study were those in place on September 30, 1985. New standards for hydro projects set by the 1985 Legislature took effect on October 1, 1985. Rules to apply the new law were not ready in time to be in this study.

Local Constraints

Scope

Legal constraints reviewed in this section are the county land use ordinances that affect hydro projects in the state. Thirty-six county planning directors and/or staff were asked to take part in this review.

Assigning Classes

Local constraints were grouped into these classes:

<u>Class</u>	<u>Effect of Certain Land Use Plans or Zoning Ordinances</u>	<u>Action Needed to Remove Constraint</u>
1	Prohibits hydro projects	Plan amendment, zoning change, or exception to Goal 3 (agricultural land) or Goal 4 (forest land)
2	Restrictions specific to hydro projects (siting, noise, visibility, etc.)	Approval of conditional use permit by county

3	Small hydro projects allowed with limits on height, amount of power generated, etc.	"	"
4	All hydro projects allowed conditionally	"	"
5	All hydro projects allowed without constraint		Development permit required
Unclassified	Applies to urban and mixed use areas that are hard to map.		

### Mapping the Data

The DLCDC took zoning data from county maps and put them on BLM 1:100,000 scale base maps. These maps show more than 1,000 zones and areas.

For each zone and area, a data record of the constraint class was made. County planning directors have been asked to check these records.

A sample data record is in Appendix 5A. The complete records are available from the DLCDC.

Deschutes, Clackamas, and Multnomah counties have applied special zones to some streams, such as overlay zones. These zones are in the river study's data base, along with state and Federal waterway program constraints.

### Caution About Using the Data

The maps and data from this study should not be used for site-specific reviews. The maps have these limits:

- No zoning within urban growth boundaries is shown.
- Rural residential zones often are combined.
- Overlay zones are not shown, except as described above.
- Where zoning is complex, zones are grouped or plan designations are mapped.

AL/al  
2723J

December 1986

Appendix  
Pacific Northwest Rivers Study:  
Assessment Guidelines  
Oregon

Oregon Department of Energy  
625 Marion Street NE  
Salem, OR 97310  
(503) 378-8327

Appendix 1A  
Resident Fish: Rivers Study Participants

OR Fish & Wildlife

Columbia  
 Warren Knispel  
 Clair Kunkel  
 Doug Taylor  
 Gene Herb  
 Jay Massey

Northwest  
 Jim Greer  
 Wayne Hunt  
 Jim Hutchison  
 Jim Heintz  
 Gene Steward  
 Harold Sturgis  
 John Haxton  
 Jerry MacLeod

Southwest  
 Bill Mullarkey  
 Pete Perrin  
 Rick Werner  
 John Johnson  
 Mick Jennings  
 Dave Liscia

Northeast  
 Jim Phelps  
 Errol Claire  
 Mike Black  
 Greg Hattan  
 Ken Witty  
 Duane West  
 Mike Kemp  
 Glen Ward

Central  
 Jeff Ziller  
 John Toman\*  
 Jim Newton  
 Jim Torlan  
 Harlan Scott  
 Ed Schwartz  
 Norman Behrands  
 Ted Fies

Southeast  
 Frank Grogan  
 Gary Anderson  
 Bill Hosford  
 Bill Olson  
 Steve Pribyl  
 Ron Garner

Forest Service

Mt. Hood  
 Rich Brown  
  
Willamette  
 Ed Harshman  
 Del Skeesick\*

Siuslaw  
 Charlie Phillips  
 Cal Baker  
  
Umpqua  
 Ray Zalunardo

Siskiyou  
 Lee Johnson  
 Roger Mendenhall  
 Don King

Deschutes  
 Bruce McCammon

Winema  
 Garwin Carlson  
 Jack Inman

Ochoco  
 Randy Hickenbottom  
 Bruce Anderson  
 Nancy Lee  
 Shawn Mahoric  
 Grant Gunderson

Malheur  
 Rich Gritz  
 Ann Archie

Umatilla  
 John Andrews

Wallowa-Whitman  
 Rick Hardy  
 Rod Miller  
 Tom Thomas  
 Ralph Anderson  
 Lloyd Ames  
 Carey Crist

Fremont  
 Mike Lohrey  
 Gene Silovsky

Bureau Land Mgt

Salem  
 Wayne Logan\*  
 Bob House\*  
 Roger Monthey  
 Val Crispin

Eugene  
 Ron Smith  
 Neil Armentrout\*  
 Russ Hammer  
 Charlie Thomas\*

Roseburg  
 Joe Lint  
 Frank Oliver

Coos Bay  
 John Anderson  
 Bob Ruediger

Medford  
 Dick Brown

Lakeview  
 Walt DeVoor\*

Burns  
 Ron Wiley\*  
 Fred Taylor  
 Guy Sheeter

Vale  
 Walt VanDyke  
 Mike Grouse  
 Bob Kindschy

Prineville  
 Wayne Elmore  
 Brad Keller

Indian Tribes

Warm Springs & Inter-tribal Fish Commission  
 Chris Stainbrook  
 Louie Pitts  
 Rob Lothrop  
 Alex Heindl\*

Nez Perce  
 Burnie Hill

\* Attended more than one workshop

Appendix 1B  
Resident Game Fish of Oregon

<u>Group*</u>	<u>Common Name</u>	<u>Scientific Name</u>
Trout	Brown Trout	Salmo trutta
	Rainbow Trout	Salmo gairdneri
	Redband Trout	Salmo sp.
	Cutthroat Trout	Salmo clarki
Char	Brook Trout	Salvelinus fontinalis
	Lake Trout	Salvelinus namaychus
	Bull Trout	Salvelinus confluentus
Salmon	Kokanee	Oncorhynchus nerka
Atlantic salmon	Atlantic Salmon	Salmo salar
Whitefish	Mountain Whitefish	Prosopium williamsoni
Catfish	White Catfish	Ictalurus catus
	Channel Catfish	Ictalurus punctatus
	Flathead Catfish	Pylodictus olivaris
	Black Bullhead	Ictalurus melas
	Yellow Bullhead	Ictalurus natalis
	Brown Bullhead	Ictalurus nebulosus
	Blue Catfish	Ictalurus furcatus
Bass	Largemouth Bass	Micropterus salmoides
	Smallmouth Bass	Micropterus solomieu
Sunfish	Pumpkinseed	Lepomis gibbosus
	Bluegill	Lepomis macrochirus
	Warmouth	Chaenobryttus gulosus
	Green Sunfish	Lepomis cyanellus
	Scaramentao Perch	Achoplites interruptus
	Redear Sunfish	Lepomis microlophus
Crappie	White Crappie	Pomoxis annularis
	Black Crappie	Pomoxis nigromaculatus
Green Sturgeon	Green Sturgeon	Acipenser medirostris
White Sturgeon	White Sturgeon	Acipenser transmontanus
Yellow perch	Yellow Perch	Perca flavescens
Walleye	Walleye	Stizostedion vitreum
Mullet	Lost River Sucker	Catostomus luxatus
Striped bass	Striped Bass	Morone saxatilis
	Striped/White Hybrid	Morone sp.
American shad	American Shad	Alosa sapidissima

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\* As listed in ORS 496.009 "Game fish" defined.

Appendix 1C  
Threatened or Engangered, and Resident Fish Species  
of Limited Distribution in Oregon

<u>Common Name</u>	<u>Scientific Name</u>	<u>Status*</u>
Hutton Spring Tui Chub	<i>Gila bicolor</i> ssp.	1,3,4
Borax Lake Chub	<i>Gila boraxobius</i>	1,3,4
Foskett Spring Dace	<i>Rhinichthys osculus</i> ssp.	1,3,4
Jenny Creek Sucker	<i>Catostomus rimiculus</i> ssp.	2,3
Warner Sucker	<i>Catostomus warnerensis</i>	2,3,4
Shortnose Sucker	<i>Chasmistes brevirostris</i>	2,3
Alvord Cutthroat Trout	<i>Salmo Clarki</i> ssp.	3
Tahoe Sucker	<i>Catostomus tahoensis</i>	3
Alvord Chub	<i>Gila alvordensis</i>	3
Catlow Tui Chub	<i>Gila bicolor</i> ssp.	2,3
Lahontan Redside	<i>Richardsonius egregius</i>	3
California Roach	<i>Hesperoleucus symmetricus</i>	3
Sheldon Tui Chub	<i>Gila bicolor eurysoma</i>	2,3
Oregon Lakes Tui Chub	<i>Gila bicolor oregonensis</i>	2
Summer Basin Tui Chub	<i>Gila bicolor</i> ssp.	2
Oregon Chub	<i>Hyboscus crameri</i>	2
Goose Lake (Sacramento) Sucker	<i>Catostomus occidentalis</i> ssp.	2
Klamath Largescale Sucker	<i>Catostomus snyder</i>	2
Malheur Mottled Sculpin	<i>Cottus bairdi</i>	2
Pit Sculpin	<i>Cottus pitensis</i>	3

\*STATUS:

- 1) Endangered Species Act: Endangered or Threatened List, July 27, 1983, up dated March 28, 1985
- 2) Candidate Species for addition to the Endangered or Threatened List, December 30, 1982
- 3) Special Species List from Natural Heritage Plan, ORS 273.561-591
- 4) Protected Nongame, OAR 635-44-130



Appendix 1E  
Resident Fish: Habitat and Stream Characteristics

Stream Zone

- A - Steep gradient, boulders, straight channel
- B - Moderate gradient, gravel/cobble, braided channel
- C - Slight gradient, fine sediments, meandering channel

Land Use

- A - Agriculture
- F - Forestry
- G - Grazing
- M - Mining
- Z - Rural Residential
- U - Urban
- I - Industrial
- R - Recreation

Diversity (structure, cover, pool/riffle)

- A - High
- B - Moderate
- C - Low

Flow Regulation

- A - Unregulated
- B - Regulated
- C - Highly Regulated

Temperature

- A - Hardly ever above 70° F
- B - Occasionally above 70° F
- C - Often above 70° F

Riparian Cover

- A - Above 75%
- B - 25% - 75%
- C - Below 25%

Streambank Erosion

- A - Below 25%
- B - 25% - 75%
- C - Above 75%

Appendix 2A  
Wildlife: Rivers Study Participants

<u>OR Fish &amp; Wildlife</u>	<u>Forest Service</u>	<u>Bureau Land Mgt</u>	<u>Indian Tribes</u>
<u>Columbia</u> Warren Knispel Clair Kunkel Doug Taylor Gene Herb Jay Massey	<u>Mt. Hood</u> Rich Brown  <u>Willamette</u> Ed Harshman Del Skeesick*	<u>Salem</u> Wayne Logan* Bob House* Roger Monthey Val Crispin	<u>Warm Springs &amp; Inter-tribal Fish Commission</u> Chris Stainbrook Louie Pitts Rob Lothrop Alex Heindl*
<u>Northwest</u> Jim Greer Wayne Hunt Jim Hutchison Jim Heintz Gene Steward Harold Sturgis John Haxton Jerry MacLeod	<u>Siuslaw</u> Charlie Phillips Cal Baker  <u>Umpqua</u> Ray Zalunardo  <u>Siskiyou</u> Lee Johnson Roger Mendenhall Don King	<u>Eugene</u> Ron Smith Neil Armentrout* Russ Hammer Charlie Thomas*  <u>Roseburg</u> Joe Lint Frank Oliver  <u>Coos Bay</u> John Anderson Bob Ruediger  <u>Medford</u> Dick Brown  <u>Lakeview</u> Walt DeVoor*	<u>Nez Perce</u> Burnie Hill
<u>Southwest</u> Bill Mullarkey Pete Perrin Rick Werner John Johnson Mick Jennings Dave Liscia	<u>Deschutes</u> Bruce McCammon  <u>Winema</u> Garwin Carlson Jack Inman		
<u>Northeast</u> Jim Phelps Errol Claire Mike Black Greg Hattan Ken Witty Duane West Mike Kemp Glen Ward Jerry Grover	<u>Ochoco</u> Randy Hickenbottom Bruce Anderson Nancy Lee Shawn Mahoric Grant Gunderson  <u>Malheur</u> Rich Gritz Ann Archie	<u>Burns</u> Ron Wiley* Fred Taylor Guy Sheeter  <u>Vale</u> Walt VanDyke Mike Grouse Bob Kindschy	
<u>Central</u> Jeff Ziller John Toman* Jim Newton Jim Torlan Harlan Scott Ed Schwartz Norman Behrands Ted Fies	<u>Umatilla</u> John Andrews  <u>Wallowa-Whitman</u> Rick Hardy Rod Miller Tom Thomas Ralph Anderson Lloyd Ames Carey Crist	<u>Prineville</u> Wayne Elmore Brad Keller	
<u>Southeast</u> Frank Grogan Gary Anderson Bill Hosford Bill Olson Steve Pribyl Ron Garner	<u>Fremont</u> Mike Lohrey Gene Silovsky		

\* Attended more than one workshop

Appendix 2B  
Game Mammals, Furbearing Mammals, and Game Birds of Oregon

Group	Species*
Game Mammals:	Antelope Black Bear Cougar Deer Elk Mountain Goat Mountain Sheep Silver Gray Squirrel
Furbearing Mammals:	Beaver Bobcat Fisher Marten Mink Muskrat Otter Raccoon Red Fox Gray Fox
Game Birds:	Swans Geese Brant Ducks Mourning Doves Bandtailed pigeons Grouse Ptarmigan Pheasants Quail Partridge Wild Turkey Snipe Cranes Rails Gallinules Coots

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\*As listed in ORS 496.004 and 496.007

Appendix 2C  
Threatened or Endangered, and Wildlife Species  
of Limited Distribution in Oregon

<u>Common Name</u>	<u>Scientific Name</u>	<u>Status*</u>
<u>Birds:</u> "any nongame bird except starling and house sparrow"		4
Aleutian Canada Goose	<i>Branta canadensis leucopareia</i>	1,3,6
Bald Eagle	<i>Haliaeetus Leucocephalus</i>	1,3,6
American Peregrine Falcon	<i>Falco peregrinus</i>	1,3,6
California Least Tern	<i>Sterna antillarum browni</i>	1
White-faced Ibis	<i>Plegadis chihi</i>	2,3,5
Swainson's Hawk	<i>Buteo swainsoni</i>	2,3,5
Ferruginous Hawk	<i>Buteo regalis</i>	2,3
Western Snowy Plover	<i>Charadrius alexandrinus nivosus</i>	2,3,5,6
Western Yellow-billed Cuckoo	<i>Coccyzus americanus occidentalis</i>	2,3,5
Tricolored Blackbird	<i>Agelaius tricolor</i>	2
Long-billed Curlew	<i>Numenius americanus</i>	2,3
Upland Sandpiper	<i>Bartramia brevirostris</i>	3
Ring-necked Duck (nesting)	<i>Aythya collaris</i>	3
Bufflehead (nesting)	<i>Bucephala albeola</i>	3
Caspian Tern	<i>Hydropogone caspia</i>	3
White Pelican	<i>Pelecanus erthrorhynchos</i>	3
Horned Grebe	<i>Podiceps auritus</i>	3
Red-necked Grebe	<i>Podiceps grisegena</i>	3
Barred Owl	<i>Strix varia</i>	3
Great Egret	<i>Casmerodius albus</i>	3
Bobolink	<i>Dolichonyx oryzivorus</i>	3
Snowy Egret	<i>Egretta thula</i>	3
Black-necked Stilt	<i>Himantopus mexicanus</i>	3
Black Rosey Finch	<i>Leucosticte atrata</i>	3
Warner Valley Plain Titmouse	<i>Parus inornatus zaleptus</i>	3
Blue-grey Gnatcatcher	<i>Polioptila caerulea</i>	3
Lewis' Woodpecker	<i>Melanerpes lewis</i>	3,5
Merlin	<i>Falco columbarius</i>	3
Least Bittern	<i>Ixobrychus exilis</i>	3
Wallowa Gray-crowned Rosy Finch	<i>Leucosticte tephrocotis wallowa</i>	3
Purple Martin	<i>Progne subis</i>	3,5
Western Bluebird	<i>Sialia mexicana</i>	3,5
Spotted Owl	<i>Strix occidentalis</i>	3,5,6
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	3
Spruce Grouse	<i>Canachites canadensis</i>	3
Yellow Rail	<i>Coturnicops noveboracensis</i>	3
Black-shouldered Kite	<i>Elanus leucurus</i>	3
Sharp-tailed Grouse	<i>Pedioecetes phasianellus</i>	3,5
Common Loon	<i>Gavia immer</i>	5
Tundra Swan	<i>Olor buccinator</i>	5
Greater Sandhill Crane	<i>Grus canadensis tabida</i>	5
Great Gray Owl	<i>Strix nebulosa</i>	5
Willow Flycatcher	<i>Empidonax traillii</i>	5
Loggerhead Shrike	<i>Lanius ludovicianus</i>	5
Yellow Warbler	<i>Dendroica petechia</i>	5
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	3
Harlequin Duck	<i>Histrionicus histrionicus</i>	3
Black Phoebe	<i>Sayornis nigricans</i>	3

## Appendix 2C (continued)

<u>Common Name</u>	<u>Scientific Name</u>	<u>Status*</u>
<u>Mammals</u>		
Columbia White-tailed Deer	<i>Odocoileus virginianus leucurus</i>	1,3,6
Spotted Bat	<i>Euderma maculatum</i>	2,3
Wolverine	<i>Gulo gulo</i>	3,4,6
Fisher	<i>Martes pennanti</i>	3,4
Northern Elephant Seal	<i>Mirounga angustirostris</i>	3,4
Kit Fox	<i>Vulpes macrotis</i>	3,4,6
Sea Otter	<i>Enhydra lutris</i>	3,4,6
Ringtail Cat	<i>Bassariscus astutus</i>	4
Cony (pika)	<i>Ochotona princeps</i>	4
<u>Amphibians and Reptiles</u>		
Larch Mountain Salamander	<i>Plethodon larselli</i>	2,3,4
Siskiyou Mountain Salamander	<i>Plethodon stormi</i>	2,4
Pacific Giant Salamander	<i>Dicamptodon ensatus</i>	3
Western Ground Snake	<i>Sonora semiannulata</i>	3
Black Salamander	<i>Aneides flavipunctatus</i>	4
Oregon Slender Salamander	<i>Batrachoseps wrighti</i>	4
Tailed Frog	<i>Ascaphus truei</i>	4
Western Spotted Frog	<i>Rana pretiosa</i>	4,6
Collared Lizard	<i>Crotaphytus collaris</i>	4
Leopard Lizard	<i>Crotaphytus wislizenii</i>	4
Short-horned Lizard	<i>Phrynosoma douglassi</i>	4
Sharp-tailed Snake	<i>Contia tenuis</i>	4
California Mt. Kingsnake	<i>Lampropeltis zonata</i>	3
Western Pond Turtle	<i>Clemmys marmorata</i>	3

\*Status

- 1) Endangered Species Act: Endangered or Threatened List, July 27, 1983.
- 2) Candidate Species for addition to the Endangered or Threatened List, December 30, 1982.
- 3) Special Species List from Natural Heritage Plan, ORS 273.561-591.
- 4) Protected Nongame, OAR 635-44-130.
- 5) Sensitive Bird Species pamphlet, July 1982 by U.S. Fish and Wildlife Service, Portland.
- 6) Oregon species classed as Threatened or Endangered as adopted by Oregon Wildlife Commission, January 10, 1975.



Appendix 2E  
Wildlife: Habitat and Stream Characteristics

Land Use

- A - Agriculture
- F - Forestry
- G - Grazing
- M - Mining
- Z - Rural Residential
- U - Urban
- I - Industrial
- R - Recreational

Diversity (Habitat and Wildlife)

- A - High
- B - Moderate
- C - Low

Communities of special concern

- A - River islands
- B - Well developed riparian vegetation
- C - Old-growth cottonwood bottoms
- D - Old-growth coniferous bottoms
- E - Ox-bow sloughs
- F - Other, please specify

Important seasonal habitats

- A - Occupied by threatened, endangered or limited distribution species
- B - Big game winter range
- C - Nesting habitats
- D - Occupied by species of special interest or concern
- E - Other, please specify

Minor disturbances

Habitats with minor, man-made disturbances but still valuable as wildlife habitat

Major disturbances

Evidence of major man-caused disturbances and little change to regenerate vegetation

Appendix 3A  
Plant Species Cited in Rivers Study

Agastache cusickii var. cusickii  
Agoseris elata  
Agrostis howellii  
Allium bolanderi  
Allium brandegei  
Allium campanulatum  
Allium geyeri var. geyeri  
Allium macrum  
Allium madidum  
Allium pleianthum  
Allium robinsonii  
Allium tolmiei var. platyphyllum  
Arabis furcata  
Arabis koehleri var. stipitata  
Arabis macdonaldiana  
Arabis modesta  
Arabis sparsiflora var. atrorubens  
Arctostaphylos hispidula  
Arenaria franklinii var. thompsonii  
Argemone munita ssp. rotundata  
Arnica viscosa  
Artemisia ludoviciana ssp. estesii  
Artemisia packardiae  
Artemisia papposa  
Asplenium septentrionale  
Aster curtus  
Aster vialis  
Astragalus atratus var. owyheensis  
Astragalus calycosus  
Astragalus collinus var. laurentii  
Astragalus diaphanus  
Astragalus hoodianus  
Astragalus mulfordae  
Astragalus peckii  
Astragalus reventus var. reventus  
Astragalus robbinsii var. alpiniformis  
Astragalus solitarius  
Astragalus sterilis  
Astragalus tegetarioides  
Astragalus umbraticus  
Balsamorhiza rosea  
Balsamorhiza sericea  
Bensoniella oregona  
Betula papyrifera var. commutata  
Bolandra oregana  
Botrychium boreale  
Botrychium lanceolatum  
Botrychium lunaria  
Botrychium simplex  
Brodiaea ida-maia  
Brodiaea laxa  
Calamagrostis breweri  
Calochortus greenei  
Calochortus howellii

Appendix 3A (continued)

Calochortus indecorus  
 Calochortus longebarbatus var. longebarbatus  
 Calochortus longebarbatus var. peckii  
 Carex concinna  
 Carex limnophila  
 Carex macrochaeta  
 Carex scabriuscula  
 Castilleja chlorotica  
 Castilleja levisecta  
 Castilleja steenensis  
 Castilleja xanthotricha  
 Chaenactis cusickii  
 Chaenactis nevii  
 Cheilanthes feei  
 Collomia macrocalyx  
 Collomia mazama  
 Corallorhiza trifida  
 Corydalis aquae-gelidae  
 Cryptantha leucophaea  
 Cryptantha propria  
 Cupressus bakeri  
 Cymopterus bipinnatus  
 Cypripedium californicum  
 Cypripedium fasciculatum  
 Delphinium leucophaeum  
 Delphinium pavonaceum  
 Dentaria gemmata  
 Dicentra formosa var. oregana  
 Draba sphaeroides var. cusickii  
 Dryopteris filix-mas  
 Epilobium oreganum  
 Epilobium rigidum  
 Erigeron cervinus  
 Erigeron chrysopsidis var. brevifolius  
 Erigeron decumbens var. decumbens  
 Erigeron decumbens var. robustior  
 Erigeron engelmannii var. davisii  
 Erigeron howellii  
 Erigeron oreganus  
 Eriogonum crosbyae  
 Eriogonum cusickii  
 Eriogonum ochrocephalum ssp. calcareum  
 Eriogonum prociduum  
 Eriogonum salicornioides  
 Eriogonum scopulorum  
 Eriogonum ternatum  
 Erythronium howellii  
 Eschscholzia caespitosa  
 Filipendula occidentalis  
 Frasera umpquaensis  
 Fritillaria gentneri  
 Fritillaria glauca  
 Gentiana bisetata  
 Gentiana newberryi  
 Gratiola heterosepala

Appendix 3A (continued)

Habenaria obtusata  
Habenaria orbiculata  
Hackelia cronquistii  
Hackelia ophiobia  
Haplopappus radiatus  
Haplopappus whitneyi ssp. discoideus  
Hastingsia bracteosa  
Heuchera grossularifolia var. grossularifolia  
Hieracium bolanderi  
Hieracium longiberbe  
Horkelia hendersonii  
Howellia aquatilis  
Hydrocotyle verticillata  
Hymenoxys cooperi var. canescens  
Iliamna latibracteata  
Ivesia rhypara  
Juncus gerardii  
Juncus supiniformis  
Lasthenia macrantha ssp. prisca  
Lathyrus delnorticus  
Lathyrus holochlorus  
Leptodactylon hazelae  
Lesquerella kingii ssp. diversifolia  
Lewisia columbiana var. columbiana  
Lewisia cotyledon var. purdyi  
Lewisia leana  
Lewisia oppositifolia  
Lilium occidentale  
Lilium parvum  
Limnanthes floccosa ssp. bellingeriana  
Limnanthes gracilis var. gracilis  
Lobelia dortmanna  
Lomatium bradshawii  
Lomatium farinosum var. hambleniae  
Lomatium laevigatum  
Lomatium nelsonianum  
Lomatium rollinsii  
Lomatium salmoniflorum  
Lomatium suksdorfii  
Lomatium tracyi  
Lomatium watsonii  
Luina serpentina  
Lupinus biddlei  
Lupinus burkei ssp. caeruleomontanus  
Lupinus cusickii  
Lupinus sabinii  
Lupinus sericeus var. egglestonianus  
Lycopodium annotinum  
Lycopodium inundatum  
Lycopodium selago  
Melica stricta  
Mentzelia mollis  
Mentzelia packardiae  
Microcala quadrangularis  
Microseris detlingii

Appendix 3A (continued)

Microseris howellii  
Mimulus clivicola  
Mimulus douglasii  
Mimulus hymenophyllus  
Mimulus jungermannioides  
Mimulus kelloggii  
Mimulus patulus  
Mimulus tricolor  
Mimulus "washingtonensis"  
Mirabilis macfarlanei  
Monardella purpurea  
Ophioglossum vulgatum  
Oryzopsis hendersonii  
Pedicularis howellii  
Pellaea andromedaefolia  
Pellaea bridgesii  
Penstemon barrettiae  
Penstemon davidsonii var. praeteritus  
Penstemon eriantherus var. argillosus  
Penstemon peckii  
Penstemon spatulatus  
Perideridia erythrorhiza  
Perideridia howellii  
Phacelia argentea  
Phacelia gymnoclada  
Phacelia leonis  
Phacelia lutea var. mackenzieorum  
Phacelia minutissima  
Phacelia verna  
Phlox multiflora  
Pinus flexilis  
Plagiobothrys hirtus var. hirtus  
Plagiobothrys lamprocarpus  
Plagiobothrys salsus  
Pleuropogon oregonus  
Poa laxiflora  
Poa marcida  
Poa piperi  
Polystichum californicum  
Primula cusickiana  
Ranunculus austro-oreganus  
Ranunculus oresterus  
Ribes irriguum  
Ribes klamathense  
Romanzoffia thompsonii  
Rorippa columbiae  
Rubus bartonianus  
Salix bebbiana  
Salix delnortensis  
Salix tracyi  
Sedum laxum ssp. heckneri  
Sedum moranii  
Sedum spathulifolium ssp. purdyi  
Senecio ertterae  
Senecio hesperius

Appendix 3A (continued)

Sidalcea campestris  
Sidalcea cusickii  
Sidalcea hirtipes  
Sidalcea malvaeflora ssp. patula  
Sidalcea nelsoniana  
Sidalcea setosa ssp. setosa  
Silene hookeri ssp. bolanderi  
Silene nuda ssp. insectivora  
Silene scaposa ssp. scaposa  
Smilax californica  
Sophora leachiana  
Streptanthus howellii  
Streptopus streptopoides  
Stylocline psilocarphoides  
Suksdorfia violacea  
Sullivantia oregana  
Synthyris missurica ssp. hirsuta  
Tauschia stricklandii  
Thelypodium brachycarpum  
Thelypodium eucosmum  
Thelypodium howellii ssp. spectabilis  
Thlaspi montanum var. siskiyouense  
Trifolium leibergii  
Trifolium owyheense  
Viola lanceolata ssp. occidentalis

Appendix 3B  
Riparian Plant Associations

Oregon Ash bottomland woodlands

Alder, Cottonwood and Willow woodlands

Cherry, Hawthorne and Willow thickets and woodlands

Quaking Aspen groves

Shrub dominated bogs and wetlands

Rush, sedge and herb dominated bogs, fens and wetlands

Bulrush and Cattail marshes

Appendix 3C  
Hydrologic and Geologic Features

Undeveloped river/stream segments

Outstanding waterfalls and/or gorges

Hot or warm springs

Exceptional paleontological/fossil localities

Unstable soil areas

Other exceptional geologic features

Appendix 3D  
Natural Features: Information Packet Sent to  
Participating Federal Agencies and Tribes

To: Agency Rivers Study Coordinators

From: Natural Features Staff  
Oregon Natural Heritage Data Base  
1234 NW 25th Avenue  
Portland, Oregon 97210  
(503) 228-9550

The Oregon Natural Heritage Data Base has been contracted to produce the Natural Features section of the BPA Rivers Study. The Forest Service and Bureau of Land Management have received funds to assist the Natural Features staff in the compilation of information. This memo will serve to instruct you and your staff as to what assistance we desire from you in the project.

The enclosed chapter from the manual for the Rivers Study entitled "Method for Assessing the Significance of River Segments and Systems for Natural Features Resources in Oregon" describes the two categories of natural features that will be addressed in this aspect of the study: 1) botanical features, and 2) hydrological/geological features. Two types of botanical features information are to be included in the completed study--rare, threatened and endangered plant species found in river-related habitats, and exceptional examples of native plant associations found in riparian zones. Federal agencies are being asked to supply information on riparian plant associations found on lands under their jurisdiction and on exceptional hydrological/geological features, especially unstable soil areas within riparian zones. We in turn will be responsible for the rare, threatened and endangered plant information and for the final report on natural features.

A list of riparian zone plant associations can be found in Table II (p. 6c) of the Natural Features chapter. What determines an exceptional example of a riparian community is fairly subjective, although guidelines are given on page 2 of the above mentioned chapter. The riparian community must lie within 1000' of the bank of the river or stream and be of sufficient size to be self-sustaining, i.e., able to repair itself after natural disturbance such as periodic flooding. The successional stage of the community in question should be at least mid-seral to ensure that a full complement of natural species is present and to provide sufficient structural diversity to the system. We are relying on the expertise of the personnel in each District to make the judgement whether a particular location qualifies as an "exceptional" example of riparian vegetation for the region. We will gladly assist you individually on particular problems you may encounter in the assessment of the streams and rivers under your jurisdiction.

### Appendix 3D (continued)

With regard to hydrological and geological features we are principally relying on the Federal agencies to provide information on areas of unstable soils that lie in riparian zones. This information should be readily available to you through the soils experts on the District and on relevant soils maps. We are not trying to discourage you from also providing information on outstanding geological and hydrological formations that may occur on your District (see Table III, p.6d of Natural Features section), but we have other sources for this type of information and realize that to make best use of your limited time for this project this information is a lower priority for us.

The question of what constitutes a river or stream for this project can best be addressed by the 1:100,000 scale maps we have been provided by BPA. This scale roughly corresponds to maps of 1/2 inch to the mile. Thus you will need to assess rivers and streams that appear on this scale of map. On the data sheet (see attachment), under Stream/River Segment, you should define the segment in which the natural feature(s) occur by locating it between two readily distinguishable geographic locations that appear on the map. A segment may be defined as an entire stream, for instance, or an entire drainage of a small tributary, or a 10 mile stretch of a major river. There is no need to record a segment or stream if there are no natural features (exceptional riparian habitats or unstable soil areas) occurring along it.

The data sheets are provided for your convenience and to assist us in compiling the information into a final report. In recording your information please feel free to add any relevant comments on a particular natural feature occurrence that you may have. For instance, if a riparian area is a noted wildlife habitat, please indicate it as such, or if it is the absolute best site on the District, we need to know that. This will help us in making our final assessment of each segment of river or stream. Under the column headed "Natural Features" please indicate the type of riparian plant association (see Table II of the chapter) that occurs along the segment. Again if more specific information regarding the riparian plant association is available we would appreciate it being included. Attached is an example of a recorded natural feature on a sample data sheet.

The Forest Service and Bureau of Land Management will be playing an integral part in the Rivers Study information gathering process for natural features and we look forward to your involvement. It should be remembered that we are only asking you for information and do not expect an evaluation of the river segments. If you feel that it would be more efficient to provide the information requested of you for the natural features portion of the Rivers Study via telephone please contact us. We also are available to answer any questions you may have of the project; and we can meet with you individually on the District if necessary.

Appendix 3E  
Natural Features: Rivers Study  
Participants and References

Academic and agency personnel listed below were interviewed by mail, telephone, and in person for natural features information not currently held by the Oregon National Heritage Data Base.

Subsequently, locations of natural features were plotted on maps and summarized in tabular form. Finally, value classes were assigned to stream/river segments based on the four criteria discussed previously.

The final product of tables and maps assessing natural features in Oregon was reviewed by qualified people from natural resource agencies around the state.

Federal agency contacts

Bureau of Land Management

Baker Resource Area	Kent Woodruff	Baker
Burns District	Josh Warburton	Burns
Coos Bay District	Reg Pullen	Coos Bay
Eugene District	Mei Clausen	Eugene
Lakeview District	Bill Cannon	Lakeview
Medford District	Bob Bessey	Medford
Prineville District	Gerald Magnuson	Prineville
Roseburg District	Bob Alverts	Roseburg
Salem District	Bob Bright	Salem
Vale District	Bob Kindschy	Vale

Forest Service

Deschutes National Forest	Bruce McCannon	Bend
Fremont National Forest	Gene Silovsky	Lakeview
Malheur National Forest	Rich Gritz	John Day
Mt. Hood National Forest	Rich Wheeler	Gresham
Ochoco National Forest	Bruce Anderson	Prineville
Rogue River National Forest	Jim Wolfe	Medford
Siskiyou National Forest	Mark Anderson	Grants Pass
Siuslaw National Forest	Jim Reim	Corvallis
Umatilla National Forest	John Andrews	Pendleton
Umpqua National Forest	Steve Hofford	Roseburg
Wallowa Whitman National Forest	Rod Miller	Baker
Willamette National Forest	Del Skeesick	Eugene
Winema National Forest	Garwin Carlson	Klamath Falls

Appendix 3E (continued)

Other Agencies Contacted

Columbia River Inter-Tribal Fish Commission, Rob Lothrop, Portland

Oregon Department of Forestry, Logan Jones, Salem.

U.S. Fish & Wildlife Service, Dick Giger, Portland.

Other Persons Contacted

Dr. John Eliot Allen, professor emeritus of Geology, Portland State University.

Peter Brown, Oregon Museum of Science and Industry, Portland. Paleontologic sites.

Don Parks, Geologic Society of the Oregon Country, Portland.

Oregon Grotto Group, Portland. Cave sites.

References

National Park Service, Pacific Northwest Region, Seattle, Washington - Undeveloped river reaches.

Office of State Historic Preservation, Salem - Cave sites

Oregon Department of Geology and Mineral Industries. 1982. "Map of Geothermal Resources of Oregon." Portland.

Oregon Natural Heritage Data Base. The Nature Conservancy, Portland.

Orr, William and Elizabeth. 1981. Handbook of Oregon Plant and Animal Fossils. Eugene.

Plumb, Gregory. 1983. Waterfalls of the Pacific Northwest. The Writing Works. Seattle, Washington.

Steere, Margaret (ed.). 1977. Fossils in Oregon. Oregon Department of Geology and Mineral Industries. Portland.

Appendix 4A  
Recreation: Instructions For Filling Out  
the Rivers Study Questionnaire

The rivers listed here are the major streams in each of the 18 river basins as recognized by the Water Resources Department. If you have recreation information for additional streams, please use the space at the end of the list.

#### Source of Information

If you have no information about a specific river or river segment, mark "0" in the box and continue with the next river. If you have information based on personal recreational use, write a "1" in the box and answer the questions for that river. If you have not used the river for recreation but have knowledge about it, mark a "2" and continue rating it.

#### Rating of Recreational Quality

The quality of recreational resources varies from river to river. In this section of the survey, we ask you to consider the recreational resources of a river segment according to six general recreational qualities (defined below). For each quality, rate the river's importance in providing that quality. If you feel you have insufficient information to rate a given quality, simply mark "0" for that quality and go on to the next quality.

Using your own judgement, rate the importance of each quality using the following five point scale:

0. Unknown
1. Not important or not present
2. Little importance
3. Somewhat important
4. Important
5. Extremely important

#### Definition of Qualities

##### 1. Boating Quality

Here the focus should be on the general quality of the boating opportunity itself apart from any other associated recreational use. Please consider all possible boating use, not just your personal preference. For example, you may value the challenge of whitewater boating but know a particular river offers an easy float of high quality for the novice. Rate the importance of each river in terms of its unique place in the range of possible experiences.

##### 2. Fishing Quality

Rate the importance of recreational fishing qualities that you have knowledge of for each river. Again, rate the river in terms of its individual characteristics. Some rivers may be principally a warm-water fishery, others offer resident trout, still others offer anadromous steelhead and salmon, while others offer a diversity of recreational fishing opportunities.

Appendix 4A (continued)

3. Other Recreational Qualities

Rate the quality of recreational opportunities on the river independent from the boating and fishing qualities. These include such things as hiking, swimming, nature viewing, hunting, primitive camping, bicycling, horseback riding, etc.

4. Scenic Qualities

The scenic qualities along a river can be an important aspect of recreation. Rate the quality of the visual aspects of the river and its surroundings, whether man made developments are present or not.

5. Primitive Qualities

Degree of primitiveness can be an important aspect of recreation. Rate the quality of the river in providing a wilderness-like setting where man-made developments are absent or minimal.

6. Developed Recreational Facilities

Along many rivers, the presence of developed facilities such as campgrounds, picnic sites, restrooms, boatramps and trails are an important component to recreational use of the river. On other rivers, they may be less crucial. Please rate the importance of such facilities for each river.

Ease of Access

Now we'd like you to consider public access to the river for recreational purposes. Access for boating purposes may differ from that for non-boating bank use. Rate the two separately using the following scale:

1. Poor access, severely limits desired use
2. Adequate, but some limitation of desired use.
3. Good, little or no limitation to use.

Again, if you have no knowledge about one or both types of access, mark a "0" and continue on with the survey.

1. Public Boating Access

Consider the number and location of roads and public put-ins and take-outs, and whether they allow appropriate boating opportunities on the river.

2. Non-Boating Bank Access

Rate the public access for non-boating recreational activity - the degree to which the banks are not obstructed or closed to the public for such things as fishing, hiking, primitive camping, etc.

Appendix 4A (continued)

Degree of Recreation Use

Finally, please give your perception of the degree of recreational use of the river. Use the following scale:

0. Unknown
1. Extremely low use
2. Low use
3. Moderate use
4. High use
5. Extremely high use

Rate the following:

1. Motor or powered boats, jet sleds
2. Drift boats, inflatable rafts, canoes, kayaks, etc.
3. Sail boats, sail boards
4. Non-boating bank use

## Appendix 5A

Hood River County  
Department of Land Conservation and Development's Rivers Data Base

<u>County</u>	<u>City</u>	<u>Label</u>	<u>Description</u>	<u>Designation</u>	<u>Acres</u> <u>Est.</u>	<u>Acres</u> <u>Rep.</u>	<u>Lot</u> <u>Size</u>	<u>HP</u> <u>Use</u>	<u>Citation</u>
Hood River		HRF1	Forest F-1 Zone	Forestry			40	3	5.20c
Hood River		HRF2	Primary Forest F-2 Zone	Forestry			80	3	6.20c
Hood River		HRA1	EFU Zone	Agriculture			20	4	7.40c
Hood River		HRR1	Residential Zones	Rural Res.					
Hood River		HRI1	Industrial M-1 Zone	Industrial				1	
Hood River		HRC1	Rural Commercial Zone	Commercial				1	
Hood River	Cascade Locks	HRU1	Cascade Locks UGB	Urban				U	
Hood River	Hood River	HRU2	Hood River UGB	Urban				U	
Hood River		HRI2	Light Industrial M-2 Zone	Industrial					
Hood River		HRS1	Parkdale	Rural Ser. Cen.				1	
Hood River		HRS2	Oak Grove	Rural Ser. Cen.			.5	1	
Hood River		HRS3	Airport	Airport					
Hood River		HRN1	Environmental Protection	Floodplain				4	43.20
Hood River		HRN2	Country Club	Park/Rec.			20	1	

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