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Annual Compendium Of WRP Aquatic Rehabilitation Projects For The Watershed Restoration Program 1997 - 1998

Watershed Restoration Project Report No. 8
1998

BRITISH COLUMBIA

Watershed Restoration Program
Ministry of Environment, Lands and Parks
and Ministry of Forests

Annual Compendium Of WRP Aquatic Rehabilitation Projects For The Watershed Restoration Program 1997 - 1998

Editor
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Watershed Restoration Program
Ministry of Environment, Lands and Parks
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1998

Preface

An annual compendium of stream and riparian restoration projects is a valuable technical reference to those planning, prescribing and implementing aquatic ecosystem restoration projects including fish habitat rehabilitation and mitigation. Of equal importance, this summary provides Program planners and reviewers, including Forest Renewal BC with both a summary and a broad understanding of aquatic restoration projects managed or facilitated by the Ministry of Environment, Lands and Parks. Also, these descriptions with scanned colour photos provide technical reference material for communications. Typical examples of 1997/98 restoration projects are summarized in this compendium as provided via regional WRP Fisheries Specialists, Coordinators and district staff; some contacts or proponents may not have provided descriptions of all projects.

We have endeavoured to include costs and measures of outputs as these can be useful in gauging how much various restoration applications cost per unit completed, compared to costs summaries from elsewhere or in WRP technical circulars. Achieving cost-effective projects is crucial because it facilitates more rapid advancement of restoration of aquatic resources. Estimates of length or area of off-channel and in-stream works are provided, and if available, production of salmonids per annum are predicted from Koning and Keeley (1997; Chapter 3 in WRP Technical Circular 9). The latter facilitate estimates of benefit-cost, which for sound fish habitat rehabilitation projects are generally positive within 10 to 20 years because of their rapid rate of return as benefits (2-5 years; as described by Scarfe 1997; Chapter 4 in Technical Circular 9).

Most of the in-stream projects are focused on the short term (20-50 years) to accelerate natural recovery of logging-impacted aquatic ecosystems. For the long term, riparian protection and restoration needs to be implemented and managed to recover desired future conditions. It is assumed that accelerated recovery of structural diversity and nutrient sources (i.e., often from keystone species, as salmon carcasses) will eventually restore diverse aquatic communities.

Numbers of WRP stream and riparian assessment and restoration projects, by B.C. Environment region/subregion, which were undertaken in the 1997/98 fiscal year, are summarized in the following table (whereby numbers are derived on a watershed sub-basin or tributary level). As hillslopes are stabilized early in the Program, fish habitat rehabilitation and riparian restoration will dominate activities, as is projected for 1998/99.

	Channel Assessments	Habitat Assessments	Riparian Assessments	Culvert Assessments	Habitat - Channel Restoration	Riparian Restoration	Project Effectiveness Monitoring
Vancouver Island	5	74	15	1	31	2	10
Lower Mainland	26	82	58	1	21	11	20
Kamloops	6	23	0	0	2	0	0
Okanagan	10	26	0	0	8	0	2
Kootenay	14	36	7	3	6	0	1
Cariboo	1	165	127	11	1	0	1
Skeena	4	100	15	0	41	0	1
Omineca	10	51	22	21	2	3	0
Peace	4	9	2	2	4	2	1
Totals	80	566	246	39	116	18	36

Acknowledgements

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Re-establishing Flows to the Lower 2 km of Thurston Creek

Objectives
As part of an overall restoration strategy for the Thurston Creek Watershed, a 1997 stream restoration project was initiated with the objective of re-establishing stream flows to the lower 2 reaches of the creek. These lower reaches historically supported considerable numbers of a various species of salmonids.

FRBC Region / MELP Region / MOF Region
Pacific / Skeena / Prince Rupert

Author
Jeff Lough

Proponent
Western Forest Products Ltd.

Watershed
Thurston Creek

Location
Thurston Creek drains to Thurston Harbour on Talunkwan Island located 55 km south of Queen Charlotte City (6-1).

Introduction
Thurston Creek is a relatively small watershed with a historical drainage area of 44 km^2 and is typical of many of the small, steep sloped coastal streams on the Queen Charlotte Islands. Logging activity was initiated in 1885 with a total of 80% of the watershed area being harvested between 1885 and 1984. The entire lower watershed was harvested between 1965 and 1974 and the majority of the upper watershed was harvested in the early 1970's. Although the shallow soils on Talunkwan Island are prone to natural torrenting, WRP Overview and Level 1 Fish Habitat Assessments have revealed that the frequency and volume of landslides have increased sharply after logging commenced in the upper watershed in the 1970's.

In 1987 the Department of Fisheries and Oceans first reported a major stream channel diversion of Thurston Creek approximately 2 km upstream from the estuary. One or several debris torrents triggered by intense rainstorms in either 1978 or 1987 carried a large volume of sediment and logs downstream to the point of diversion. Thurston Creek jumped out of its channel into an adjacent cutblock where it joined a small non-productive creek (North Creek) which drains to the ocean on the north side of Talunkwan Island. North Creek is inaccessible to anadromous fish due to a cascade/falls at its mouth. The result of this diversion is that the water quantity for lower Thurston Creek has been substantially reduced for the past 10 to 20 years. Fortunately, small tributaries joining lower Thurston Creek were maintaining some marginal flows and fish habitat in Reach 1 of the creek. Remnant populations of chum, coho, pink, cutthroat, and Dolly Varden are presently utilizing Reach 1 of Thurston Creek.

Rehabilitation Work
After a year of stream assessment work and road hillslope sediment source stabilization, a prescription was presented in October 1996 for regulatory approval to put upper Thurston Creek back into its original channel with the objective of re-establishing flows to the lower 2 km. Although the riparian area in the lower Thurston is at varied stages of rebound since harvesting, the fish habitat in these reaches still exceeds the quality of the habitat in North Creek (although it required some water).

The design approach to rediverting upper Thurston Creek back to its lower reaches, was broken into three initial elements (Figs. 6-2 to 6-6):

- Construct a guide bank that would close off the blowout channel to North Creek and direct the flows back into Reach 2 of Thurston Creek.
- Excavate a 150 m long channel through the debris jam located at the diversion site at the top end of Reach 2.
- Rehabilitate the fish habitat in the excavated channel by developing riffles and installing LWD.

Equipment

Equipment used included:

- Moxy rock truck.
- H9-300 track excavator.
- Barges for equipment mobilization.
- ATV.
- 15-man crew boat.
- Electroshocker.

Cost Summary

Supervision, labour, environmental monitor	$42,300
Engineering costs	$14,250
Camp cost, per diems	$16,360
Materials (rock etc. delivered)	$66,043
Moxy	$9,750
Excavators	$6,700
ATV, Crew boat	$6,100
Total	$161,503

Production Estimates

The Thurston Creek stream restoration project re-established approximately 6,500 m^2 of spawning and rearing habitat for chum, pink, coho, cutthroat, Dolly Varden and steelhead.

Proposed Work

The Level 1 detailed Fish Habitat Assessment has identified that quantity and quality of large woody debris in the lower reaches of Thurston Creek are below what would be expected in similar but undisturbed watersheds. The low frequency of LWD can be attributed to poor recruitment of wood due to the nature of riparian reserve growth after 100 years of harvesting. In addition to the recruitment problems, "stream cleaning" activities began as early as 1941 and were also reported in the 1950's, 1970's and continued up until 1987. To address this situation, a project is proposed to pull unused LWD off adjacent cutblocks into the creek to provide cover and habitat complexity for short-term rehabilitation. To accelerate recruitment of a long-term source of LWD, selective release of suppressed conifers is proposed for patches in the riparian reserve where alder has dominated the forest canopy after harvesting.

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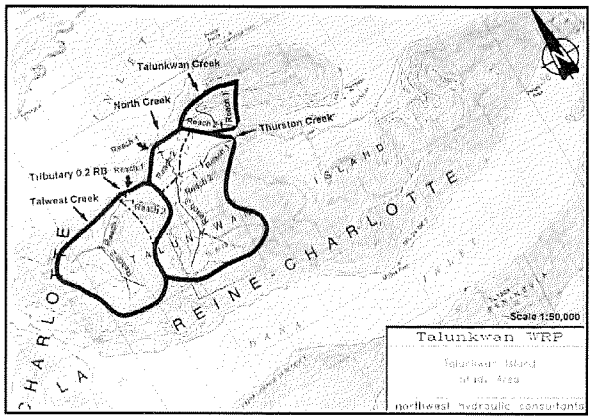

Figure 6-1. Map showing location of Thurston Creek watershed.

Figure 6-2. The site of the Thurston Creek diversion (upper limit of Reach 2). Note age of riparian growth on the debris plug indicates the age of diversion to be approximately 10 to 20 years old.

Figure 6-3. Latter stages of removing torrented material at the site of the diversion. This stage of work reconnected upper Thurston Creek with lower Thurston Creek after 10 to 20 years of de-watering.

Figure 6-4. Stockpile of torrented material removed from the diversion at Thurston Creek.

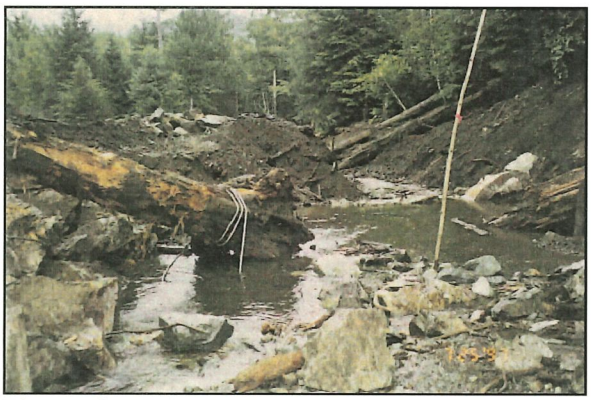

Figure 6-5. Initial placement of LWD in a partially constructed channel prior to reconnecting stream flows on Thurston Creek.

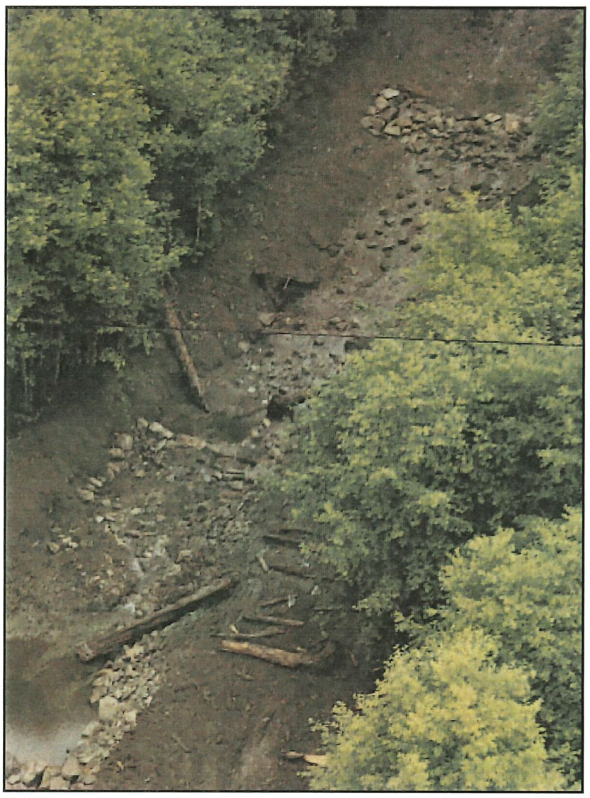

Figure 6-6. New channel reconnecting upper Thurston Creek and lower Thurston Creek (prior to reconnecting water).

King Creek Groundwater Side Channel - Rearing Habitat Development

Objectives
The King Creek side channel project was initiated with two main objectives:

1. rehabilitate and develop limited off-channel rearing habitat primarily for coho juveniles; and
2. utilize experienced professionals to train the proponent group, contractors, and agency staff in the technical and administrative procedures required to successfully develop groundwater sources for the purpose of rehabilitating fish habitat.

FRBC Region / MELP Region / MOF Region
Pacific / Skeena / Prince Rupert

Author
Jeff Lough

Proponent
MacMillan Bloedel Ltd.

Partners
Haida Fisheries Society, Ministry of Environment, Lands and Parks and Fisheries and Oceans Canada

Watershed
Yakoun River, Queen Charlotte Islands

Location
Across the creek from the old hatchery site on lower King Creek, located at 25 km on the Queen Charlotte Main Line on Graham Island.

Introduction
King Creek is a 22.2 km^2 tributary watershed of the Yakoun River watershed located on south central Graham Island of the Queen Charlotte Islands. Similar to many of the Yakoun River tributaries, the King Creek watershed has seen extensive harvesting over the past 20 years. Twenty-five percent of the entire watershed area has been harvested to date of which over 90% was completed between 1974 and 1993 in elevations lower than 300 m.

Assessments and Prescriptions
After completing a WRP Overview Assessment of the Yakoun watershed, King Creek was identified as a high priority tributary that warranted a Level 1 Fish Habitat Assessment (FHAP). From the King Creek Level 1 FHAP (Lee 1997) off-channel habitat was identified as a limiting and /or an impacted habitat type. Recommendations of the Level 1 Assessment recommended that development of off-channel rearing areas in Reach 1 would benefit juvenile coho and trout survivals.

In March 1997, a site survey and design was completed for developing groundwater sources in a blind side channel located at 0+230 on the left bank of King Creek. A contour map and conceptual design (Fig. 6-7) was submitted for regulatory approvals.

Rehabilitation Work
Construction commenced at the beginning of August 1997. Primary construction of the ponds (excavation) commenced in the lower remnant side channel (Figs. 6-8, 6-9) and was completed in five days (Fig. 6-10). Additional features of the ponds included: construction of an island to increase channel irregularity and diversify water depths (Fig. 6-11); laying of geotextile erosion control matting (Fig. 6-12); and construction of a floating island/reef structure to increase cover and benefit benthic insect food production (Fig. 6-13).

Equipment
Equipment used included:

- John Deere 892 track excavator.
- Crew truck.
- Electroshocker.
- Chain saw.
- Surveyors level.

Cost Summary

Supervision, labour, environmental monitor	$13,750
Hydrologist	$3,150
Excavator	$9,700

Electroshocker, spill kits, power tools, hand tools	$3,275
Materials and freight	$5,000
Travel	$2,150
Truck	$1,800
Total	$38,825

Production Estimates

Production benefits will be evaluated over the next few years although the project has developed approximately 2,000 m^2 of stable rearing habitat that is suitable for use by coho, cutthroat and Dolly Varden. This equals to 1,800-2,000 coho smolts or 180-200 adult coho per annum in the long term (from Koning and Keeley 1997). Because this project will be viable during the full rotation of reforestation (100 years) production could be 20,000 adult coho (or 5,000 over 25 years).

Proposed Work

Assessment of fish use, production and dissolved oxygen levels in the channel will be evaluated throughout the winter of 1997 and the spring of 1998. Additional monitoring will be proposed for work plans for subsequent years.

An assessment of the riparian reserve zone on lower King Creek was completed in 1997 and restorative treatments are proposed for the summer of 1998.

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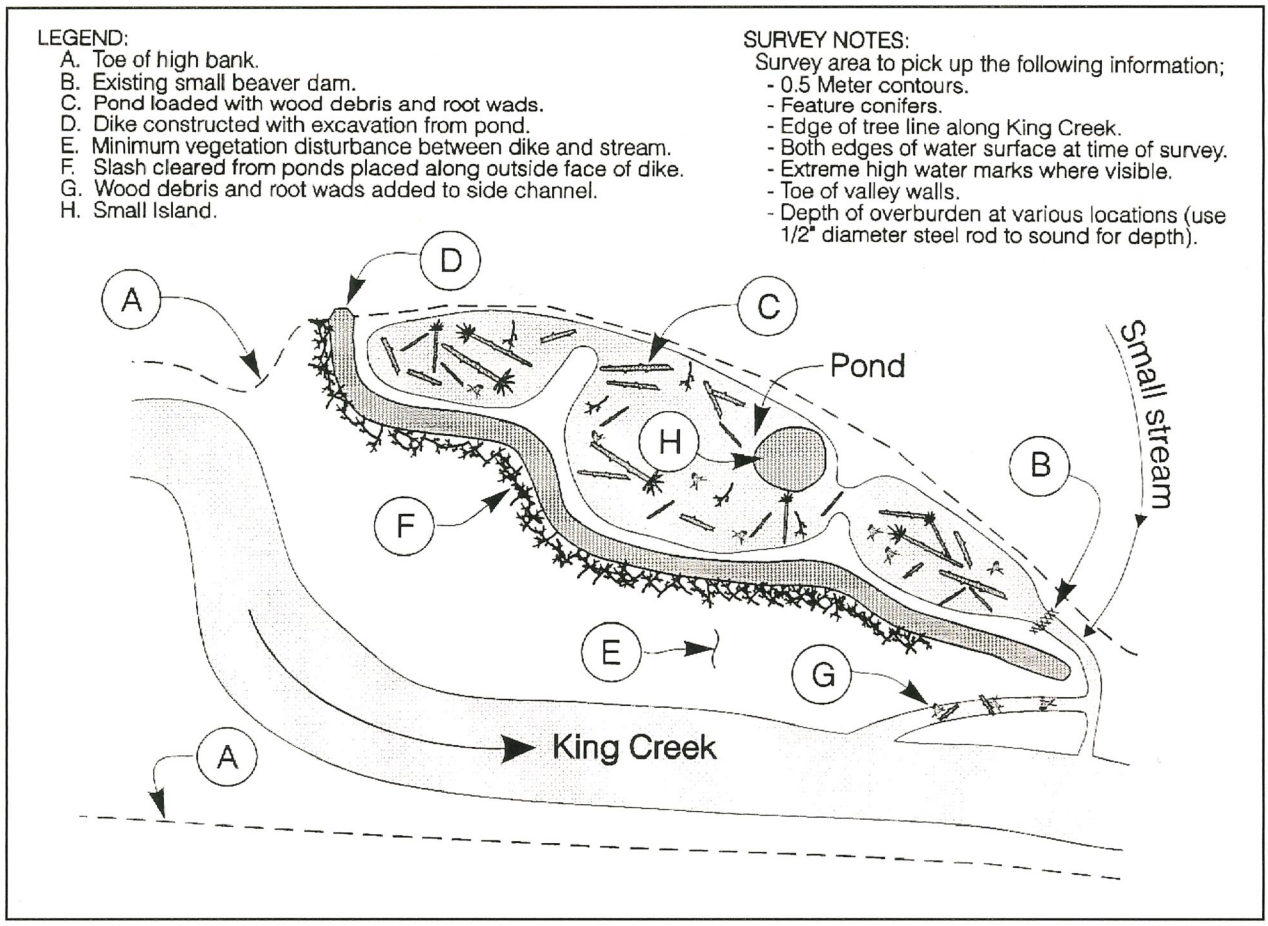

Figure 6-7. Conceptual sketch of proposed rearing ponds at King Creek (opposite old hatchery site).

Figure 6-8. Natural entrance off of King Creek mainstem into "blind" side channel.

Figure 6-9. Lower end of "blind" side channel off of King Creek prior to developing groundwater sources.

Figure 6-10. King Creek blind side channel after developing groundwater for rearing habitat.

Figure 6-11. Upper end of King Creek "blind" side channel prior to laying of erosion control matting. Note construction of island to increase the irregularity of the channel margin.

Figure 6-12. Upper end of King Creek "blind" side channel after placement of erosion control matting and grass seeding.

Figure 6-13. Floating island/reef constructed to increase both cover and benthic invertebrate food production.