# GRANDE RONDE RIVER BASIN

# FISH HABITAT IMPROVEMENT IMPLEMENTATION PLAN


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## CONTENTS

LIST OF TABLES

LIST OF FIGURES

**ABSTRACT**

A basin habitat improvement program designed to maximize production of summer/spring chinook and summer steelhead within the Grande Ronde River Basin is being implemented by the Oregon Department of Fish and Wildlife (ODFW) and the Wallowa Whitman National Forest. This implementation plan was prepared by the ODFW to facilitate accomplishment of the program on private (nonfederal) lands in the most cost effective manner possible. This plan identifies existing habitat problems, solutions, goals and objectives, priorities, estimated project costs and associated fishery benefits. This plan will periodically be reviewed and updated. Modifications to this plan may then be made based on new information, operational experience and/or new program directives resulting from completion of the Grande Ronde Basin Plan. All modifications will be subject to review and approval by the Bonneville Power Administration.

The program provides for treatment of approximately 66 miles of stream habitat from 1988 to 1991. The primary factor limiting chinook and steelhead production is rearing habitat. Five primary factors have been identified which affect the quality and/or quantity of rearing habitat. These factors are: 1) high summer water temperatures, 2) low summer flows, 3) lack of riparian vegetation, 4) lack of habitat diversity, and 5) poor channel stability. Most limiting factors are inter-related. Treatment techniques to be implemented to mitigate these limiting factors are: a) construction of approximately 100.4 miles of riparian fence, b) planting 35 miles of stream bank, c) placing instream structures in 31.75 miles of stream and d) constructing approximately 60 off-site watering developments. (Tables 10 and 11.)

Factors taken into account when developing an implementation schedule and project priorities included: a) species of interest, b) benefits to fish, c) project orientation, d) cost effectiveness, e) landowner acceptance and cooperation, and f) logistic constraints.

## INTRODUCTION

The Oregon Department of Fish and Wildlife (ODFW) and U.S.Forest Service (USFS) are working cooperatively to restore salmonid spawning and rearing habitats in the Grande Ronde River Basin to optimum conditions. The ODFW is undertaking projects on private (non-federal) lands, while the USFS is undertaking similar projects on federal lands. This cooperative, multi-year fish habitat enhancement program was initiated in the Grande Ronde River Basin in 1984. Funds for these projects are being provided by the Bonneville Power Administration (BPA) as part of the Columbia River Basin Fish and Wildlife Program, measure 704 (d)(1), Grande Ronde River Basin.

The **goal** of this program is to optimize spring/summer chinook and summer steelhead smolt production within the Grande Ronde River Basin using habitat enhancement measures. Accomplishing this goal will partially mitigate mainstem losses due to the Columbia River hydroelectric system.

To facilitate accomplishing this goal in the most cost effective manner possible, an implementation plan identifying habitat problems and solutions, program priorities and costs, and fishery benefits has been prepared. The objectives of this implementation plan are:

1. Identify the major factors limiting chinook and steelhead production in the Grande Ronde River Basin.
2. Present strategies to modify those limiting features and increase chinook and steelhead production.
3. Present a schedule and rationale for implementation of habitat improvement activities.
4. Present implementation cost estimates for budget planning purposes.
5. Estimate fishery benefits from habitat improvements.

Streams needing riparian enhancement work within the Joseph Creek and upper Grande Ronde River subbasins have been identified in Tables 1 and 2. Only part of these streams, however, will receive enhancement work within the time constraints of this Implementation Plan; work on streams not specifically addressed in this Implementation Plan will occur after March 31, 1992. This Implementation Plan attempts to make provisions for completion of highest priority enhancement activities within the April 1, 1988 - March 31, 1992. time period. The work schedule outlined in this Implementation Plan, however, will also be subject to change following completion of the Grande Ronde Basin Plan on March 1, 1989.

Proposed project time frames and costs, and fishery benefits are provisional. Landowner cooperation on private lands is required to meet this schedule. Costs will be adjusted based on actual operational experience.

## DESCRIPTION OF GRANDE RONDE RIVER BASIN

For program implementation purposes the Grande Ronde River Basin has been divided into two subbasins; the Joseph Creek and Upper Grande Ronde River subbasins.

### Joseph Creek Subbasin

The Joseph Creek subbasin constitutes a major drainage within the Grande Ronde River basin of northeast Oregon; it drains approximately 556 square miles of the 3,950 square mile Grande Ronde River basin and empties into the Grande Ronde River 4.3 miles above the confluence of the Grande Ronde and Snake rivers (Figure 1). Approximately 75 percent of the Joseph Creek system is within the project area. Not included in the project area is lower Joseph Creek in Washington state, and the Cottonwood Creek drainage which enters Joseph Creek 4.4 miles above Joseph Creek's confluence with the Grande Ronde River (Figure 1).

Within the project area 120.5 miles of stream have been identified as in need of habitat enhancement; 75 miles on private land and 45.5 miles on National Forest lands (Table 1).[1/]

### Upper Grande Ronde River Subbasin

The upper Grande Ronde River subbasin constitutes approximatly 1,622 square miles of the Grande Ronde River basin above the confluence of the Grande Ronde and Wallowa rivers at Rondowa; 81.4 miles upstream from the confluence of the Grande Ronde and Snake rivers (Figure 2). A major portion of the upper Grande Ronde River drainage, including the mainstem Grande Ronde River and 33 of its tributaries are within the project area.

Within the project area 211.8 miles of stream have been identified as in need of habitat enhancement; 116.8 miles on private lands and 95.0 miles on National Forest lands (Table 2).[1/]

### General Land Use Features

Degradation of riparian and instream habitats characterize both subbasins within the Grande Ronde River Basin. Several factors have contributed to this habitat degradation including cattle grazing, farming practices, timber harvest practices, road construction and stream channelization; cattle grazing and farming practices being the main factors on private lands. The result of this degradation has been loss of shade-producing streamside vegetation, thereby causing

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1/ For updated versions of Tables 1 and 2, following three years of field work and therefore a reprioritization of streams and reassessment of needed riparian enhancement work, see "Implementation Schedule and Costs" section.

high summer water temperatures, and destruction of natural pool/riffle ratios which are necessary for good smolt production. It has been estimated there is currently a 28 percent shade cover over most streams within project areas and, with proper habitat enhancement measures, this can be increased to seventy percent; a 250 percent increase over present shade cover. Installation of instream structures can restore pool/riffle ratios to acceptable levels.

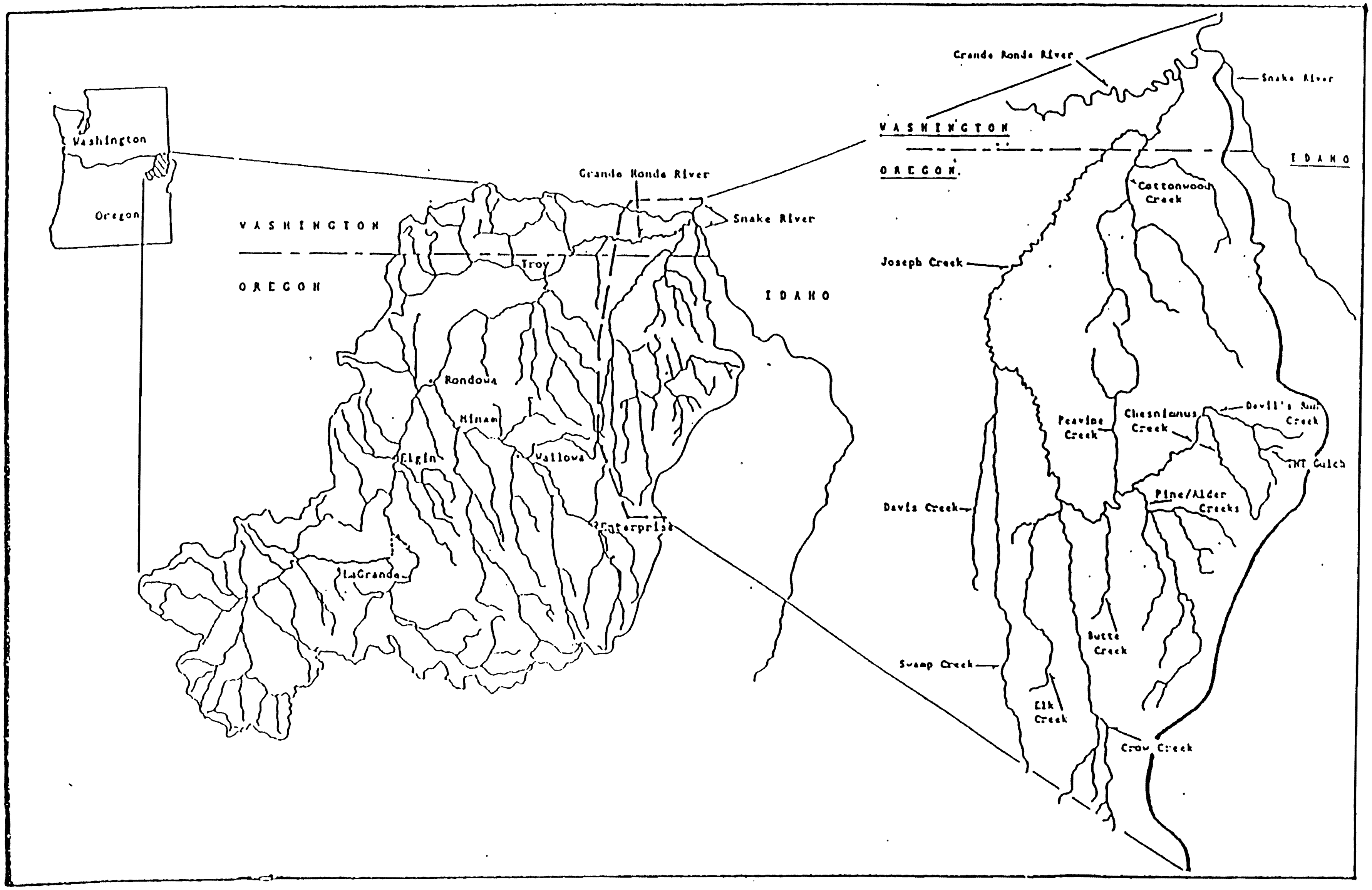



Figure 1. The Joseph Creek subbasin as it relates to the Grande Ronde River Basin of northeast Oregon and Washington.

Table 1. The estimated amount of riparian and instream habitat work needed within the Joseph Creek subbasin by stream, and in priority order.[1/]

| Joseph Creek Drainage | Species Affected | Miles of Stream | | | Miles of Riparian Work: Fencing | | Miles of Riparian Work: Planting | | Instream Structures | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | USFS | Private | Total | USFS | Private | USFS | Private | USFS | Private |
| Peavine Creek | Stld | 8.0 | 0.0 | 8.0 | 4.5 | 0.0 | 4.5 | 0.0 | 43 | 0 |
| Elk Creek | Stld | 3.5 | 5.0 | 8.5 | 3.5 | 5.0 | 3.5 | 5.0 | 25 | 35 |
| Chesnimnus Creek | Stld | 12.0 | 8.0 | 20.0 | 12.0 | 8.0 | 8.0 | 4.0 | 60 | 40 |
| Crow Creek | Stld | 1.0 | 13.0 | 14.0 | 1.0 | 13.0 | 0.0 | 10.0 | 10 | 50 |
| Swamp Creek | Stld | 5.0 | 10.0 | 15.0 | 5.0 | 10.0 | 2.5 | 5.0 | 10 | 20 |
| Pine Cr. System | Stld | 2.0 | 20.0 | 22.0 | 2.0 | 18.0 | 2.0 | 18.0 | 10 | 40 |
| Devil's Run Cr. | Stld | 5.0 | 0.0 | 5.0 | 2.0 | 0.0 | 2.0 | 0.0 | 10 | 10 |
| Davis Creek | Stld | 7.0 | 3.0 | 10.0 | 7.0 | 3.0 | 4.0 | 3.0 | 10 | 0 |
| Butte Creek | Stld | 0.0 | 4.0 | 4.0 | 0.0 | 4.0 | 0.0 | 3.0 | 0 | 10 |
| TNT Gulch | Stld | 2.0 | 0.0 | 2.0 | 2.0 | 0.0 | 2.0 | 0.0 | 10 | 0 |
| Joseph Creek | Stld | 0.0 | 12.0 | 12.0 | 0.0 | 12.0 | 0.0 | 12.0 | 0 | 80 |
| Sub-Basin Totals | | 45.5 | 75.0 | 120.5 | 39.0 | 73.0 | 28.5 | 60.0 | 188 | 285 |

Source: Confederated Tribes of the Umatilla Indian Reservation. 1984. Grande Ronde River Basin. Recommended Salmon and Steelhead Habitat Improvement Measures. 92 pp.

1/ Priorities have been re-evaluated and adjusted based on the most current available information (see Table 6).

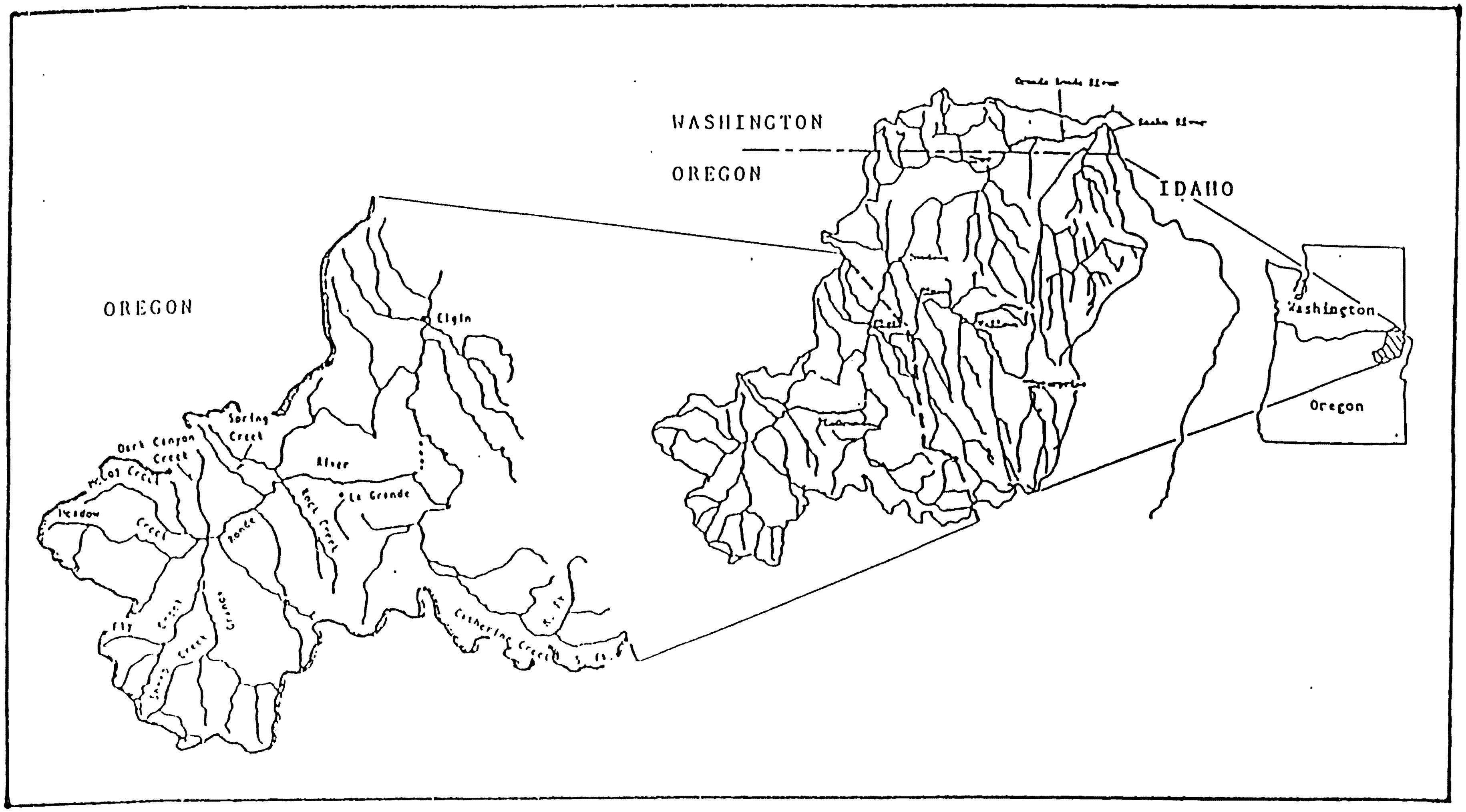



Figure 2. The Upper Grande Ronde River subbasin as it relates to the Grande Ronde River Basin of northeast Oregon.

Table 2. The estimated amount of riparian and instream habitat work needed within the Upper Grande Ronde River **subbasin** by stream, and in priority order. 1/

| Upper Grande Ronde River Drainage | Species Affected | Miles of Stream | | | Miles of Riparian Work: Fencing | | Miles of Riparian Work: Planting | | Instream Structures | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | USFS | Private | Total | USFS | Private | USFS | Private | USFS | Private |
| Grande Ronde River | Ch, Stld | 6.0 | 5.0 | 11.0 | 2.0 | 5.0 | 1.0 | 4.0 | 130 | 175 |
| Sheep River | Ch, Stld | 7.0 | 5.0 | 12.0 | 1.0 | 5.0 | 0.5 | 2.5 | 210 | 175 |
| Fly Creek | Stld | 6.0 | 6.0 | 12.0 | 1.0 | 5.0 | 0.5 | 3.0 | 180 | 180 |
| Spring Creek | Stld | 5.0 | 0.0 | 5.0 | 1.0 | 0.0 | 2.5 | 0.0 | 150 | 0 |
| S. Fork Spring Cr. | Stld | 3.0 | 0.0 | 3.0 | 1.0 | 0.0 | 1.5 | 0.0 | 90 | 0 |
| N. F. Catherine Cr. | Ch, Stld | 3.0 | 0.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 90 | 0 |
| McCoy Creek | Stld | 4.0 | 7.0 | 11.0 | 1.0 | 7.0 | 3.0 | 4.0 | 120 | 210 |
| Rock Creek | Stld | 0.0 | 6.0 | 6.0 | 0.0 | 8.0 | 0.0 | 3.0 | 0 | 90 |
| Dark Canyon Creek | Stld | 1.0 | 2.5 | 3.5 | 0.0 | 2.5 | 0.0 | 0.0 | 15 | 38 |
| Meadow Creek | Stld | 7.0 | 7.0 | 14.0 | 1.0 | 7.0 | 0.5 | 0.5 | 210 | 210 |
| Indian Creek | Ch, Stld | 1.0 | 5.0 | 6.0 | 0.5 | 3.5 | 0.0 | 0.0 | 30 | 150 |
| Chicken Creek | Stld | 5.0 | 2.0 | 7.0 | 1.0 | 1.0 | 0.0 | 1.0 | 75 | 70 |
| Catherine Creek | Ch, Stld | 0.0 | 5.0 | 5.0 | 0.0 | 4.0 | 0.0 | 0.0 | 0 | 150 |
| Beaver Creek | Stld | 1.5 | 5.0 | 6.5 | 0.0 | 3.0 | 0.0 | 0.0 | 45 | 150 |
| Five Points Creek | Stld | 5.5 | 0.5 | 6.0 | 0.0 | 0.5 | 0.0 | 0.5 | 165 | 15 |
| Clark Creek | Ch, Stld | 0.0 | 6.0 | 6.0 | 0.0 | 4.0 | 0.0 | 3.0 | 0 | 180 |
| Little Catherine Cr. | Stld | 1.0 | 4.0 | 5.0 | 0.0 | 2.0 | 0.0 | 1.5 | 15 | 60 |
| Bear Creek | Stld | 5.0 | 0.5 | 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | 75 | 8 |
| Limber Jim Creek | Ch, Stld | 2.0 | 0.3 | 2.3 | 0.0 | 0.0 | 1.0 | 0.3 | 30 | 5 |

- Continued -

Table 2 continued.

| Upper Grande Ronde River Drainage | Species Affected | Miles of Stream | | | Miles of Riparian Work: Fencing | | Miles of Riparian Work: Planting | | Instream Structures | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | USFS | Private | Total | USFS | Private | USFS | Private | USFS | Private |
| Pelican Creek | Stld | 3.0 | 0.5 | 3.5 | 0.0 | 0.0 | 0.0 | 0.0 | 45 | 8 |
| Peet Creek | Stld | 2.0 | 1.0 | 3.0 | 0.0 | 0.0 | 1.0 | 0.5 | 60 | 30 |
| Little Fly Creek | Stld | 3.0 | 2.5 | 5.5 | 0.0 | 0.0 | 0.0 | 1.0 | 90 | 75 |
| Whiskey Creek | Stld | 1.0 | 8.0 | 9.0 | 0.0 | 4.0 | 0.0 | 2.0 | 15 | 120 |
| Jordan Creek | Stld | 2.0 | 8.0 | 10.0 | 0.0 | 4.0 | 0.0 | 2.0 | 30 | 120 |
| N. Fork Limber Jim | Stld | 2.0 | 0.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30 | 0 |
| McIntyre Creek | Stld | 2.5 | 5.0 | 7.5 | 1.0 | 3.0 | 1.0 | 5.0 | 75 | 150 |
| Waucup Creek | Stld | 5.0 | 0.0 | 5.0 | 0.0 | 0.0 | 1.0 | 0.0 | 150 | 0 |
| Burnt Corral Cr. | Stld | 6.0 | 0.2 | 6.2 | 0.0 | 0.0 | 0.0 | 0.0 | 90 | 4 |
| Lookout Creek | Stld | 3.5 | 0.8 | 4.3 | 0.0 | 0.0 | 0.0 | 0.0 | 53 | 24 |
| Little Dark Canyon Cr. | Stld | 2.0 | 0.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 60 | 0 |
| Phillips Creek | Stld | 0.0 | 6.0 | 6.0 | 0.0 | 2.0 | 0.0 | 0.0 | 0 | 180 |
| Gordon Creek | Stld | 0.0 | 7.0 | 7.0 | 0.0 | 4.0 | 0.0 | 2.0 | 0 | 210 |
| Dry Creek | Stld | 0.0 | 8.0 | 8.0 | 0.0 | 6.0 | 0.0 | 4.0 | 0 | 240 |
| Cabin Creek | Stld | 0.0 | 3.0 | 3.0 | 0.0 | 2.0 | 0.0 | 0.0 | 0 | 90 |
| Sub-Basin Totals | | 95.0 | 116.8 | 21.8 | 10.5 | 82.5 | 13.5 | 39.8 | 2328 | 3117 |

Source: Confederated Tribes of the Umatilla Indian Reservation. 1984. Grande Ronde River Basin. Recommended Salmon and Steelhead Habitat Improvement Measures. 92 pp.

1/ Priorities have been re-evaluated and adjusted based on the most current available information (see Table 7)

## FISHERY CHARACTERISTICS - LIMITING FACTORS

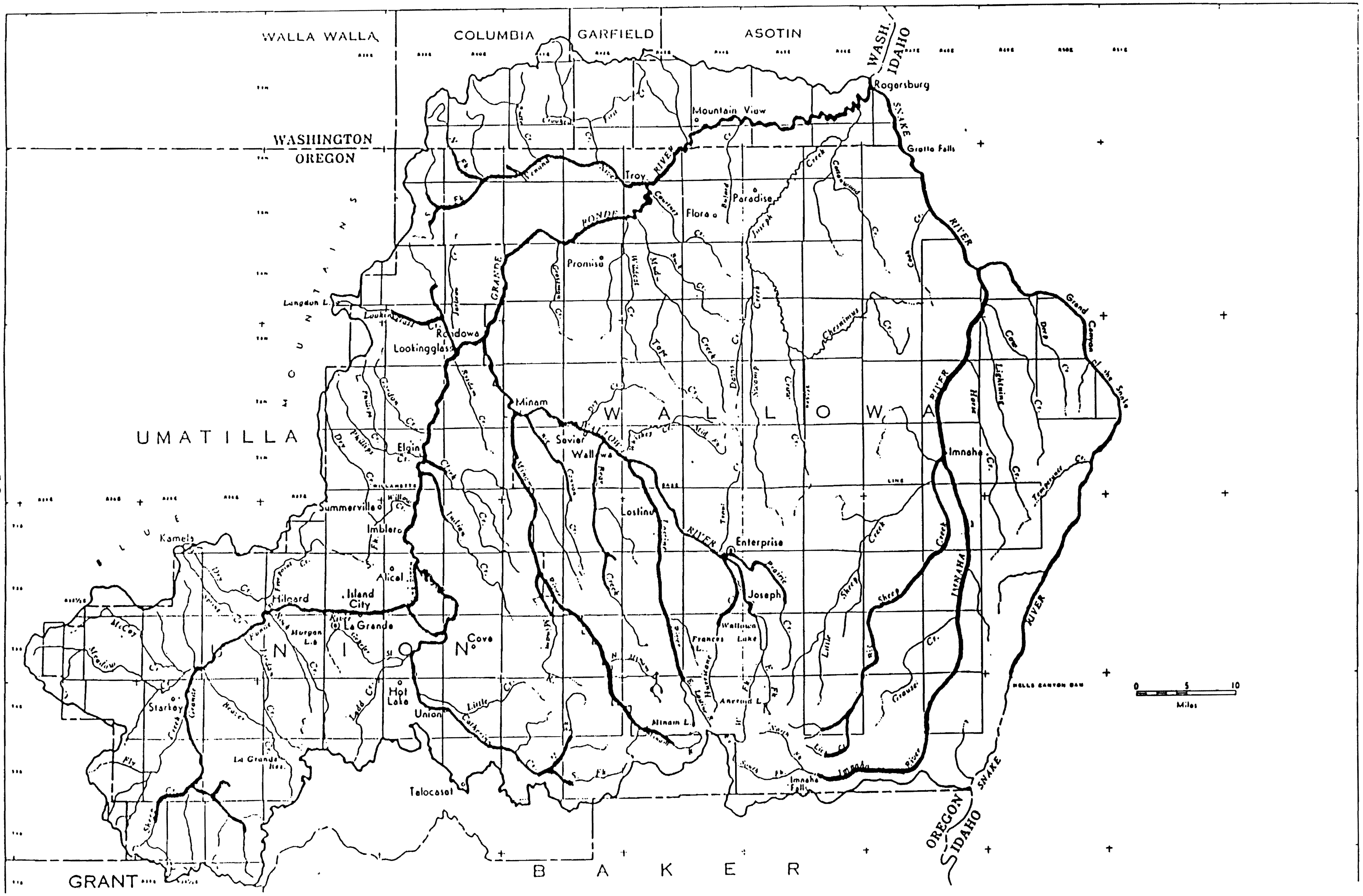
The Grande Ronde River Basin in northeast Oregon supports natural runs of spring/summer chinook (Figure 3), summer steelhead (Figure 4), resident trout and a remnant run of coho salmon(Figure 5). Though historical run sizes of chinook and steelhead in the Grande Ronde River are uncertain, annual runs of chinook were estimated at about 12,200 fish and steelhead runs at about 15,900 fish. Recent redd counts conducted by the ODFW on the Grande Ronde River and its tributaries show returns of both chinook and steelhead to be well below those observed in the early 1970's (Tables 3 and 4). By the mid-1970's chinook runs had declined to about 8,400 fish and steelhead runs to about 10,600 fish. Reasons for the decline of anadromous fish include problems with passage at mainstem Columbia and Snake river dams, degradation of spawning and rearing habitats, and user demands for the resource.

Current summer steelhead production capacity of the Grande Ronde River basin is estimated at 16,566 adults and 322,895 smolts (U.S. v. Oregon Grande Ronde River steelhead production report). Current spawner escapement, however, is estimated at only 4,142 adults. It has been estimated that there is approximately 1,240 miles of steelhead spawning habitat; estimates of total available rearing habitat are not presently available.

Current spring chinook production capacity of the Grande Ronde River basin is estimated at 8,789 adults and 432,844 smolts (U.S. v. Oregon Spring Chinook Production report). Current spawner escapement, however is estimated at only 640 adults. It has been estimated that there are approximately 157.8 miles of chinook spawning habitat containing approximately 288,000 $yd^2$ of spawning gravel; estimates of total available rearing habitat are not presently available.

Both the quantity and quality of chinook and steelhead spawning and rearing habitats are limited within the Grande Ronde River Basin due to degradation of instream and riparian habitats. Appendix A presents an explanation of habitat inventory methodologies which were used to identify habitat deficiencies, or needs. Appendix B summarizes habitat conditions for each inventoried stream within the Upper Grande Ronde and Joseph Creek subbasins. Using these habitat inventories, in conjunction with information provided by ODFW personnel, limiting factors associated with instream and riparian habitat degradation have been identified as:

> High summer water temperatures. High summer water temperatures have greatly reduced resident and anadromous salmonid rearing habitat. Loss of riparian vegetation combined with low summer flows have resulted in water temperatures frequently exceeding 80°F during late summer. Not only do these high water temperatures displace salmonids, but they also encourage increased populations of warmwater tolerant species such as dace, squawfish and suckers.


WALLA WALLA
COLUMBIA
GARFIELD
ASOTIN
WASH.
IDAHO
WASHINGTON
OREGON
UMATILLA
W A L L O W A
U N I O N
GRANT
B A K E R
OREGON
IDAHO
Rogersburg
Mountain View
Grotto Falls
Troy
Flora
Paradise
Promise
Langdon L.
Rondowa
Lookingglass
Minam
Sevier
Wallowa
Elgin
Summerville
Imbler
Lostine
Enterprise
Joseph
Wallowa Lake
Frances L.
Imnaha
Kamela
Hilgard
Island City
La Grande
Alicel
Cove
Hot Lake
Union
Starkey
Telocaset
Minam L.
Aneroid L.
Imnaha Falls
La Grande Res.
Morgan L.
SNAKE
RIVER
GRANDE
RONDE
RIVER
IMNAHA
Grand Canyon of the Snake
WELLS CANYON DAM
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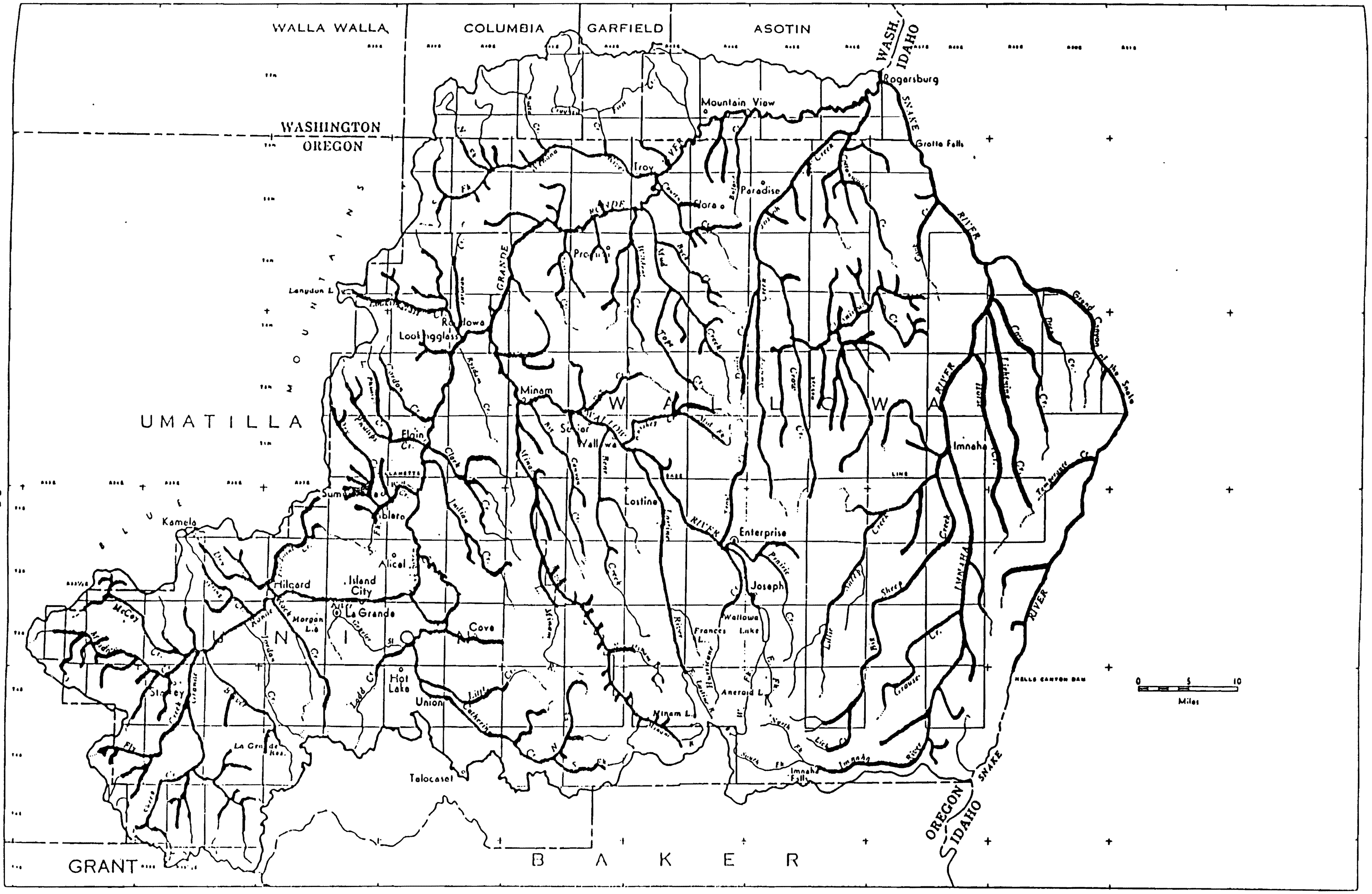


Figure 4. Summer steelhead distribution, Grande Ronde Basin.

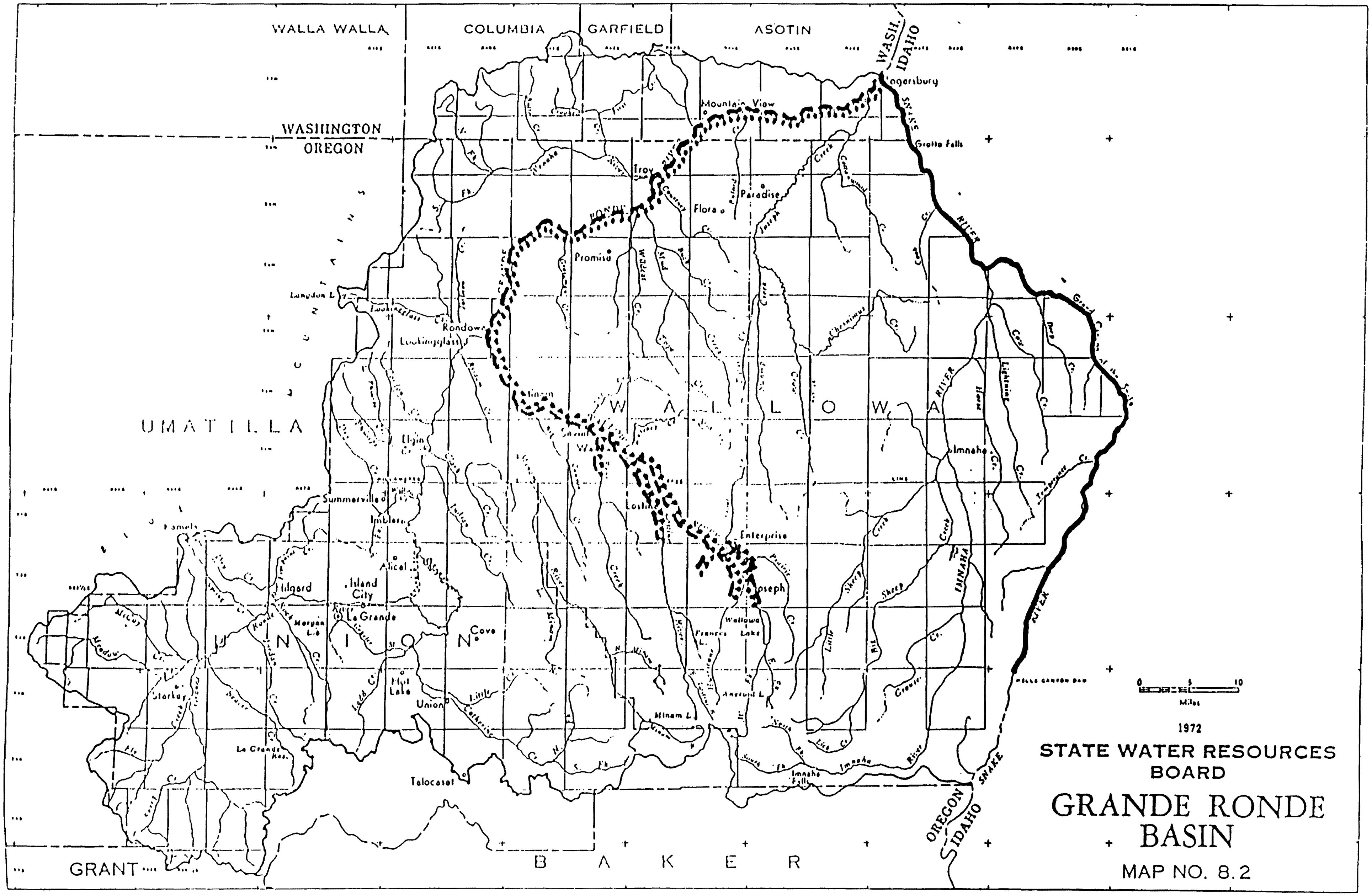


Figure 5. Historic Coho salmon distribution within the Grande Ronde River Basin

Table 3. Summer steelhead spawning ground counts in the Joseph Creek drainage[1,2], 1966 through 1986[3].

| YEAR | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Redds Observed | 780 | 611 | 234 | 357 | 267 | 148 | 209 | 103 | 113 | 17 | 29 | 34 | 40 | 9 | 93 | 103 | 87 | 75 | 76 | 463 | 417 |
| Miles Surveyed | 56 | 52 | 51 | 63 | 47 | 53 | 55 | 60 | 54 | 34 | 50 | 30 | 51 | 58 | 59 | 59 | 45 | 58 | 49 | 49 | 46 |
| Redds/ Mile | 13.9 | 12.9 | 4.6 | 5.8 | 5.7 | 2.8 | 3.8 | 1.7 | 2.1 | 0.5 | 0.5 | 1.1 | 0.8 | 0.2 | 1.8 | 1.8 | 1.9 | 1.3 | 1.6 | 9.45 | 9.07 |

1 Streams included in the Joseph Creek drainage summer steelhead spawning ground counts include Butte, Chesnimnus (mainstem, north, and south forks), Crow, Devil's Run, Elk, Peavine, Swamp, and TNT Gulch creeks. All of these creeks, however, may not be inventoried on any given year due to river conditions. This annual variation is reflected in the "Miles Surveyed".

2 Since the Joseph Creek and upper Grande Ronde River drainages are both within the Grande Ronde River basin, it is felt spawning ground trends within the Joseph Creek drainage are also representative of those within the upper Grande Ronde River drainage.

3 Summer steelhead spawning ground counts were obtained from Kenneth L. Witty, District Fish Biologist, Wallowa District, Oregon Department of Fish and Wildlife.



Table 4. Spring chinook spawning ground counts in the upper Grande Ronde River drainage[1], 1967 through 1986[2].

| YEAR | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Redds Observed | 310 | 390 | 447 | 198 | 422 | 323 | 295 | 186 | 106 | 205 | 102 | 122 | 48 | 106 | 68 | 110 | 112 | 72 | 132 | 117 |
| Miles Surveyed | 40.5 | 38 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 19 | 21 | 27 | 27 | 27 | 28 | 27 | 27 | 27 | 27 |
| Redds/Mile | 7.7 | 10.3 | 16.6 | 7.3 | 15.6 | 12.0 | 10.9 | 6.9 | 3.9 | 7.6 | 5.4 | 5.8 | 1.8 | 3.9 | 2.5 | 4.1 | 4.2 | 2.7 | 4.9 | 4.3 |

1 Streams in the upper Grande Ronde River drainage spring chinook spawning ground counts include North Fork, South Fork, and mainstem Catherine Creek, mainstem Grande Ronde River, and Sheep Creek.

2 Spring chinook spawning ground counts were obtained from Duane C. West, District Fish Biologist, La Grande District, Oregon Department of Fish and Wildlife.

- > Low summer flows. Loss of riparian vegetation, questionable watershed management practices, and compaction of soil by livestock has resulted in increased late winter and spring run-off and reduced summer flows. Reduction of summer flows has not only reduced the resident trout and summer steelhead rearing habitats, but has also, in some areas, reduced the amount of available spring/summer chinook spawning habitat.

- > Lack of riparian vegetation. Loss of riparian vegetation primarily from over utilization by domestic livestock has resulted in a loss of a vegetative canopy for shading and insect drop. The loss of riparian vegetation has also resulted in a loss of the plant root systems, thereby decreasing streambank stability and water retention properties of streambank soils. Loss of riparian vegetation has also resulted in a reduction of woody debris within and along creek corridors.

- > Lack of habitat diversity. Instream habitats in much of the scheduled program work areas tend to be characterized by a lack of habitat diversity. Many of the streams are dominated by either pool/glide-run or riffle features, but tend to have a poor mix of these two desireable characteristics. This lack of diversity can be attributed largely to a lack of large woody debris in many areas.

- > Channel instability. Lack of channel, and therefore streambank stability has resulted in increased sediment loads and high summer water temperatures. Channels which at one time were narrow and relatively deep are now considerably wider and shallower due to loss of riparian vegetation and over utilization by domestic livestock. As streambeds become shallower the streams are more prone to leave their original channel at high flows and form numerous braided channels or develop new channels where, once again, they can cut deeper, narrower channels in the less compacted soils.

- > Winter icing. Freezing of streams during the winter not only reduces or eliminates available overwintering habitat, but may also cause direct mortality of some fish. In areas where streams freeze completely or where anchor ice forms, the possibility of physical damage occurring to the instream habitat when spring break-up occurs is also a concern.

Millions of dollars are currently being spent by various entities to resolve fish passage problems at the mainstem dams. There are indications that these efforts, along with harvest controls, are resulting in larger fish runs. Assuring optimum spawning and rearing habitats for these fish and their progeny through habitat enhancement activities will maximize the contribution of naturally produced fish, help to protect genetic diversity in supplemented stocks, and may expedite the return of increased anadromous fish runs to the Columbia and Snake river basins.

## DESCRIPTION OF DESIRED CONDITIONS - GOALS AND OBJECTIVES

The **goal** of this program is to optimize spring/summer chinook and summer steelhead smolt production within the Grande Ronde River Basin using habitat enhancement measures. Accomplishing this goal will partially mitigate mainstem losses due to the Columbia River hydroelectric system. Objectives designed to achieve the program goal are discussed below as they relate to previously identified limiting factors.

> High summer water temperatures. Improved stream shading provided by overhanging riparian vegetation will result in reduced summer water temperatures, thereby increasing the useability of these streams by resident and anadromous salmonids. Maximum shade attainable for most streams in the project areas is approximately 80%. The objective of these projects is to reach a minimum of 70% shade with water temperatures of no more than 68°F within 20 years of project completion.

> Low summer flows. By reducing domestic livestock utilization of riparian areas, soil compaction can be lessened and riparian vegetation recovery can be expedites. As riparian vegetation recovers and vegetation root quantity increases the soil will again be able to absorb a larger quantity of water and retain it for a longer time period, thereby reducing late winter and spring run-offs and increasing summer flows.

> Lack of riparian vegetation. The quantity and quality of riparian vegetation will be increased using three methods: a) leased riparian areas will be fenced and livestock utilization greatly reduced or eliminated for the duration of the lease; b) in selected areas trees and/or shrubs will be planted to supplement existing woody vegetation and thereby expedite stream shading and vegetative root mass development for mitigating soil compaction and streambank erosion; and c) in appropriate areas grasses and legumes will be seeded, primarily to expedite soil buildup and vegetative recovery on exposed gravel bars and flood plains.

> Lack of habitat diversity. Habitat diversity will be increased in appropriate project areas through use of instream structures, streambank stabilization structures and cabling-in of large woody debris. Additional habitat diversity will be provided as riparian vegetation increases and streambanks become stable. A 40% to 60% pool habitat objective will not, however, necessarily be a project objective. Pool/riffle ratios approximating those found in adjacent, undisturbed stream reaches will determine the desired pool/riffle configurations for our project areas.

> Channel instability. Streambank stability work will be undertaken only in areas where unstable banks prove to be creating problems, or are potential problems, for fish. Streambank stability work may be in the form of structures, boulders, and in some cases rock and/or vegetative rip-rapping. It is most desireable,

however, to accomplish streambank stabilization through the medium of vegetative regrowth and livestock management within leased riparian habitat areas.

> Winter icing. Freezing of streams may be reduced by providing a vegetative thermal canopy, and by encouraging the narrowing and deepening of stream channels. As stream corridors are protected from over utilization by domestic livestock and supplemental planting is done, it is expected that riparian vegetation will increase, thereby providing a thermal canopy and encouraging the narrowing and deepening of the stream channel. This process may also be expedited through the use of some instream structures.

Table 5. Limiting factors with associated treatment strategies designed for mitigation purposes.

| Limiting Factor(s) | Treatment Strategy[1/] |
|---|---|
| High summer water temperatures | RVR |
| Low summer flows | RVR |
| Lack of riparian vegetation | RVR |
| Lack of habitat diversity | RVR/HDI |
| Channel instability | RVR/HDI |
| Winter icing | RVR/HDI |

1/ See Appendix A for an explanation of criteria used to identify habitat needs and develop treatment strategies.

In addition to developing treatment strategies to mitigate limiting factors, rationale were developed by which streams could be prioritized for implementation purposes. In so doing, six rationale (three biological in nature and three logistical or administrative in nature) were developed:

Biological rationale:

a. Species of interest
b. Benefits to fish
c. Project orientation within the subbasin and in relation to other ongoing projects

Administrative and logistical rationale

d. Cost effectiveness
e. Landowner acceptance and cooperation
f. Logistic constraints

a. Species of interest. Though all fish species will be taken into account when planning habitat enhancement projects, primary consideration within the Grande Ronde River Basin will be given to anadromous salmonids. Summer steelhead and spring/summer chinook habitats will be targeted for enhancement activities. On streams utilized by both chinook and steelhead, care will be taken to consider habitat requirements of both species when planning habitat enhancement activities.

b. Benefits to fish. The greatest benefit(s) to fish will be realized when enhancement work is done in areas utilized by the greatest number and species of salmonids. Therefore streams with the greatest number and species of salmonids and the greatest diversity of habitat utilization (spawning, rearing, overwintering, etc.) will receive the highest prioritization.

c. Project orientation. Resolution of limiting factors should begin in the headwaters of the basin and on the uppermost reaches of individual streams. Habitat work should then proceed downstream to meet habitat objectives, and protect improvement investments and private lands. This will provide positive, cumulative downstream effects in terms of stream flows, water temperatures, and channel stability. Another factor affecting the project location will be the location of ongoing riparian projects (by ODFW and other agencies) within the basin or on a specific stream. As maximum benefits will be realized when large reaches of stream are treated (e.g. the longer the continuous section of stream that is treated the greater and longer lasting the benefits), efforts will be made to coordinate with other agencies to implement projects in close proximity to their ongoing projects.

d. Cost effectiveness. The program strategy is to implement activities that provide for the most immediate and long lasting benefits to fish production capability, and to do so in the most cost effective manner possible.

e. Landowner acceptance and cooperation. Landowner acceptance and cooperation are necessary on private lands to allow for implementation of improvement activities. Some, but not all factors which may affect landowner acceptance may include: a) disruption of, or interference with, current or planned property utilization (i.e., farming or ranching practices); b) uncertainty or fear of dealing with a governmental agency; c) property currently being for sale; and d) absentee landowners.

f. Logistic constraints. Logistic constraints may include equipment access, timing as it relates to landowner landuse practices, chinook and/or steelhead spawning and incubation periods, and technical feasibility.

Once these rationale had been established, highest priority anadromous fish streams within the Joseph Creek and Upper Grande Ronde River subbasins were identified. These streams were then prioritized based on the biological rationale (e.g., species of interest, potential fishery benefits, and project orientation) (Table 6 and 7). When biologically prioritizing streams within each subbasin, streams with similar characteristics were grouped together. Therefore, though individual streams are numerically prioritized in tables 6 and 7, streams within any one grouping could be interchanged for implementation purposes without compromising the effectiveness of the habitat enhancement program.

Joseph Creek Subbasin (Table 6)

The Joseph Creek subbasin provides habitat for wild runs of summer steelhead and resident trout; no hatchery stocking has occurred in the subbasin and chinook are not present in the project area. Streams within the Joseph Creek subbasin were placed in priority groupings as follows:

1. Chesnimnus, Crow, Elk and Swamp creeks all provide spawning, rearing and/or overwintering habitat for summer steelhead in varying degrees. Additionally, Chesnimnus Creek provides access to all of the steelhead producing tributaries in the upper Joseph Creek subbasin. Additionally, Chesnimnus Creek provides access to all of the steelhead producing tributaries in the upper Joseph Creek subbasin.

2. Butte, Davis and Pine creeks provide valuable, but limited spawning and rearing haitat for summer steelhead. Unlike the higher priority grouping, streams in this group do not presently provide substantial overwintering habitat and the quantity, quality and accessibility of spawning and rearing habitats are presently limited.

Table 6: Highest priority anadromous fish streams on private lands within the Joseph Creek subbasin in need of riparian and/or instream enhancement.1/

| Stream | Species | Priority | Miles Needing Work | Fencing2/ | Planting3/ | Instream Structures2/ | Off-site Watering | Total Cost4/ |
|---|---|---|---|---|---|---|---|---|
| Elk Cr. | Stld. | 1 | 5.0 | 7.5 | 5.0 | 3.0 | 2 | 84,500 |
| Crow Cr. | Stld. | 2 | 13.0 | 20.0 | 10.0 | 7.0 | 10 | 217,500 |
| Swamp Cr. | Stld. | 3 | 10.0 | 15.0 | 5.0 | 1.0 | 10 | 121,250 |
| Chesnimnus Cr. | Stld. | 4 | 8.0 | 12.0 | 4.0 | 8.0 | 8 | 249,000 |
| Pine Cr. System5/ | Stld. | 5 | 20.0 | 30.0 | 18.0 | 10.0 | 5 | 313,500 |
| Butte Cr. | Stld. | 6 | 4.0 | 6.0 | 3.0 | 2.0 | 2 | 63,250 |
| Davis Cr. | Stld. | 7 | 3.0 | 4.5 | 3.0 | 3.0 | 2 | 63,500 |
| Joseph Cr. | Stld. | 8 | 12.0 | 18.0 | 12.0 | 12.0 | 10 | 376,000 |
| Subbasin Totals | | | 75.0 | 113.0 | 60.0 | 46.0 | 49 | 1,488,750 |

1/ Revised from Table 1 of this report following three years of field work and therefore a reprioritization of streams and a reassessment by ODFW personnel of work needed on private lands.

2/ Miles of fence to build or stream to be treated with structures.

3/ Miles of stream bank to plant (1 mile of stream = 2 miles of streambank).

4/ Costs based on the following:
- (a) fencing = 6,500.00/mile
- (b) planting = 750.00/mile
- (c) instream structures = 20,000/mile on large streams
  10,000/mile on small streams
- (d) off-site watering = 1,000/water development

5/ The Pine Creek System includes Alder, Salmon, Dry Salmon and Pine creeks.

D-1/32

Table 7: Highest priority anadromous fish streams on private lands within the Grande Ronde River subbasin in need of riparian and/or instream enhancement. 1/

| Stream | Species | Priority | Miles Needing Work | Fencing 2/ | Planting 3/ | Instream Structures 2/ | Off-site Water | Total Cost 4/ |
|---|---|---|---|---|---|---|---|---|
| Grande Ronde R. | Ch, Stld. | 1 | 5.0 | 7.5 | 4.0 | 3.0 | 3 | 114,750 |
| Sheep Cr. | Ch, Stld. | 2 | 8.0 | 12.0 | 6.0 | 8.0 | 8 | 170,500 |
| Fly Cr. | Stld. | 3 | 6.0 | 7.5 | 3.0 | 4.0 | 4 | 95,000 |
| McCoy Cr. | Stld. | 4 | 7.0 | 10.5 | 4.0 | 3.0 | 5 | 106,250 |
| Chicken Cr. | Stld. | 5 | 2.0 | 3.0 | 1.0 | 2.0 | 2 | 42,250 |
| Meadow Cr. | Stld. | 6 | 7.0 | 10.5 | 0.5 | 5.0 | 8 | 176,625 |
| Beaver Cr. | Stld. | 7 | 5.0 | 7.5 | 0.0 | 5.0 | 5 | 103,750 |
| Jordan Cr. | Stld. | 8 | 8.0 | 12.0 | 2.0 | 4.0 | 10 | 129,500 |
| Whiskey Cr. | Stld. | 9 | 8.0 | 12.0 | 2.0 | 4.0 | 10 | 129,500 |
| Rock Cr. | Stld. | 10 | 6.0 | 9.0 | 3.0 | 3.0 | 8 | 98,750 |
| Little Fly Cr. | Stld. | 11 | 2.5 | 4.0 | 1.0 | 2.0 | 2 | 48,750 |
| Subbasin Totals | | | 64.5 | 95.5 | 26.5 | 43.0 | 65 | 1,215,625 |



1/ Revised from Table 1 of this report following three years of field work and therefore a reprioritization of streams and a reassessment by ODFW personnel of work needed on private lands.

2/ Miles of fence to build or stream to be treated with structures.

3/ Miles of stream bank to plant (1 mile of stream = 2 miles of streambank).

4/ Costs based on the following:
(a) Fencing = 6,500.00/mile
(b) Planting = 750.00/mile
(c) Instream Structures = 20,000/mile on large streams
10,000/mile on small streams
(d) Off-site watering = 1,000/water development.

3. Joseph Creek, though valuable as overwintering habitat, contains no useable spawning habitat. The use of Joseph Creek as rearing habitat is limited due to the high summer water temperatures.

Upper Grande Ronde River subbasin (Table 7)

The Upper Grande Ronde River subbasin provides habitat for hatchery and wild runs of spring/summer chinook and summer steelhead. Populations of resident trout are also plentiful within the subbasin. Streams within the Upper Grande Ronde River subbasin were placed in priority groupings as follows:

1. The Grande Ronde River and Sheep Creek are the only two streams within the top eleven priority streams in the Upper Grande Ronde River subbasin (Table 7) which contain runs of spring/summer chinook. Additionally these streams support runs of summer steelhead and populations of resident trout. Both streams provide spawning, rearing and overwintering habitat for all of these fish species.

2. Fly, McCoy, Chicken and Meadow creeks all support runs of summer steelhead and populations of resident trout. These streams primarily provide spawning and/or rearing habitat, but may also provide limited overwintering habitat on some years. The primary factor affecting overwintering habitat is the frequent occurrence of severe icing.

3. Beaver, Jordan, Whiskey, Rock and Little Fly creeks provide limited spawning, rearing and/or overwintering habitat for summer steelhead and resident trout. Presently the quantity, quality and/or accessibility of these habitats is limited in these streams.

## IMPLEMENTATION SCHEDULE AND COSTS .

After developing priority tables based on biological rationale (species of interest, benefits to fish and project orientation (Tables 6 and 7) additional tables were developed which reflected work to be undertaken between April 1, 1988 and March 31, 1992 (Tables 8 and 9). In addition to biological rationale, the logistical and administrative rationale (cost effectiveness, landowner acceptance and cooperation, and logistical constraints) were taken into consideration when developing these implementation schedules.

For the April 1, 1988 - March 31, 1989 time period one additional rationale was taken into consideration; prior commitments (e.g., lease agreements which had already been signed and therefore commitments already made to the landowners). This final rationale enabled us to make the implementation schedule as realistic as possible.

Tables 6 and 7 prioritize streams identified as in need of riparian and/or instream enhancement work within the Joseph Creek and Upper Grande Ronde subbasins respectively. These tables are modified versions of Tables 1 and 2 of this report. Modifications of enhancement type, quantity and cost estimates were made to these two tables following three years of field work and therefore more accurately identify needs and proposed costs within each subbasin.

Tables 8 and 9 display the proposed schedules for implementation and costs of the Joseph Creek and Upper Grande Ronde subbasins habitat improvement projects, respectively. Proposed miles of stream to be treated, by year, and the proposed treatment and implementation costs are shown by stream and priority. Improvement projects include implementation on private (non-federal) lands within the subbasins. The implementation schedules provide for treatment of 35.5 miles of stream habitat within the Upper Grande Ronde subbasin and 25.5 miles of stream habitat within the Joseph Creek subbasin through March 31, 1992. In total, approximately 100.4 miles of riparian fencing to protect 61.0 stream miles and instream structures in 31.75 miles of creek will be built. Additionally, about 60 off-site watering developments will be installed to complement the other enhancement acitivites and thereby attain the program goals and objectives.

Out-year cost estimates are subject to modification. Significant cost savings may result from improvement in implementation efficiency.

Table 8: Implementation schedule, with associated costs[1], proposed for the Joseph Creek subbasin, for fiscal years 1988-1991.

| Streams | Fiscal Year | Creek Miles to treat | Smolt capacities with enhancement StS | Fencing[2] | Planting[3] | Instream Structures[2] | Off-site Watering | Program Costs[4] Implementation | Program Costs[4] Administration | Program Costs[4] Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Elk Cr. [5] | 1988 | 1.0 | 520 | 2.0 | 0.0 | 0.0 | - | 13,000 | 18,269 | 31,269 |
| Crow Cr. | | 1.0 | 520 | 2.3 | 1.0 | 1.0 | 2 | 27,700 | 38,769 | 66,469 |
| Chesnimnus Cr. [6] | | 1.5 | 780 | 3.0 | 1.0 | 0.75 | 2 | 37,250 | 52,250 | 89,500 |
| Crow Cr. | 1989 | 2.5 | 1,300 | 6.0 | 3.0 | 2.0 | 4 | 65,250 | 43,500 | 108,750 |
| Chesnimnus Cr. [6] | | 1.5 | 780 | 3.0 | 2.0 | 1.0 | 4 | 45,000 | 30,000 | 75,000 |
| Swamp Cr. [7] | | 3.5 | 1,820 | 5.2 | 2.0 | -- | 4 | 39,300 | 26,950 | 66,250 |
| Elk Cr. [5] | 1990 | 1.5 | 780 | 2.5 | 1.5 | 1.0 | 2 | 29,375 | 19,875 | 49,250 |
| Chesnimnus [6] | | 2.0 | 1,040 | 3.0 | 1.0 | 1.5 | 2 | 52,250 | 34,250 | 86,500 |
| Pine Cr. System | | 2.5 | 1,300 | 4.0 | 2.0 | 1.5 | 2 | 44,500 | 29,000 | 73,500 |
| Butte Cr. | | 1.0 | 520 | 2.0 | 1.0 | 1.0 | 1 | 24,750 | 16,000 | 40,750 |
| Crow Cr. | 1991 | 2.0 | 1,040 | 3.5 | 2.0 | 1.5 | 1 | 40,250 | 27,000 | 67,250 |
| Pine Cr. System | | 2.5 | 1,300 | 4.5 | 2.0 | 1.5 | 2 | 47,750 | 32,250 | 80,000 |
| Davis Cr. | | 1.0 | 520 | 2.0 | 0.5 | 1.0 | 1 | 24,375 | 20,875 | 45,250 |
| Joseph Cr. | | 1.0 | 520 | 2.0 | 0.5 | 1.0 | 1 | 24,375 | 33,125 | 57,500 |
| Subbasin Totals | | 25.5 | 12,740 | 45.0 | 19.5 | 14.75 | 28 | 515,125 | 422,113 | 937,238 |

1/ All work and costs contingent on landowner approval, logistics and access to the streams.

2/ Miles of fence to build or stream to be treated with structures.

3/ Miles of stream bank to plant (1 mile of stream = 2 miles of streambank).

4/ Costs based on:
(a)fencing = 6,500.00/mile
(b)planting = 750.00/mile
(c)instream structures = 20,000/mile on large streams
10,000/mile on small streams
(d)Off-site watering = 1,000/water development

5/ 1.5 miles of creek work completed prior to FY 1988
6/ 3.0 miles of creek work completed prior to FY 1988
7/ 5.0 miles of creek work completed prior to FY 1988

D-1/33(1)

Table 9. Implementation schedule, with associated costs1/, proposed for the Grande Ronde River subbasin for fiscal years 1988-1991.

| Streams | Fiscal Year | Creek Miles to treat | Smolt capacities with enhancement StS | Ch | Fencing2/ | Planting3/ | Instream Structures2/ | Off-site Watering | Program Costs4/ Implementation | Administration | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sheep Cr.5/ | 1988 | 4.2 | 2,184 | 12,306 | 5.5 | 3.0 | 0.0 | 0 | 38,000 | 33,131 | 71,131 |
| McCoy Cr. | | 1.6 | 832 | - | 3.4 | 1.0 | 1.0 | 2 | 34,850 | 30,442 | 65,292 |
| Meadow Cr. | | 3.9 | 2,028 | - | 7.2 | 0.0 | 1.0 | 2 | 68,800 | 60,193 | 128,993 |
| Grande Ronde River Mainstem | 1989 | 1.0 | 520 | 2,930 | 2.0 | 1.0 | 0.5 | 1 | 24,750 | 16,750 | 41,500 |
| Sheep Cr. 5/ | | 2.0 | 1,040 | 5,860 | 3.5 | 1.0 | 1.0 | 4 | 37,500 | 25,500 | 63,000 |
| Fly Cr. 6/ | | 2.5 | 1,300 | - | 3.0 | 1.5 | 2.0 | 2 | 42,625 | 28,875 | 71,500 |
| McCoy Cr. | | 2.5 | 1,300 | - | 4.0 | 1.5 | 1.5 | 2 | 44,125 | 29,875 | 74,000 |
| Fly Cr. 6/ | 1990 | 2.3 | 1,196 | - | 2.8 | 1.5 | 1.5 | 2 | 36,325 | 23,925 | 60,250 |
| Chicken Cr. | | 2.0 | 1,040 | - | 3.0 | 1.0 | 2.0 | 2 | 42,250 | 27,750 | 70,000 |
| Beaver Cr. | | 4.0 | 2,080 | - | 6.5 | 0.0 | 2.5 | 5 | 72,250 | 47,500 | 119,750 |
| McCoy Cr. | 1991 | 2.0 | 1,040 | - | 3.0 | 1.0 | 0.5 | 4 | 29,250 | 19,500 | 48,750 |
| Jordan Cr. | | 2.0 | 1,040 | - | 3.0 | 0.5 | 1.0 | 3 | 32,875 | 21,875 | 54,750 |
| Whiskey Cr. | | 2.0 | 1,040 | - | 3.0 | 1.0 | 1.0 | 2 | 32,250 | 21,500 | 53,750 |
| Rock Cr. | | 2.0 | 1,040 | - | 3.0 | 1.0 | 1.0 | 2 | 32,250 | 21,500 | 53,750 |
| Little Fly Cr. | | 1.5 | 780 | - | 2.5 | 0.5 | 0.5 | 2 | 23,625 | 15,375 | 39,000 |
| Subbasin Totals | | 35.5 | 18,460 | 21,096 | 55.4 | 15.5 | 17.0 | 32 | 591,725 | 423,691 | 1,015,416 |

1/ All work and costs contingent on landowner approval, logistics and access to the streams.

2/ Miles of fence to build or stream to be treated with structures.

3/ Miles of stream bank to plant (1 mile of stream = 2 miles of streambank).

4/ Costs based on:
(a) Fencing = 6,500.00/mile
(b) Planting = 750.00/mile
(c) Instream Structures = 20,000/mile on large streams
10,000/mile on small streams
(d) Off-site watering = 1,000/water development

5/ 0.8 miles of creek work completed prior to FY 1988

6/ 1.2 miles of creek work completed prior to FY 1988

## BENEFITS

Preliminary estimates of fishery benefits from habitat enhancement projects in the Grande Ronde Basin are identified in Table 10.

## ADDITIONAL INFORMATION NEEDS/CONSIDERATIONS

An important part of determining the effectiveness of habitat improvement activities is the assessment of the success or failure of different improvement techniques. To facilitate such assessments habitat inventory and monitoring programs have been designed and implemented and temperature data collection will begin in 1988.

Riparian habitat inventories were designed to be one-time-through, nonrepetitive inventories whose objective is to give an overall picture of instream and riparian habitats for project design and prioritization purposes. Riparian habitat transect monitoring guidelines, however, were designed to monitor habitat changes over time, and wil be ongoing throughout the duration of the program. Water temperatures will be monitored to document the temperature regime in the basin and track reductions in summer water temperatures as riparian vegetation recovers. Photographic documentation will be used to visually display vegetative recovery in riparian areas.

Table 10. Preliminary estimates of fishery benefits[a] from habitat enhancement projects in the Grande Ronde River Basin.

| Stream | Species | Type of Work[b] | No. Miles | NUMBER OF SMOLTS: Steelhead: Current Capacity | Capacity w/ Enhancement | Increase in Capacity | Chinook: Current Capacity | Capacity w/ Enhancement | Increase in Capacity |
|---|---|---|---|---|---|---|---|---|---|
| **Joseph Creek Subbasin** | | | | | | | | | |
| Elk Creek | StS | F | 2.5 | 650 | 1,300 | 650[b] | 0 | 0 | 0 |
| Crow Creek | StS | F, P, IS | 5.5 | 1,430 | 2,860 | 1,430[b] | 0 | 0 | 0 |
| Chesnimnus Creek | StS | F, P, IS | 5.0 | 1,300 | 2,600 | 1,300[b] | 0 | 0 | 0 |
| Swamp Creek | StS | F, P | 3.5 | 910 | 1,820 | 910[b] | 0 | 0 | 0 |
| Pine Creek System | StS | F, P, IS | 5.0 | 1,300 | 2,600 | 1,300[b] | 0 | 0 | 0 |
| Butte Creek | StS | F, P, IS | 1.0 | 260 | 520 | 260[b] | 0 | 0 | 0 |
| Davis Creek | StS | F, P, IS | 1.0 | 260 | 520 | 260[b] | 0 | 0 | 0 |
| Joseph Creek | StS | F, P, IS | 1.0 | 260 | 520 | 260[b] | 0 | 0 | 0 |
| **Upper Grande Ronde Subbasin** | | | | | | | | | |
| Sheep Creek | StS, ChS | F, P, IS | 6.2 | 1,612 | 3,224 | 1,612[b] | 9,083[b] | 18,166[b] | 9,083[b] |
| Grande Ronde River | StS, ChS | F, P, IS | 1.0 | 260 | 520 | 260[b] | 1,465[b] | 2,930[b] | 1,465[b] |
| McCoy Creek | StS | F, P, IS | 6.1 | 1,586 | 3,172 | 1,586[b] | 0 | 0 | 0 |
| Meadow Creek | StS | F, IS | 3.9 | 1,014 | 2,028 | 1,014[b] | 0 | 0 | 0 |
| Fly Creek | StS | F, P, IS | 4.8 | 1,248 | 2,496 | 1,248[b] | 0 | 0 | 0 |
| Chicken Creek | StS | F, P, IS | 2.0 | 520 | 1,040 | 520[b] | 0 | 0 | 0 |
| Beaver Creek | StS | F, IS | 4.0 | 1,040 | 2,080 | 1,040[b] | 0 | 0 | 0 |
| Jordan Creek | StS | F, P, IS | 2.0 | 520 | 0,040 | 520[b] | 0 | 0 | 0 |
| Whiskey Creek | StS | F, P, IS | 2.0 | 520 | 1,040 | 520[b] | 0 | 0 | 0 |
| Rock Creek | StS | F, P, IS | 2.0 | 520 | 1,040 | 520[b] | 0 | 0 | 0 |
| Little Fly Creek | StS | F, P, IS | 1.5 | 390 | 780 | 390[b] | 0 | 0 | 0 |
| | | Total | 60 | 15,600 | 31,200 | 15,600[b] | 10,548[b] | 21,096[b] | 10,548[b] |

Our measure of fishery benefit from habitat improvements is increase in smolt capacity. Current smolt capacities were estimated using data developed for the Grande Ronde River under U.S. v. Oregon[c]:

Steelhead: 8.0 redds/mile; 4,340 eggs/redd; and a 0.75% egg-to-smolt survival at full seeding under current conditions.

Chinook: 12.4 redds/mile; 3,940 eggs/redd; and a 3.0% egg-to-smolt survival at full seeding under current conditions.

Capacities with enhancement (a 100% increase of current capacities) were based on habitat evaluation studies in the John Day River (Claire & Storch 1977[d]; Olsen et al, 1984[e]; Olsen and Lindsay 1984[f]; USFWS and USNMFS 19819). Current capacities were calculated to be 260 steelhead smolts/mile and 1,465 chinook smolts/mile; 520 steelhead smolts/mile and 2,930 chinook smolts/mile with habitat enhancement.

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a Estimates will be updated when subbasin planning and evaluations of habitat projects are completed. Benefits from riparian enhancement (fencing) will not be fully realized for 15-20 years.

b Increases shown in capacity will not be realized unless runs are supplemented with hatchery releases. Models developed under U.S. v. Oregon indicate that because of extensive loss of smolts and adults at the eight Federal dams on the Columbia and Snake rivers, extensive hatchery supplementation in addition to the Lower Snake River Compensation Program will be required to fully seed currently available chinook and steelhead habitat in the Grande Ronde.

c Working drafts of U.S. v. Oregon spring chinook and summer steelhead production reports. Oregon Department of Fish and Wildlife, Portland, Oregon.

d Claire, E., and R. Storch. 1977. Streamside management and livestock grazing: An objective look at the situation. In Symposium on livestock interactions with wildlife, fisheries and their environments, May 3-5, 1977, Sparks, Nevada. United States Department of Agriculture Forest Service, Sparks, Nevada.

e Olsen, E.A., R.B. Lindsay and B.J. Smith. 1984. Evaluation of habitat improvements -- John Day River. Oregon Department of Fish and Wildlife, Fisheries Research Project DE-AI83BP39801, Annual Progress Report, Portland, Oregon

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2. Confederated Tribes of the Umatilla Indian Reservation, 1984. Working Paper, Grande Ronde River Basin Recommended Salmon and Steelhead Habitat Improvement Measures.

3. Duff, B.A., and J.L. Cooper. 1976. Techniques for Conducting a Stream Habitat Survey on National Resource Land. J.S. Bureau Land Management. Tech. Note 283. 72 pp.

4. U.S. v. Oregon, Grande Ronde River spring chinook production report. Oregon Department of Fish and Wildlife, Portland, Oregon.

5. U.S. v. Oregon, Grande Ronde River summer steelhead production report. Oregon Department of Fish and Wildlife, Portland, Oregon.

# APPENDIX - A

## Riparian Habitat Inventories:

Methodologies and criteria used
to identify treatment needs

# RIPARIAN HABITAT INVENTORY METHODOLOGIES

Riparian habitat inventories were designed to be one-time-through, nonrepetative inventories whose objective is to give an overall picture of instream and riparian habitats for project design and prioritization purposes only. Riparian habitat transect monitoring guidelines, whose objective is to monitor habitat changes over time have also been developed and implemented but will not be a part of this report.

Riparian habitat inventory methodologies were developed as a cooperative effort between ODFW and the USFS (Wallowa Whitman National Forest) for the purpose of consistent data collection within the Grande Ronde River Basin. Methodologies were first developed and implemented in 1985. Following the 1985 field season some procedures were revised to facilitate more accurate field data collection and/or to better reflect actual habitat conditions.

Habitat inventory categories which were examined, and will be discussed herein are: 1) flow features, 2) organic debris, 3) shade density, and 4) riparian vegetation density.

1. Flow features. Flow features were divided into three categories: a) pools, b) glide/runs, and c) riffles. Each flow feature was then recorded as a percentage, in 5% increments, based on a visual estimate. Flow features were defined as follows:
   a. Pools. Portions of the stream that are deeper and of lower velocity than the main current (Arnette, 1976).
   b. Glide/runs. Portions of the stream where the water surface is not broken, but is shallower than a pool and has a velocity as fast, or faster, than the main current (Duff and Cooper, 1976).
   c. Riffles. Faster, shallower areas in which the water surface is broken into waves by wholly or partially submerged obstructions.
2. Organic debris. The organic debris index was designed to reflect the amount of cover within a stream channel which was provided by nonliving organic debris (leaves, branches, logs, etc.), either stationary or transient in nature.

Two indicies were used, one in 1985 and one thereafter. The 1985 organic debris index was based on the following scale (Table A-1):

Table A-1. Organic debris index rating chart used in 1985.

| Rating | Debris description |
|---|---|
| 1 | No organic debris. |
| 2 | Infrequent debris; debris present consists of small, floatable organic debris. |
| 3 | Debris of moderate frequency; a mixture of small to medium size debris affecting less than 10% of the channel area. |
| 4 | Numerous debris; a mixture of medium to large size debris affecting 11 to 30% of the channel area. |
| 5 | Debris dams of predominantly large material affecting 31 to 50% of the channel area and often occupying the total width of the channel. |
| 6 | Extensive, large debris dams either continuous or influencing over 50% of the channel area. Forces water onto the floodplain even at moderate flows. Generally presents a fish migration blockage (Roegen, 1983). |

The 1985 index proved to be too inflexible. Therefore a new Organic Debris Index was developed for 1986 and thereafter which used two variables; debris frequency and debris size (Table A-2).

Table A-2. Organic debris index rating chart used in 1986 and later.

| Frequency rating: | Description of frequency and size |
|---|---|
| 0 | None |
| 1 | Debris covering less than 10% of the channel area. |
| 2 | Debris covering 11 to 30% of the channel area. |
| 3 | Debris covering 31 to 50% of the channel area. |
| 4 | Debris covering over 50% of the channel area. |
| 5 | Extensive debris jams which force water onto flood plain even with moderate flows. May present a fish migration blockage. |
| Size rating: | |
| A | Small, floatable organic debris. |
| B | Mixture of small (1-6" dia.) to medium (7-12" dia.) size debris. |
| C | Mixture of medium to large (more than 12" dia.) size debris. |
| D | Predominantly large debris. |

During field surveys each survey section was given an organic debris index class based on Table A-2 (i.e. 2C - a mixture of medium or larger size debris which covered 11-30% of the stream channel). This class was later converted to a numeric value using a matrix (Table A-3). The numeric values within the matrix were developed to reflect the relative importance of the frequency and size of debris to fish utilization (Table A-4).

Table A-3. Organic debris matrix for assigning numeric values to debris frequency and size combinations.

| Organic Debris Frequency | | A | B | C | D |
|---|---|---|---|---|---|
| | 5 | 3 | 6 | 6 | 7 |
| | 4 | 4 | 5 | 5 | 6 |
| | 3 | 3 | 5 | 5 | 6 |
| | 2 | 3 | 5 | 5 | 5 |
| | 1 | 2 | 3 | 4 | 3 |

(A–D: Organic Debris Size)

Table A-4. Relative importance of organic debris index numbers to fish utilization.

| Numeric Value | Value as fish habitat |
|---|---|
| 0 - 2 | Little or no value to fish. |
| 3 - 4 | Moderate value to fish. |
| 5 | Maximum value to fish. |
| 6 | Good value as fish habitat, but may prove detrimental at certain flows. |
| 7 | Primarily detrimental to fish, but may provide some useable cover. |

3. <u>Shade density.</u> The shade density class was developed as a means of estimating the percentage of the overhead canopy which would provide shade at the heating period of the day. The percent of canopy cover was estimated and then a shade density class rating as follows:

| Percent Shade | 0 | 1-10 | 11-30 | 31-50 | 51-70 | 71-90 | 91-100 |
|---|---|---|---|---|---|---|---|
| Shade Density Class | 0 | 5 | 20 | 40 | 60 | 80 | 90 |

4. <u>Riparian Vegetation Density</u> The riparian vegetation density class was developed as a means to quantify the present and potential shade producing trees and shrubs within a given distance of a creek. Again, as with the organic debris index, two indicies were used for the riparian vegetation density index; one for 1985, and one thereafter. The 1985 index was based on brush within six feet of the water's edge versus trees within 25 feet of the water's edge. For any survey section, two density classes were required, "Brush Density Class" and "Tree Density Class" based on Tables A-5a and A-5b.

Table A-5a. Brush density class designations used in 1985.

| Percent Cover | 0 | 1-10 | 11-20 | 21-40 | 41-60 | 61-80 | 81-100 |
|---|---|---|---|---|---|---|---|
| Brush Density Class | 0 | 5 | 15 | 30 | 50 | 70 | 90 |

Table A-5b. Tree density class designations used in 1985.

| Percent Cover | 0 | 1-20 | 21-40 | 41-60 | 61-80 | 81-100 |
|---|---|---|---|---|---|---|
| Tree Density Class | 0 | 15 | 30 | 50 | 70 | 90 |

Beginning in 1986 the brush and tree density classes were replaced with one "Riparian Vegetation Density Class" (Table A-6). Using this methodology the percent of cover provided by trees and shrubs within 10 feet of the water's edge and less than five feet tall were rated separately from the trees and shrubs within 20 feet of the water's edge and greater than 5 feet tall. Coniferous and decidous vegetation were also recorded separately. Therefore, for any survey section, four density classes were required (confierous vegetation < 5 ft. tall and within 10 ft. of water's edge; deciduous vegetation < 5 ft. tall and within 10 ft. of water's edge; coniferous vegetation > 5 ft. tall and within 20 ft. of water's edge; and deciduous vegetation > 5 ft. tall and within 20 ft. of water's edge.)

Table A-6. Riparian Vegetation Density class designations used in 1986 and later.

| Percent Cover | 0 | 1-10 | 11-20 | 21-40 | 41-60 | 61-80 | 81-100 |
|---|---|---|---|---|---|---|---|
| Riparian Vegetation Density Class | 0 | 5 | 15 | 30 | 50 | 70 | 90 |

D-1/29

APPENDIX B

Riparian Habitat Inventory Summaries:

- by Subbasin and stream

Table B-1. A summary of riparian habitat inventory data[1/] by stream within the upper Grande Ronde River subbasin.

| Stream | Flow Features (%) [2/] | | | Organic Debris Index | Riparian Vegetation Density Class 1985 [3/] | | Riparian Vegetation Density Class 1986 - 1987 [4/] | | | | Shade Density Class |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | P | G/R | R | | Br | Tr | D<5 | C<5 | D>5 | C>5 | |
| Upper Grande Ronde River mainstem | 8.5 | 43.0 | 48.5 | 1.8 | 7.9 | 6.3 | -- | -- | -- | -- | 7.4 |
| Sheep Cr. | 22.0 | 57.0 | 21.0 | 1.4 | 2.0 | 1.1 | -- | -- | -- | -- | 0.6 |
| Fly Cr. | 69.0 | 27.0 | 4.0 | 2.0 | 1.7 | 3.1 | -- | -- | -- | -- | 1.8 |
| McCoy Cr. | 40.0 | 23.0 | 37.0 | 1.2 | -- | -- | 7.0 | 0.7 | 6.0 | 3.0 | 7.0 |
| Chicken Cr. | -----Data not available----- | | | | | | | | | | |
| Meadow Cr. | 32.0 | 36.0 | 32.0 | 1.1 | -- | -- | 6.0 | 0.0 | 6.0 | 1.3 | 3.0 |
| Beaver Cr. | -----Data not available----- | | | | | | | | | | |
| Jordan Cr. | -----Data not available----- | | | | | | | | | | |
| Whiskey Cr. | 33.0 | 20.0 | 47.0 | 2.7 | -- | -- | 4.0 | 2.0 | 7.0 | 8.0 | 19.0 |
| Rock Cr. | 25.0 | 40.0 | 35.0 | 2.1 | -- | -- | 1.6 | 0.0 | 7.0 | 0.9 | 7.0 |
| Little Fly Cr. | -----Data not available----- | | | | | | | | | | |

1/ For definitions/explanations of the Organic Debris Index, Riparian Vegetation Density Class and Shade Density Class numeric values, see Appendix A of this report.

2/ Flow features are given as percent Pool (P), Glide/Run (G/R), and Riffle (R).

3/ Riparian vegetation density classes for 1985 were in terms of Brush (Br) and Trees (Tr).

4/ Riparian vegetation density classes for 1986-1987 were in terms of Deciduous (D) and Coniferous (C) plants less than five feet tall (<5) or greater than five feet tall (>5).

D 1/29

Table B-2. A summary of riparian habitat inventory data[1/] by stream within the Joseph Creek subbasin.

| Stream | Flow Features (%) [2/] | | | Organic Debris Index | Riparian Vegetation Density Class 1985 [3/] | | Riparian Vegetation Density Class 1986 - 1987 [4/] | | | | Shade Density Class |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | P | G/R | R | | Br | Tr | D<5 | C<5 | D>5 | C>5 | |
| Upper Elk Cr. (USFS lands) | 9.5 | 37.4 | 53.1 | 3.7 | -- | -- | 10.5 | 5.0 | 15.3 | 23.3 | 24.3 |
| Lower Elk Cr. (Private lands) | 16.4 | 46.0 | 37.6 | 2.8 | 7.2 | 11.1 | -- | -- | -- | -- | 18.3 |
| Crow Cr. | 34.8 | 39.8 | 25.4 | 2.3 | -- | -- | 3.6 | .01 | 21.9 | 1.2 | 19.3 |
| Lower Swamp Cr. (USFS lands) | 22.1 | 37.7 | 40.2 | 3.0 | -- | -- | 5.0 | .42 | 18.7 | 13.7 | 28.7 |
| Upper Swamp Cr. (Private lands) | 26.5 | 49.8 | 23.7 | 3.1 | 15.1 | 16.9 | -- | -- | -- | -- | 27.8 |
| Chesnimnus Cr. | 6.6 | 64.1 | 29.3 | 2.1 | -- | -- | 13.1 | .05 | 20.1 | 1.5 | 9.3 |
| Pine Cr. System | 18.0 | 65.0 | 17.0 | 2.0 | -- | -- | 8.9 | .11 | 8.9 | 1.5 | 12.5 |
| Butte Cr. | 11.5 | 44.4 | 44.1 | 2.5 | -- | -- | 6.8 | 0 | 25.9 | 0.4 | 29.7 |
| Davis Cr. | -----Data not available----- | | | | | | | | | | |
| Joseph Cr. | -----Data not available----- | | | | | | | | | | |

1/ For definitions/explanations of the Organic Debris Index, Riparian Vegetation Density Class and Shade Density Class numeric values, see Appendix A of this report.

2/ Flow features are given as percent Pool (P), Glide/Run (G/R), and Riffle (R).

3/ Riparian vegetation density classes for 1985 were in terms of Brush (Br) and Trees (Tr).

4/ Riparian vegetation density classes for 1986-1987 were in terms of Deciduous (D) and Coniferous (C) plants less than five feet tall (<5) or greater than five feet tall (>5).

VIII