A Comprehensive Approach to Restoring Habitat Conditions Needed to Protect Threatened Salmon Species in a Severely Degraded River - The Upper Grande Ronde River Anadromous Fish Habitat Protection, Restoration and Monitoring Plan

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The Grande Ronde River occupies the northeastern corner of Oregon (Figure 1) and is a tributary to the Snake River in the Columbia River basin and provides habitat for spring chinook salmon and steelhead. Most of the 3,950 square mile watershed of Upper Grande Ronde River is part of the Wallowa-Whitman National Forest (Figure 1) with some interspersed private land.

The Upper Grande Ronde River Plan (UGRRP) was developed in response to several environmental and social issues. Spring chinook populations have declined precipitously over the past three decades (Figure 2). A 1989 flood following a fire killed many of the adult and juvenile steelhead and salmon using the river at the time, further reducing the low salmon population. Severely degraded habitat conditions in the Upper Grande Ronde have contributed to the decline in salmon populations by reducing the survival and production of salmon in natal habitat. Water temperatures violate Oregon's water temperature standard. Under the Wallowa-Whitman Forest Plan, extensive timber harvest and road construction was proposed for the basin over the next ten years. These activities, if implemented, promise to exacerbate the poor condition of salmon habitat and have been a source of conflict between fishery co-managers and the land managers of the Wallowa-Whitman National Forest.

Four Columbia Basin Indian Tribes have federally secured treaty rights to take those harvestable salmon from the Upper Grande Ronde River that pass the Tribes' usual and accustomed fishing places. These four tribes are the Umatilla, the Nez Perce, the Warm Springs, and the Yakima. The rebuilding of Columbia River salmon stocks is mandated by federal legislation, as well as obligations under treaties with the Tribes and an international treaty with Canada. Subsequent to the development of the UGRRP, the National Marine Fisheries Service included spring chinook salmon in the Grande Ronde River as a component of the Snake River salmon species listed as "threatened" species under the Endangered Species Act. Although spring chinook salmon are a primary concern, the UGRRP is also aimed at protecting and restoring summer steelhead habitat.

The Upper Grande Ronde River has undergone severe sedimentation caused by the cumulative effects of high levels of erosion generated from road construction, mining, logging, grazing, and wildfire.

While all of these activities have increased sediment delivery to the streams, roads typically cause the greatest increases in sediment delivery. Road density within the basin is extremely high, 4 mi/mi^2 overall and 7 mi/mi^2 outside of roadless areas. Most of the roads in the basin have been built to low standards and have high erosion rates. The loss of riparian vegetation caused by grazing,

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logging, and road construction has also decreased bank stability, increased channel erosion, and decreased sediment interception by vegetation. Riparian vegetation is the most effective means of intercepting eroded sediment before it is introduced into streams (Megahan 1984; Heede et al. 1988). Over the past 50 years, the amount of fine sediment in the channel substrate has increased (McIntosh 1991). The high sediment loads generated by land-disturbing activities are a probable cause of the increases, because increased sediment delivery typically increases the amount of fine sediment in channel substrate (Diplas 1991). Fine sediment in channel substrate reduces fish production and salmon survival by reducing rearing habitat or reducing the surviv-al-to-emergence of incubating salmon (Alexander and Hansen, 1986; Chapman and McLeod 1987). Fine sediment is now at levels which severely impair salmon survival and production. Improvement in fine sediment levels in fish habitat is contingent on reducing sediment loads (Platts et al. 1989; Bohn and Megahan 1991).

Much of the logging, grazing, mining and road construction has been in riparian zones. This has reduced riparian vegetation throughout the watershed. It is estimated that stream shading averages about 72% under natural conditions; in contrast, the Upper Grande Ronde is estimated to have an average stream shading of about 28%. This significant loss of stream shading has contributed to high summer water tempertures that now commonly exceed 68 ° F. Water temperatures in excess of 68° F impair salmon growth and may be indirectly lethal to salmon (Theurer et al. 1985); they also exceed Oregon's state water temperature standard.

The loss of riparian vegetation has also reduced inputs of large woody debris (LWD) that are vital for pool formation and fish production. Fish production decreases with the loss of LWD and large pools. (Fausch and Northcote 1991). Recent research indicates that the Grande Ronde River and tributaries have lost about 70% of the large pool volume over the past 50 years (McIntosh 1992). The loss of pools is attributable to both the loss of LWD (Fausch and Northcote 1991) and high levels of sediment delivery (Lyons and Beschta 1983; Alexander and Hansen 1986) caused by land disturbance at the watershed scale. Elevated sediment delivery also tends to increase the width to depth ratio of stream cross-sections (Lyons and Beschta 1983). Channel morphology in lower reaches of the

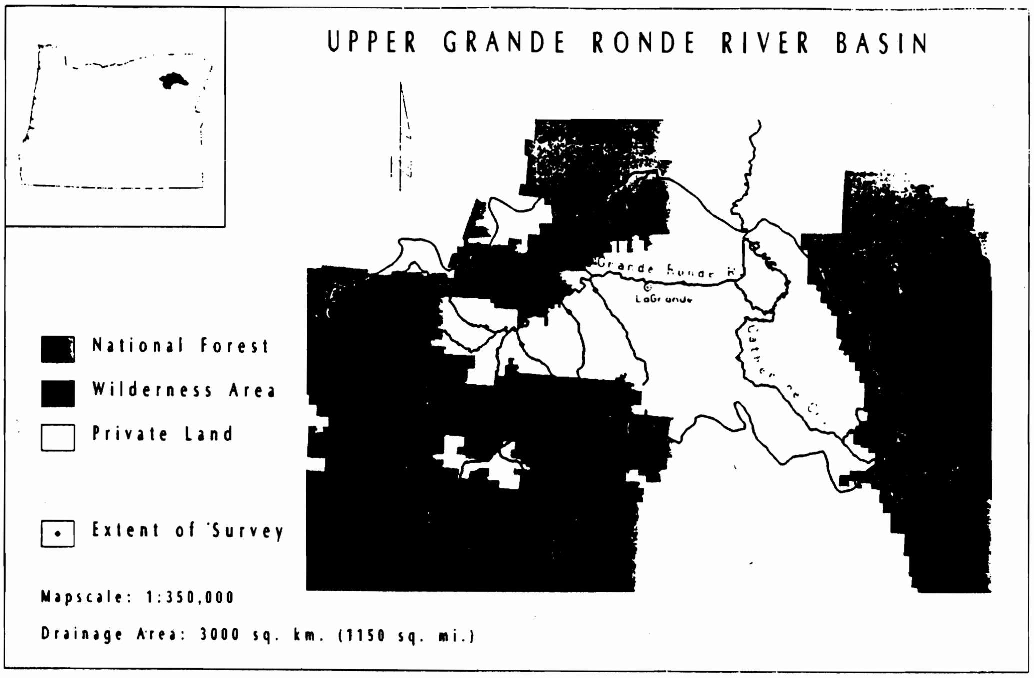

Figure 1. Location of the Upper Grande Ronde River Basin.

Upper Grande Ronde exhibits a high width to depth ratio which is exacerbating problems with seasonal temperature extremes.

The spring chinook salmon and steelhead stocks in the basin undergo extremely high mortality during downstream passage through the Columbia River hydroelectric system; this mortality is probably the main factor responsible for the decline of chinook salmon populations in the Snake River basin. However, the best available scientific information indicates that the changes in the character of the habitat caused by land-use activities have significantly reduced salmon and steelhead survival in the natal habitat.

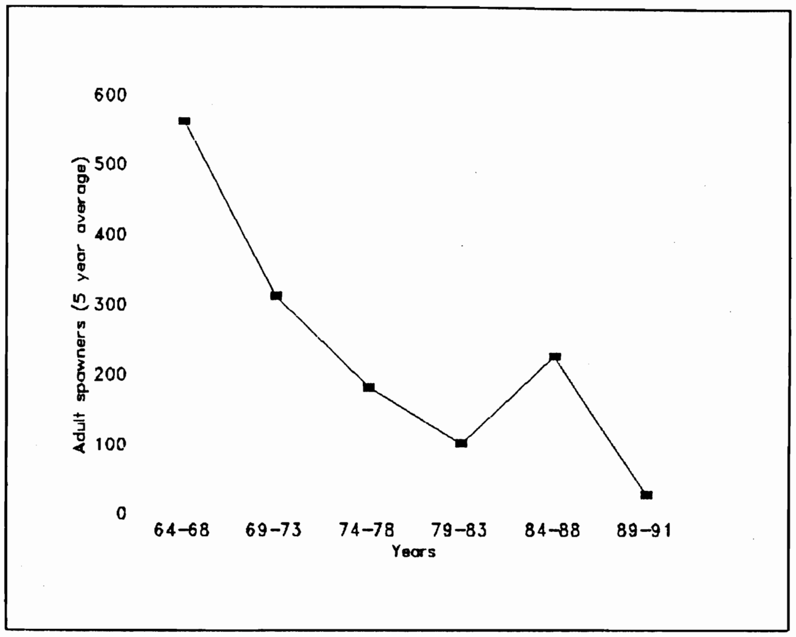

Figure 2. Trends in counts of adult spring chinook salmon returning to spawn in the Upper Grande Ronde.

While downstream passage mortality must be reduced if the full benefits of habitat restoration are to be realized, the existing conditions of water quality and riparian areas in the Grande Ronde River increases the severity of the threat of extirpation of spring chinook from the Upper Grande Ronde. Habitat damage takes years to reverse. Even under proper management, the recovery of riparian areas, fish habitat, and water quality may require 25-200 years (Gregory and Ashkenas 1990). However, it will never begin to recover if protection and restoration measures are not implemented. It is essential that freshwater survival rates of these fish be returned to the highest possible level as rapidly as possible, in order to alleviate the biologically perilous status of the basin's salmon.

The UGRRP was developed through a consensus process among multi-disciplinary personnel from agencies and organizations with fish habitat expertise and management responsibilities, including the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, Columbia River Inter-Tribal Fish Commission, Oregon Department of Fish and Wildlife, Oregon State University, the USFS Pacific Northwest Research Station, and the Wallowa-Whitman National Forest.

The UGRRP was developed in steps. First, the specific condition of biological habitat features required for salmon and steelhead survival were identified using the best available scientific information and data. Second, quantitative performance standards were established for these habitat features. Third, the existing status of the essential habitat features were assessed. Fourth, the cause of existing conditions was determined using the best data and scientific information available. Fifth, some protection measures were set as performance standards for land-use activities to ensure that progress was made toward attainment of habitat standards by arresting and reversing the causes of habitat degradation. Sixth, management guidelines were established as a means to ultimately achieve the habitat standards. An overarching goal was to create a habitat restoration plan that stresses accountability and has measurable "yardsticks" for measuring the effectiveness of restoration.

The primary goals of the UGRRP are to reduce sediment loads and summer water temperatures, and re-establish natural loading of LWD to the streams. Riparian protection and rehabilitation strategies provide a means to achieve these goals. However, the UGRRP also contains watershed level measures aimed at reducing the existing high sediment loads caused by past activities throughout the watershed.

The following were set as quantitative habitat standards in the UGRRP:

1) Maintain surface fines and fines by depth in channel substrate at less than 20% in salmon spawning habitat.

2) Achieve a decreasing trend in maximum summer water temperatures. Maximum daily water temperatures should be less than 61 degrees F in small subwatersheds. In streams greater than sixth order, maximum summer water temperatures should be less than 65 degrees F.

3) The watershed average for LWD should be least 20 pieces of LWD per 1000 feet of stream. LWD pieces should be greater than 1 foot in diameter and have minimum length of 35 feet; 80% of the pieces should be longer than 35 feet and exceed 1.75 feet in diameter.

4) In meadow ecosystem riparian zones, at least 80% of banks should be covered with shrubs, of which, at least 50% should be more than 8 feet tall

5) Achieve an increasing trend in pool volume and depth.

6) Width-to-depth ratios in channel cross sections should be less than 10.

7) No removal of forest vegetation within buffer zones. Minimum width of buffer zones set at 75 feet times Strahler stream order from edge of floodplain on both sides of stream. On streams greater than fourth order, 300 feet from the edges of floodplain is the minimum buffer width.

8) Roadless areas remain roadless until there is a documented improving trend in downstream habitat. The small fragments of roadless areas in the watershed serve as the anchor points for restoring riparian vegetation, water quality, and fish habitat.

The following management guidelines were developed to progress towards meeting the performance standards:

1) Mandatory pre-project monitoring of parameters set as performance standards.

2) No implementation or continuation of activities that could forestall an improving trend in habitat parameters in watersheds where performance standards are not met.

3) Suspension of riparian grazing in watersheds that do not meet performance standards. Rapid revision of grazing allotments plans with focus on the recovery of riparian vegetation.

4) Net reduction in sediment delivery as part of all projects in watersheds where fine sediment standards are not met. Until an improving trend in downstream substrate conditions is documented through monitoring for three consecutive years, any land-disturbing activity that produces sediment will be preceded by rehabilitation activities which actively reduce existing sediment loading by about three times the sediment delivery expected from the land-disturbing activity.

5) Active program of obliteration or rehabilitation of roads; roads in riparian zones have the highest priority. Upgrade erosion control on all roads which cannot be obliterated for management purposes. The construction of roads paralleling streams is prohibited. Avoid riparian road crossings.

6) Annual monitoring of performance standard parameters in representative reaches for analysis of trends and effectiveness. The data will also be used to adapt the UGRRP and its implementation over time.

7) Long-term validation monitoring of fish populations and fish habitat interactions.

The UGRRP also identifies research information needed to refine the UGRRP provisions over time. Several studies are currently underway, including surveys of habitat conditions by the Wallowa- Whitman National Forest and the Oregon Department of Fish and Wildlife, water temperature monitoring and model validation by Oregon State University, sediment transport monitoring model validation by Oregon State University, and monitoring of inter-annual sediment deposition in spawning habitat by the Confederated Tribes of the Umatilla Indian Reservation and the Columbia River Inter-Tribal Fish Commission. The information garnered from these monitoring and research efforts should be useful not only to the restoration of the Upper Grande Ronde, but also to the many equally degraded watersheds in the Columbia basin.

The UGRRP is presently being used as general foundation for the development of the Wallowa-Whitman's Conservation Strategy for Snake River Salmon under the Endangered Species Act. This Conservation Strategy is still in the public involvement process. Although the UGRRP has not been formally adopted, it provides a comprehensive approach to habitat restoration that is biologically sound, measurable and adaptive. Salmon habitat throughout much of the Columbia River has undergone similar degradation by similar causes as in the Grande Ronde. The UGRRP is broadly applicable to these watersheds.

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