Hot Springs Fork Habitat Improvement Project

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by

Tracii L. Hickman, District Fisheries Biologist
Mt. Hood National Forest
Estacada Ranger District
Estacada, Oregon

Prepared for

Andy Thorns, Project Manager
U.S.Department of Energy
Bonneville Power Administration
Division of Fish and Wildlife

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ABSTRACT

The Hot Springs Fork of the Collawash River is a major sub-drainage of the Clackamas River. Emphasis species for natural production are spring chinook, coho salmon, and winter steelhead. Natural production appears to be limited by a lack of quality rearing habitat. Over the last 40 years, habitat complexity has been reduced in approximately 70 percent of the area accessible to anadromous fish. The reasons for this reduction are numerous and include both natural events and management related activities. Natural passage barriers limit anadromous fish access to over approximately seven miles of high quality habitat.

The year of 1992 was the eighth year of a multi-year effort to improve fish habitat in the Hot Springs Fork drainage. Efforts concentrated on planning, implemention and monitoring of the project, to restore fish habitat from river mile 4.4 to 6.2 on the mainstem of the Hot Springs Fork. Objectives were to increase habitat complexity and cover for rearing of juvenile salmonids. To meet these objectives, a total of 51 structures, varying in complexity and composition, were constructed or rebuilt in the treatment area.

INTRODUCTION

Fish habitat in the Hot Springs Fork drainage has been impacted by a variety of natural events and management activities. This has resulted in a general lack of channel complexity and poor quality rearing habitat. In 1985, under the Northwest Power Planning Council, Fish and Wildlife Program (measure 703 [C] action item 4-21 the USDA Forest Service and Bonneville Power Administration (BPA] entered into a multi-year agreement to improve fish habitat in the Hot Springs Fork drainage. In the first year of the agreement, efforts focused on improving passage conditions in two tributaries, Pansy Creek and Nohorn Creek, and channel rehabilitation in a 0.3 mile reach of Pansy Creek (Cain, 1985) (see map, page 14). Rehabilitation of the mainstem habitat began in the second year with the construction of approximately 135 structures to increase channel complexity and rearing habitat (Cain and Hohler, 1986). Selection of the project areas in the first two years was based on opportunities identified in stream surveys conducted in 1981 and a winter/spring survey of the Hot Springs Fork in 1986.

Before the program continued and additional work was implemented, two needs were identified. First, a drainage restoration plan was needed which would guide future restoration efforts. Second, more specific baseline data was needed to further describe existing habitat conditions in the basin to aid in determining project effectiveness.

In 1987, the restoration plan was completed in cooperation with the Oregon Department of Fish and Wildlife (ODFW) [1988/1991 Implementation Plan and Work Statement, Hot Springs Fork, Collawash River Habitat Improvement]. The basin inventory was completed in the 1988 field season using techniques developed by the Pacific Northwest Forest and Range Experiment Station (Hankin and Reeves 1988).

Results of the Hot Springs Fork basin survey are summarized and discussed in the Monitoring and Evaluation of Mt. Hood National Forest Stream Habitat Improvement and Rehabilitation Projects: 1988 Annual Report (Grimes 0989). The objective of the basin survey was to identify factors limiting salmonid production in the basin. Additional fish habitat monitoring and evaluation surveys were completed in 1990 from river miles 2.1 to 4.4. The 1992 project plan and design was based on this information, coupled with field surveys by the District Fisheries Biologist and technician.

Tasks identified for implementation in FY 1991 (based on the revised Clackamas/Hood River Habitat Enhancement Project 1988-1992 Implementation Plan and Statement of Work) were:

1) Complete final design, layout and contract preparation for 1991-92 project work.

2) Implement 1991-92 project work between river mile 4.4 and 6.2 (reach five, portions of reach six and seven, a total of one mile). The project would include falling trees into the channel to improve habitat diversity, and the construction of habitat structures using introduced boulders. These structures would be built with an excavator/backhoe.

4) Continue maintenance on previously installed structures.

5) Continue pre- and post-monitoring to document changes in physical habitat and biological parameters as a result of project work.

6) Conduct a post-treatment peer review of Hot Springs Fork 1992 project work to insure all opportunities for habitat improvement have been identified and habitat objectives for the stream have been met. Review team will include other Mt. Hood National Forest fish biologists and hydrologists and Oregon Department of Fisheries and Wildlife fish biologists.

DESCRIPTION OF STUDY AREA

The Hot Springs Fork is a fourth-order tributary to the Collawash River, entering the mainstem at river mile (RM) 4.0. The mainstem of the Hot Springs Fork has a length of 14.6 miles, with 10.1 miles accessible to anadromous fish. The basin area is 60 square miles and is entirely on public lands administered by the U.S. Forest Service. The Hot Springs Fork heads on Mother Lode Mountain (elevation 5,251') and flows north-northwest before it swings and flows northeast approximately six miles to its mouth (elevation 1,624'). The topography is steep, forested sideslopes dissected by numerous first and second order streams. The drainage is in the rain-on-snow zone and precipitation largely occurs as snow in the headwaters and as rain in the lower drainage. Timber harvest and associated road building has occurred in much of the watershed with the exception of the headwaters which are within the Bull of the Woods Wilderness.

The Hot Springs Fork supports natural production of spring chinook, coho salmon, and winter steelhead. In addition, ODFW annually outplants summer steelhead and resident trout to provide a summer sport fishery. Major tributaries to the Hot Springs Fork include Pansy, Nohom, Alice, and Whetstone Creeks. Migration barriers on the mainstem and tributaries and reductions in rearing habitat complexity limit anadromous fish production in the drainage. Reductions in habitat complexity, primarily through the loss of instream wood from natural and management related activities, has affected approximately 70 percent of the accessible anadromous fish area. The loss of channel structure has resulted in a broad, shallow channel during low flows with limited hiding cover in pools and riffles. Some reaches of the Hot Springs Fork are deeply incised and scoured to bedrock. Spawning habitat is patchy in distribution, although there are about 2,400 square meters of gravel. Much of it is located in the lower 2.5 miles. The reach between RM 2.5 and 5.0 has virtually no spawning habitat and very little hiding cover. Partial passage is obstructed by a nine foot falls at RM 7.1.

Fish habitat improvement work on the Hot Springs Fork prior to 1985 concentrated on passage improvement. Pegleg Falls was bypassed by the completion of a fish ladder in 1966. Access to Pansy and Nohom Creeks, major tributaries to the Hot Springs Fork, was improved in 1985 in a cooperative effort between BPA and the Mt. Hood National Forest. In 1986, the waterfall at FM 7.1 of the Hot Springs Fork was modified to improve passage conditions. Channel rehabilitation efforts to improve spawning and rearing conditions have been conducted in the lower reach of Pansy Creek (1985) and on the mainstem Hot Springs Fork from RM 2.9 to 3.8 (1986).

MATERIALS AND METHODS

Objectives

A detailed discussion of conditions prior to project implementation in reaches five, six and seven is described in the 1990 annual report of the Monitoring and Evaluation of Mt. Hood National Forest Stream Habitat Improvement and Rehabilitation Projects (Beyer and Lindland 1992). The report provides a framework for discussing 1992 project objectives.

Results of the 1990 survey indicated:

1) The dominant habitat is riffles, providing 51% of all habitat.
2) Pools and glides comprise 45% of all habitat.
3) Side channels comprise 4% of all habitat.

Within these habitat types, habitat conditions can be generalized within the following categories:

1) There is a lack of complex margin habitat in all habitat types.
2) Pools are large and simple.
3) Overall cover in all habitat types is low in amount and complexity.
4) Cover type is rigidly stratified within habitat units, there isn't much mixed cover complexity.

Objectives of the 1992 project were:

1) Increase complexity of cover in all habitat types.
2) Create more complex pools that are a variety of sizes.
3) Increase complexity of habitat unit edges to improve in-channel habitat and increase thalweg depth during summer low flows.

Planning

Planning for the FY 1992 project was based on stream surveys and site specific project planning. In August of 1988 a basin survey was completed using the Hankin and Reeves (1988) methodology. A total of 10.2 miles were surveyed. The results of this survey are summarized in the report Monitoring and Evaluation of Mt. Hood National Forest Stream Habitat Improvement and Rehabilitation Projects: 1988 Annual Report (Grimes 1989). Physical parameters measured include composition and amount of habitat types (pools, riffles and glides) and amount of cover associated with each habitat type. Biological parameters consisted of estimating species composition and age of salmonids.

From the 1988 survey it was concluded that stream margin habitat was lacking, possibly leading to high over-winter mortality rates; large woody debris was scarce; and total cover complexity was low for the different species of fish.

The project work was then planned based on this knowledge. Field surveys were conducted throughout the treatment reach and sites were identified that were suitable for project work. Generally, treatment sites fell into two habitat categories; large, simple pools and broad, shallow riffles. The large, simple pools lacking in habitat cover and complexity were deemed appropriate for large wood/boulder structures that would increase areas of cover for the dominate l+ steelhead. Structures placed at the head of pools would also provide hiding refuge for fish foraging at the tailout of the upstream riffle. Smaller, 0+ fish tended to dominate the riffles, and structures in the riffles were planned to provide velocity refuge and hiding cover from predators.

Riffles in the Hot Springs Fork tend to be broad, shallow and simple (Grimes 1989). Structures were planned along the margins of the thalweg to force scouring in the thalweg during bedload transporting storm events (events that form the channel). These storms generally occur during the winter, underlying the importance of planning structures to be effective at a broad range of streamflows.

Another aspect of the planning process was identifying sources of material for the project work. The Hot Springs Fork is a large, flashy system subject to rain-on-snow events and during winter storm events flows in the channel may reach 5,000 to 6,000 cfs. This requires project material structurally capable of withstanding these types of events. Two to four cubic yard boulders, with a density that retains integrity after drilling and cabling, are the minimum size to keep structures in place. Boulders of this size are expensive and difficult to blast and transport.

Access points to dump boulders and for entry of the backhoe were limited, and part of the planning effort involved identifying these points. The week prior to implementation certified Forest Service fallers dropped 36 cedar and Douglas fir trees at the structure sites. These were large trees, with diameters of up to 42", an average of 32" dbh and lengths up to 200'. Trees used for project work usually were taken from above the floodplain, and evenly spaced throughout the treatment reach to minimize impacts to the riparian zone. The trees were selected in coordination with wildlife needs and concerns. Trees were later skidded to the project sites by the backhoe. Several sections of the project area have minimal riparian vegetation. It was determined the value of the tree was greatest left standing, so project work was curtailed in these areas.

Outreach was conducted to identify public concerns associated with the project. There was no response to letters, so original environmental documentation was considered adequate. Surveys were conducted for sensitive plants and cultural resources. One cultural resource site was identified and protected near PegLeg falls.

Implementation

Implementation of the 1992 project was done in two phases.
Phase one involved construction of the habitat structures. A backhoe was hired under an equipment rental contract and the structures were built under the supervision of a Forest Service employee. Most structures were complex, multi-log and multi-boulder structures. Everest et. al (1988) and other fish habitat researchers have found large, complex structures to be the most valuable for juvenile salmonids. After completion of the project, areas impacted by the entrance and exiting of the backhoe were seeded with erosion ccntrol seed mix and small conifers were planted to accelerate recovery of disturbed ground.

Phase two was the cabling of the structures. A cabling crew of four people followed the backhoe and secured the structures. Holes were drilled 10-12" deep, cleaned with water and a brush, fitted with cable and glued with epoxy resin. Structures were cabled to boulders and to standing trees on the bank

Monitoring

Mcnitoring the effectiveness of the habitat work is occuring at several different intensities. The Hankin and Reeves surveys conducted in 1988 and 1989 provided baseline biological and physical pre-treament data. These surveys confirmed the lack of instream organic (large wood) cover and further defined distribution of the juvenile salmonids.

Physical changes are being monitored by mapping and photographing the structures and treatment reaches. After all structures were cabled, the crew returned to the project area to draw maps and collect data on the structures. Prior to project implementation a series of permanent photo points were established and baseline photographs were taken. These photo points will continue to be used to provide long-term documentation of physical changes in the project area.

RESULTS AND DISCUSSION

A total of 51 structures were built or rebuilt within the time and budget estimates in the contract. Thirty-one complex, multi-log and boulder structures, 20 complex boulder habitats and numerous digger logs, wings, and log sills were constructed.

Everest et. al (1988) has identified the use of complex boulder habitat by overwintering juvenile steelhead. Thirteen different areas of the Hot Springs Fork, with an average gradient of 4%, were treated to meet this objective. A tctal of 78 boulders, with an average diamater of 3.5 cubic yards, were partially buried throughout the length of the riffles, and smaller boulders were placed on the downstream side behind the large boulder. It is hoped that these structures will provide interstitial overwintering cover for juvenile steelhead. These sites will be monitored for effectiveness.

Side channels have been identified as important off-channel habitat for salmonids. Two side channels were opened and/or modified in the project area. One side channel was 400 feet long with an average width of three feet. The second side channel was 200 feet long with an average width of three feet also.

SUMMARY AND CONCLUSIONS

The habitat improvement program on the Hot Springs Fork was successfully completed in 1992. A total of 1.0 miles of stream within a 1.8 mile section (FM 4.4 to 6.2) was treated in 1992. Fifty-one log and boulder structures were installed. Two side channels were opened and/or modified. One hundred and eighty-eight boulders were transported to project sites. Monitoring was completed and analyzed. Monitoring included quantification of physical and biological parameters throughout the stream.

Summary of Expenditures

The Bonneville Power Administration funded the 1992 program as part of the Clackamas/Hood River Habitat Enhancement (Project 84-11) agreement. A total of $70,984 was budgeted for project planning, basin inventory, monitoring, and maintenance. Expenditures for completion of project planning, monitoring, and maintenance totalled about $61,938.

1.	Personnel	$23,051
5.	Expendable equipment	3,243
8.	Sub-contracts Equipment Rental	16,750
9.	General Services (Fisheries & Watershed Support-S.O.)	4,873
10.	G&A Overhead (12%)	4,021
11.	Monitoring	3,500
14.	Total Cost	$61,938

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