

Project Completion Abstract

Salmon River Nutrient Enrichment for Fish Habitat Restoration

Salmon River, Grilse Creek, and Memekay Rivers
Coast Forest Region, Campbell River Forest District

Objectives

To enhance the habitat of winter-run steelhead (*Oncorhynchus mykiss*) and Coho (*O. kisutch*) in the Salmon River (Kelsey Bay), Grilse Creek, and the Memekay River.

FIA Schedule No. COTFL396353
FIA Project No. 6353005
Fiscal year: 2004/2005

Recipient: Weyerhaeuser
Division: Nanaimo Timberlands Services
MoF Forest Region: Coast
MoF Forest District: Campbell River

Professionals Involved in the Project

Craig Whiteman, RPBio
Senior Fisheries Biologist
Ministry of Water, Land, and Air
Protection (MWLAP)

Ken Ashley and Pat Slaney
MWLAP, Fisheries Section

Author of Project Completion Abstract

Jeff Sandford, Weyerhaeuser, FIA
Coordinator
65 Front Street, Nanaimo, BC
V9R 5H9
FAX: (250) 755-3550
Phone: (250) 755-3455
Email: jeff.sandford@weyerhaeuser.com

Watershed and Location

Salmon River, Grilse Creek, and Memekay River (92K.022 and 92K.012). Key map attached.

Introduction

The spring and summer of 2004 marked the sixteenth consecutive year of inorganic nutrient addition in the upper Salmon River watershed (Kelsey Bay). This stream enrichment project is designed to enhance the growth and survival of juvenile steelhead (*Oncorhynchus mykiss*) and coho (*O. kisutch*) through increased periphyton accrual and subsequent increases in the invertebrate food supply. Hatchery-reared steelhead fry, progeny of wild Salmon River broodstock, were released into the upper Salmon River and Grilse Creek from 1986 to 1998. Development of a slow-release fertilizer has been undertaken by the Fisheries Research and Development Section, Ministry of Water, Land and Air Protection (MWLAP), Vancouver, B.C. and supervised by Dr. Ken Ashley. A chronology of stream fertilization treatment in the Salmon River watershed, including Grilse Creek from 1988 to 2003, is detailed in Appendix 1 in the full project report entitled "Salmon River Nutrient Enrichment for Fish Habitat Restoration" prepared by Loreta Hansen. This was also the eighth year of stream nutrient addition to the Memekay River.

Description of Completed Work

A total of 2,416 L (11.6 barrels) of liquid fertilizer, ammonium polyphosphate (10-34-0), was dispensed through five drip stations: Grilse Creek – 310 L, Salmon River near Rock Creek Main Line – 624 L, Salmon River at the diversion – 548 L, Salmon River at Memekay Main Line bridge crossing – 624 L, and the Memekay River – 310 L. Fertilizer loading rates were adjusted to changing streamflow throughout the treatment period. Water samples were collected July 8, August 5, and September 6, 2004 and analysed at PSC Analytical Services in Burnaby for low level nitrogen and phosphorus. Juvenile fish were sampling using the electrofishing method at 10 sites within the control and treatment reaches.

A new product, providing organic instream nutrients, was tested in the upper Salmon River below Jessie Creek, in 2004. The product was made from organic fish meal (Alaskan pollock), heat-treated to remove pathogens, dried, and pressed into logs.

Cost Summary

Weyerhaeuser contributed \$19,422 of FIA funds towards this project. It is my understanding that BC hydro contributed a similar amount.

Conclusions

Liquid Nutrient Application

Throughout the 16 years of nutrient addition to the Salmon River watershed, there is commonly a period of very little growth, and die-off of existing growth, generally observed over a period of approximately 10 days to two weeks. This period coincided with the period of highest water temperatures in late July and early August. In 2004, the die-off period was extended, beginning earlier and ending later in August. No

Figure 1. Drip-tank with valve and filter.



Figure 2. Pollock logs 12 minutes after placement in the upper Salmon River below Jessie Creek.



chlorophyll sampling was conducted to accurately determine the length of this die-off period. A similarly extended period was also observed in 2003. Weather conditions during both seasons were very dry, with little rainfall. In 2003, water sampling showed levels of nitrogen limitation which may account for the low growth, even though the addition of 10-34-0 was continuous throughout the season. An investigation of this phenomenon is recommended to determine if this change is an effect of seasonal weather differences, changing weather patterns or an effect of nutrient addition.

Pollock Test

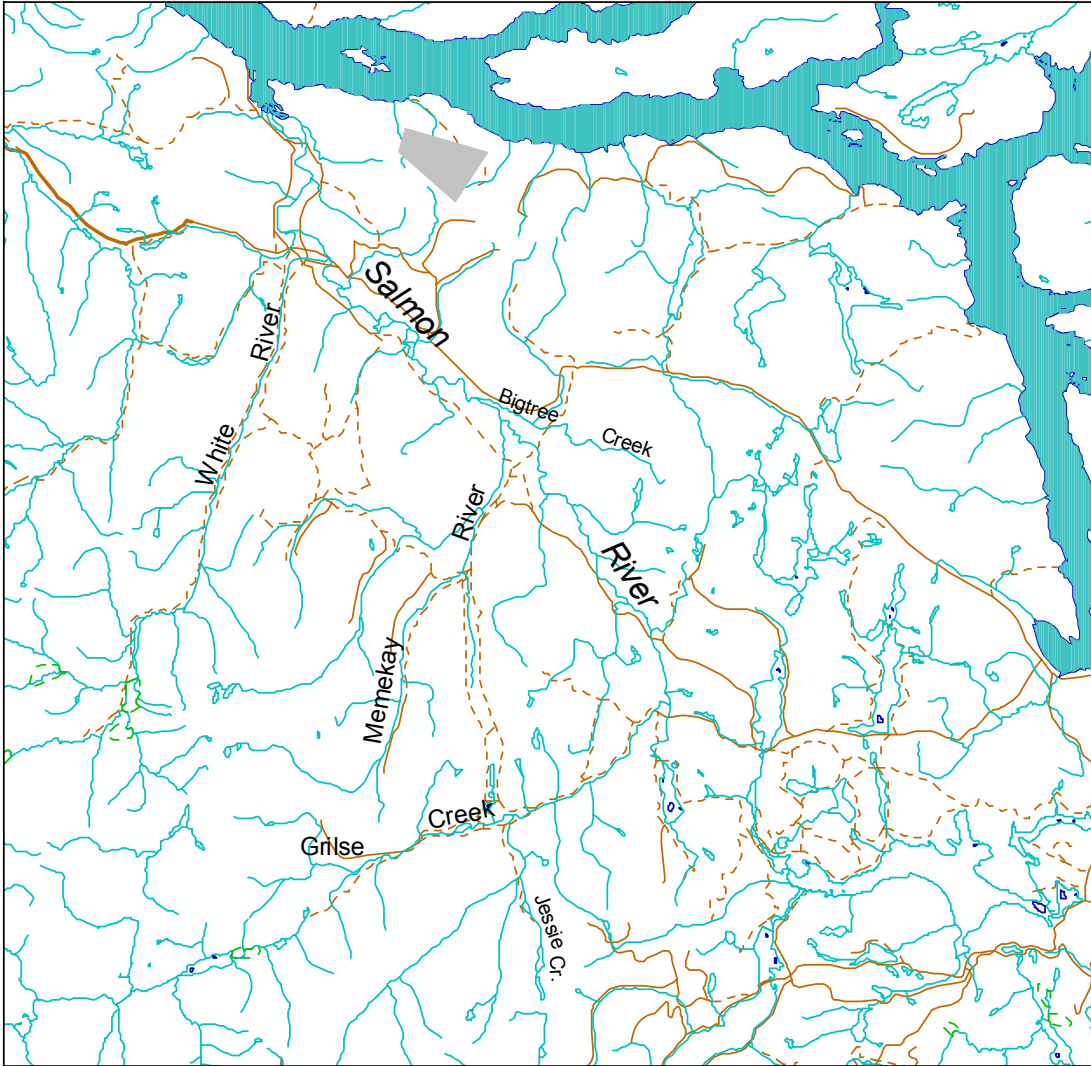
Results indicate that the upper Salmon pollock log application was successful in increasing nutrient levels and algae growth. Unfortunately a good control sample for algae was not maintained due to bear activity, although there was a visible increase in algal growth in the treated reach.

It is recommended that two periphyton plates be placed at each test site. This may increase but not guarantee usable samples should bears be attracted to the white surface again. If plates are destroyed for any reason the test should be re-started if sufficient time is left in the growing season.

In the upper Salmon River, the Washout site was 3.5 km downstream of the Pollock application and an accrual of growth occurred over the 45 day period of testing. This may indicate an effective downstream drift of nutrients for 3.5 km at the measured discharge of 1.36 m³/s declining to 0.40 m³/s. There was little difference between the 4-week and 6-week measurement at the Full Mix site, even though nutrients were available.

Key Map

Salmon River Stream Enrichment - 2004



1:340,000

5 0 5 Kilometers

