Englishman and South Englishman River
Restoration Activities - 2005

prepared for:

Pacific Salmon Endowment Fund
Vancouver, BC

Ministry of Transportation
Environmental Enhancement Fund
Victoria, BC

Habitat Conservation Trust Fund
Victoria, BC

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GREATER GEORGIA BASIN
STEELHEAD Recovery Plan
www.SteelheadRecoveryPlan.ca

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ACKNOWLEDGEMENTS

Whole trees used in site construction were donated by TimberWest from private forest land adjacent to restoration areas. D. Lannidinardo helped to identify candidate trees on behalf of TimberWest. Joan Michel and Tim Clermont facilitated restoration works within Englishman River Regional Park. Shelley Higman of Island Timberlands made ballast rock available with value applied against their San Juan Opportunistic Fund commitments. Daryl Lacusta and Moss Creekmore provided exceptional machine operation in challenging circumstances. Craig Wightman acted as project advisor.

Funding was provided by the Pacific Salmon Endowment Fund (through the Englishman River Watershed Recovery Plan), the Ministry of Transportation and the Habitat Conservation Trust Fund (through the Greater Georgia Basin Steelhead Recovery Plan).

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1.0 INTRODUCTION

The Englishman River is one of the most significant salmon bearing streams on the central east coast of Vancouver Island. The watershed supports all five species of anadromous salmon as well as rainbow and cutthroat trout, and supplies water for the city of Parksville, BC. In 2000, the BC government designated the Englishman as a sensitive stream under the Fish Protection Act. Also in 2000, the watershed became part of the United Nations designated Mount Arrowsmith Biosphere Reserve (Jamieson 2000). In recent years, the Outdoor Recreation Council of British Columbia has identified the Englishman as one of the most threatened watersheds in BC.

The Englishman River was the first watershed to be selected by the Pacific Salmon Endowment Fund Society to receive attention in the Georgia Basin salmon recovery planning process for coho and steelhead. The vision of the Pacific Salmon Endowment Fund (PSEF) is to achieve healthy, sustainable and naturally diverse Pacific salmon stocks through the development of recovery plans for specific watersheds. The Pacific Salmon Foundation manages the annual proceeds of PSEF, and now contributes funding to seven watershed recovery plans in BC. The Englishman River Watershed Recovery Plan (ERWRP; Bocking and Gaboury 2001) was developed to identify and prioritize activities required to achieve recovery goals for the watershed and its fish stocks. Several other reports including *Overview Assessment of Fish and Fish Habitat in the Englishman River Watershed* (Lough and Morley 2002) and *Englishman River Channel Condition Assessment* (nhc 2002) have been developed to complement the original plan and facilitate recovery activities.

Significant off channel development has taken place in the Englishman River watershed, with the creation of the TimberWest (a.k.a. Clay Young) and Weyerhaeuser (a.k.a. Nature Trust) side channels. These channels extend for 1,300 and 950 m, respectively (8% of watershed anadromous length), and account for 15-25% of coho smolt production in the watershed (Decker et al. 2002).

To date extensive restoration work in the mainstem Englishman River has only occurred in 2003 and 2004 with the installation of 32 LWD and boulder riffle sites, based on prescriptions by LGL Ltd. (Gaboury 2003; Appendix A). Previous work completed through the ERWRP included several “debris catcher” structures designed to protect the Weyerhaeuser side channel, capture wood and create lateral scour pools. Additional projects have been completed near the Highway 19a Bridge to reduce bank erosion with ancillary fish habitat benefits.

2.0 STUDY AREA

From its headwaters on Mount Arrowsmith (1,817 m) the Englishman River flows east draining 324 km^2 of the central east coast of Vancouver Island, entering Georgia Strait near Parksville, BC (Figure 1). Mainstem anadromous length is 15.8 km to the barrier in Englishman River Falls Provincial Park. Mean annual discharge (MAD) for the watershed is 13 m^3/s and pre-Arrowsmith Dam summer base flow was as low as 4.6% MAD (Lill 2002). The largest sub-basin, the South Englishman River, enters the mainstem 8.3 km upstream from the mouth. It drains 83 km^2 and has an anadromous length of 4.5 km. Other tributaries include Centre Creek (a sub-basin of the South Englishman), Morison Creek and Shelley Creek with anadromous lengths of 5.2, 2.1 and 1.0 km, respectively (Lough and Morely 2002). Island Timberlands LP owns 69% of the watershed (Weyerhaeuser 2003). Of the total watershed area, 27% is below 300 m, 47% is between 300 – 800 m elevation and 26% is above 800 m (Weyerhaeuser 2003).

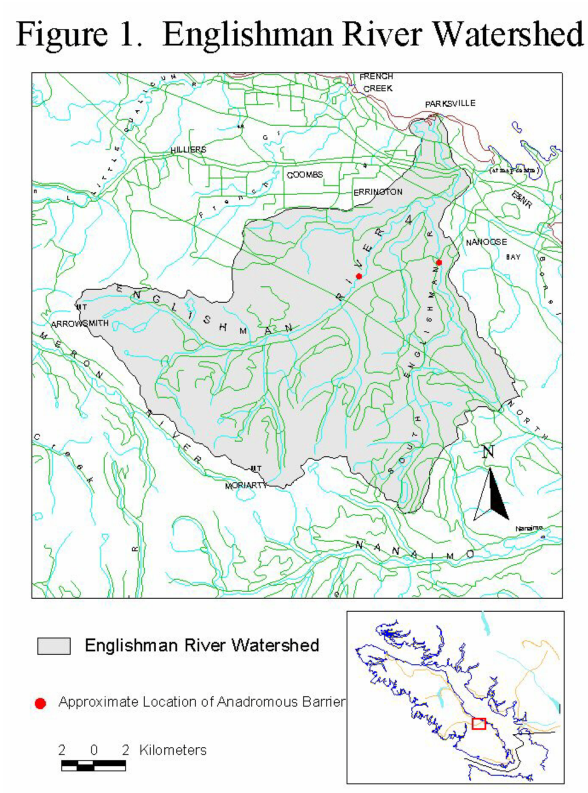


Figure 1. Location of the Englishman River watershed on southern Vancouver Island.

Mainstem reaches E3 and E4 (Allsbrook Canyon to Morison Creek confluence) and South Englishman reaches SE1 and SE2 are suitable for restoration because:

- gradient and channel morphology are conducive to instream restoration activities;
- juvenile and adult target species (steelhead trout and coho salmon) are relatively abundant;
- road access allows transport of restoration material to identified sites; and,
- these reaches were previously identified by nhc (2002) and Lough and Morley (2002) as primary candidates for instream restoration works.

Reach E3 (Allsbrook Canyon to South Englishman confluence) has been identified as the most active reach on the Englishman River based on the downstream progression of meanders, cutoffs and avulsions, and many banks in this reach were eroding along part or most of their length (nhc 2002).

Riparian forests adjacent to many eroding banks are of insufficient age (and therefore tree size) to contribute to bank stability and, after falling in, trees are quickly moved into non-functional locations or are transported out of the target restoration reach. Despite the current volatility of this reach, aerial photo interpretation has determined that channel narrowing and gravel bar re-vegetation are occurring (nhc 2002).

2.1 Hydrology

Englishman River discharge has been gauged by the Water Survey of Canada at the Highway 19a Bridge crossing (Station 08HB002) continuously since 1979. This rainfall driven watershed follows trends similar to other east coast Vancouver Island streams with the largest flows typically occurring November through February. Typical summer base flow (August and September) before development of storage at Arrowsmith Lake in 1999 was 1.2 m^3/s, or 8.5% MAD (nhc 2002). With the Arrowsmith Lake reservoir in operation, the minimum mandated flow is now 1.6 m^3/s or 11.3% MAD. In a recent analysis of flood frequency the 2-year and 50-year maximum daily flows were estimated at 204 and 471 m^3/s, respectively (nhc 2002).

Gaboury (2003) measured channel widths at five sites within reaches E3 and E4. Bankfull channel widths averaged 37.7 m. Bank heights and bankfull depth averaged 2.3 m and 1.8 m, respectively (Appendix A). Gradient in the upper restoration reach (E4) averaged 0.9% while gradient in the lower reach (E3) averaged 0.7%.

Complete hydrological assessments including detailed analysis of flood and drought return period and channel condition can be found in *Englishman River Channel Condition Assessment* (nhc 2002), and in *Fish Habitat Restoration Designs for the Englishman River* (Gaboury 2003).

2.2 Fisheries Resources

The Englishman River supports anadromous populations of steelhead and cutthroat trout, chum, coho, chinook, pink and occasionally sockeye salmon. Resident rainbow and cutthroat, Dolly Varden char, stickleback and cottid populations are also found in the watershed (Lough and Morley 2002).

Hatchery programs have historically included combinations of fry out-planting, bulk incubation/volitional release and fed fry release for pink salmon (Quinsam River brood), chinook salmon (Big Qualicum River brood) and native coho salmon stocks. Using native brood, steelhead trout were historically enhanced with a smolt program operated out of the provincial hatchery in Duncan (1979–1997) and the Little Qualicum Project (1991–1999). Englishman cutthroat continue to be augmented with smolts (Little Qualicum stock) from the Little Qualicum Project.

Recent steelhead abundance trends in the Englishman River remain relatively low, with annual peak snorkel counts in the mainstem ranging from 45 to 73 adults since 2002 (Silvestri 2005). The wild stock trend was most recently classified as “stable at a low level” (Lill 2002).

Coho population estimates have historically ranged from 750 to 1,500 adults, with a long term mean (1953–2000) of 960 adults (Bocking and Gaboury 2001). Recent escapements have been substantially higher (4,500 estimated in 2005) with a range of 3,100 to 8,000 for the last 6 years. Recent increases in coho abundance likely relate to changes in enumeration methodology and decreases in marine exploitation rather than a significant increase in smolt production or ocean survival (Baillie and Young 2003).

3.0 METHODS

3.1 Materials

A diverse range of instream enhancement projects has been completed on Vancouver Island and across BC since the mid 1990s under programs such as the Watershed Restoration Program and Forest Renewal BC. Reviews and monitoring of such projects have consistently recommended that wood used in artificial habitat structures be:

- large in bole diameter (>0.5 m) for structural durability;
- green wood to maximize structure life; and
- coniferous species (cedar is preferred) as they generally rot slower than hardwoods.

Cover, complexity, and fish use of instream structures increases dramatically when rootwads or branched trees are incorporated into structures. Structures located in moderate to high flow velocities consistently see the highest use by steelhead fry and parr.

A portion of the LWD needed for instream construction in 2005 was stockpiled on site as surplus to construction needs during the summer of 2004. This wood consisted primarily of full length Douglas fir and western red cedar trees both with and without rootwads.

In June 2005, the author and D. Lannidinardo[1] identified approximately 25 candidate trees located on TimberWest's private forest land approximately 350 m south of the mainstem, north of the Centre Creek sub-basin. Diameters at breast height ranged from 0.40-0.70 m (typically 0.50 m). Species selected included Douglas fir, western red cedar and balsam fir.

An excavator (Komatsu PL 200) was contracted to harvest standing trees in the identified areas. The excavator first destabilized the root systems and then pushed over trees in a controlled manner, preserving structural integrity. Larger trees were occasionally bucked at a landing area to facilitate movement directly into the river corridor. Trees were stockpiled on a large gravel bar at river kilometre 8.5 prior to the start of instream construction.

Rock used for ballasting LWD sites was supplied from a local contractor[2] and was purchased from the same stockpile used in 2003 and 2004 restoration projects.

Round boulders for riffle enhancement were donated by Island Timberlands from the Rhododendron (155) Mainline gravel pit. Round boulders were also gathered from an old gravel pit located in Englishman River Regional Park and transported into staging areas with an articulating dump truck (Volvo A30C)

3.2 Construction

Construction materials were staged near restoration sites using an excavator (Komatsu PL 200), a rubber-tired front end loader (Caterpillar, model 966) and/or a 6WD articulated end dump (Volvo, model A30C). All heavy equipment operating near the river channel used "fish-safe" hydraulic fluid[3]. Fuel and oil containment booms were used downstream of all sites. If heavy equipment

[1] Engineer, Nanaimo Lakes Division, TimberWest Forest Ltd., Nanaimo, BC.
[2] Milner Trucking, Nanaimo, BC.
[3] Chevron Clarity ® Hydraulic Oils.

was positioned in the stream channel at or near the wetted edge, several staged oil booms were employed. Additionally, every piece of heavy equipment carried a spill kit on board at all times and an additional spill kit was carried by the construction manager on site.

Construction started at the lowermost mainstem site and generally progressed upstream. Most accesses were present from construction activities in 2003 and 2004 although one new access trail was developed into the South Englishman River where no previous projects have taken place. Structures were generally positioned to take advantage of higher water velocities within the habitat unit to maximize use by steelhead juveniles. All structures were built to function most effectively at or near summer base flows.

Whole trees (boles with attached rootwads) were typically used in site construction to increase site complexity and maximize the hydraulic influence of the individual LWD elements. Boles were occasionally used in secondary roles or were used to further triangulate and secure structures to riparian trees. A 2003 lateral LWD structure (6+200) that has functioned well at base flows and remained stable during the winters of 2003 and 2004 has been used as a template for most of the subsequent structures (Figure 2).

Half inch steel cable (ungreased, wire core) was used to attach ballast rock to LWD. New cable was used to ensure the best possible epoxy bond in the rock drill holes. Less expensive, used, half inch cable was employed to attach LWD to trees in the riparian zone. Once positioned, ballast rock was drilled using an electric hammer drill (Bosch, model 11241 EVS) and a 9/16 inch drill bit. Holes approximately 25 cm deep were scrubbed and flushed to remove loose material and a sufficient quantity of Epcon C6 epoxy was injected into the hole to fill it once the cable was inserted. Cable was cut with an electric grinder (Dewalt, 7 inch angle grinder) and attached to LWD or anchor trees using galvanized cable clamps tightened with an electric impact wrench (Dewalt, ½ inch drive). Cables between ballast and LWD were as short and tight as possible to reduce movement and wear within the structure. To secure and further tighten cables, steel staples (4 x 3/8 inch minimum) were hammered into the logs. To hide cables, LWD boles were bored using an electric wood drill (Dewalt, ½ inch chuck) and a 3/4 inch ship auger bit with a welded extension (total length 35 inches). Cables were loosely attached around the base of anchor trees and sheathed with 3/4 inch black pvc tubing to help protect anchor trees. A portable generator (Honda, model EW 3500) was used to power all equipment.

Construction and cable crews followed forest fire prevention and suppression regulations as outlined in the Forest Practices Code of BC Act. Sufficient shovels, pulaskis, and hand-tank pumps were kept on hand at all times during site construction and cabling. A portable fire pump unit with a screened intake and 200 feet of discharge hose was set up daily at each site. Fire watches occurred following each day’s construction.

All construction personnel used safety equipment including hard hats, gloves, high visibility vests, two-way radios and eye and ear protection. Emergency procedures were clarified and first aid equipment kept on hand included Level 1 first aid kits, blankets, neck collars, eye wash bottles and a cellular phone. The site supervisor and at least one other crew person held Level 1 First Aid certification and Transportation Endorsement.

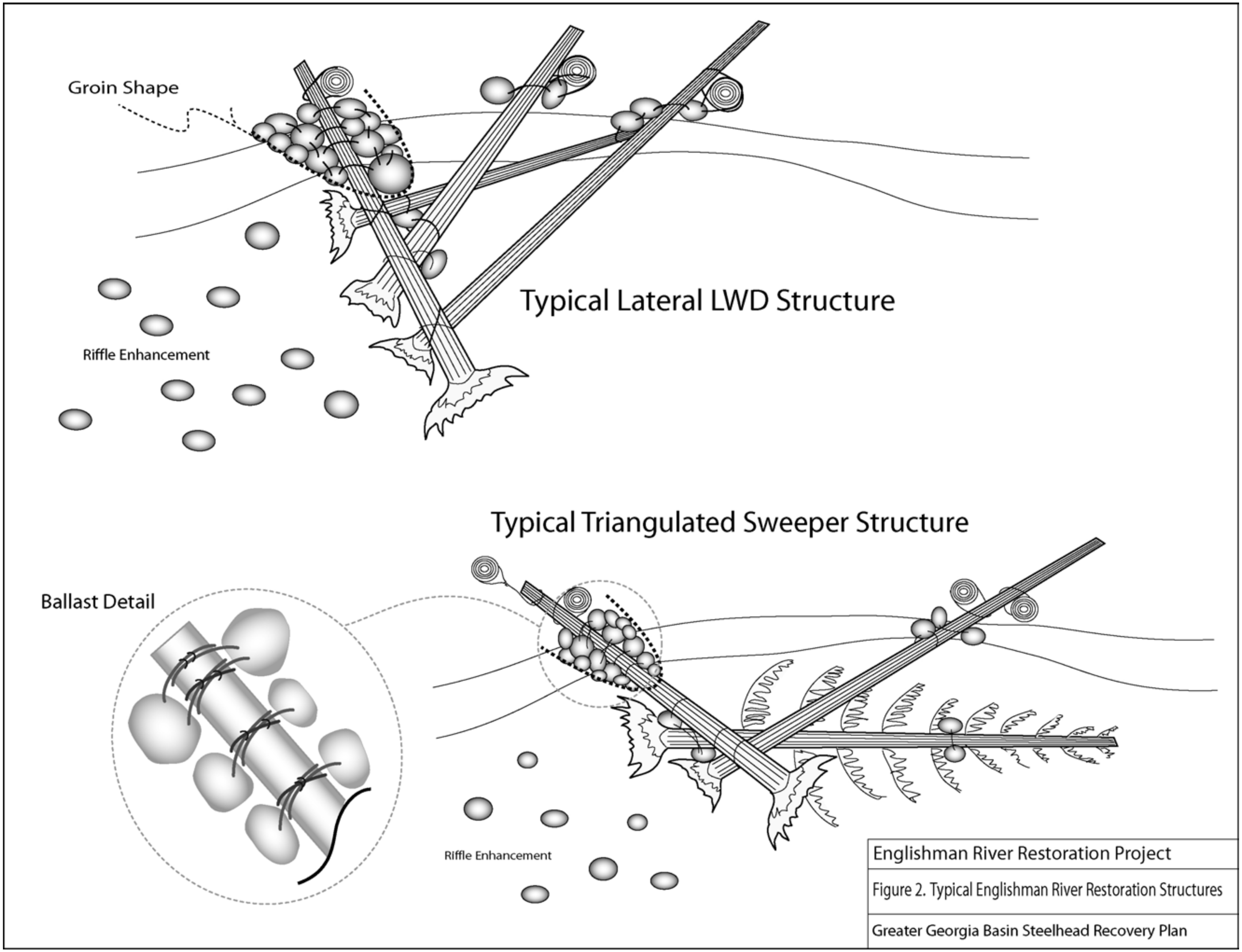
In most sites, ballast rock and local materials were used to create a rock groin at the upstream edge of the site. Groins should act as integrated bank protection by deflecting moderate and high flows away from the bank and are intended to reduce potential for scour “behind” the structure.

Boulders were installed at riffle locations to roughen the stream bed and enhance steelhead parr habitat. Riffle sites had cobble and boulder dominated substrates that required no stream bed armoring. The heights of boulders were adjusted relative to the stream bed to achieve hydraulic conditions preferred by steelhead parr (McCulloch 2000), including:

- pockets of at least 0.5 m in depth;
- areas of non turbulent (laminar) flow; and
- broken water cover from aeration and surface turbulence.

Access routes were naturalized (covered with small logs, branches and native forest debris) in all cases to reduce potential for erosion or sediment transport. Reclamation seed[4] was applied to all temporary accesses once they were put to bed. Further riparian planting including conifer seedlings will continue as a separately funded initiative of both the Mid Vancouver Island Habitat Enhancement Society and the GGBSRP.

[4] CWH biogeoclimatic zone mix, Common No.1 Forage; Pickseed Canada Inc., Abbotsford, BC.


Groin Shape
Typical Lateral LWD Structure
Riffle Enhancement
Typical Triangulated Sweeper Structure
Ballast Detail
Riffle Enhancement
Englishman River Restoration Project
Figure 2. Typical Englishman River Restoration Structures
Greater Georgia Basin Steelhead Recovery Plan

4.0 RESULTS

Tree falling took place on July 18 and 19, 2005. A total of 25 trees were harvested from TimberWest private forest lands and were subsequently used in structure construction. Fourteen truck loads of round riffle rocks were collected from the Rhododendron (155) gravel pit. Large piles of "river rocks" not typically used in road construction were sorted to remove the largest rocks (0.5-1.1 m in diameter, mean ~0.7 m) to be used in LWD sites as ballast and in riffle enhancements. An estimated 420 metric tones of rock were incorporated into project sites.

Under MWLAP permit, a total of 22 large woody debris and boulder riffle enhancements were completed between July 22 and July 29, 2005 (Table 1, Figure 3). Ten were located in the mainstem (6 LWD and 4 riffle enhancements) and 12 were located in the South Englishman River (10 LWD and 2 riffle enhancements).

Two separate projects in nearby Centre Creek included removal of the fish counting fence and associated gabions and development of an off channel pond feature as described in *Detailed Salmon Habitat and Riparian Overview with Level 2 Prescriptions* (Wartig and Clough, 2005). D. Clough[5] directly supervised and managed these projects with endorsement from the Englishman River Watershed Recovery Team. Results of this work will be reported separately and submitted to ERWRP and the Pacific Salmon Foundation.

The total budget for the instream restoration activities in 2005 was $44,000. Funding partners included:

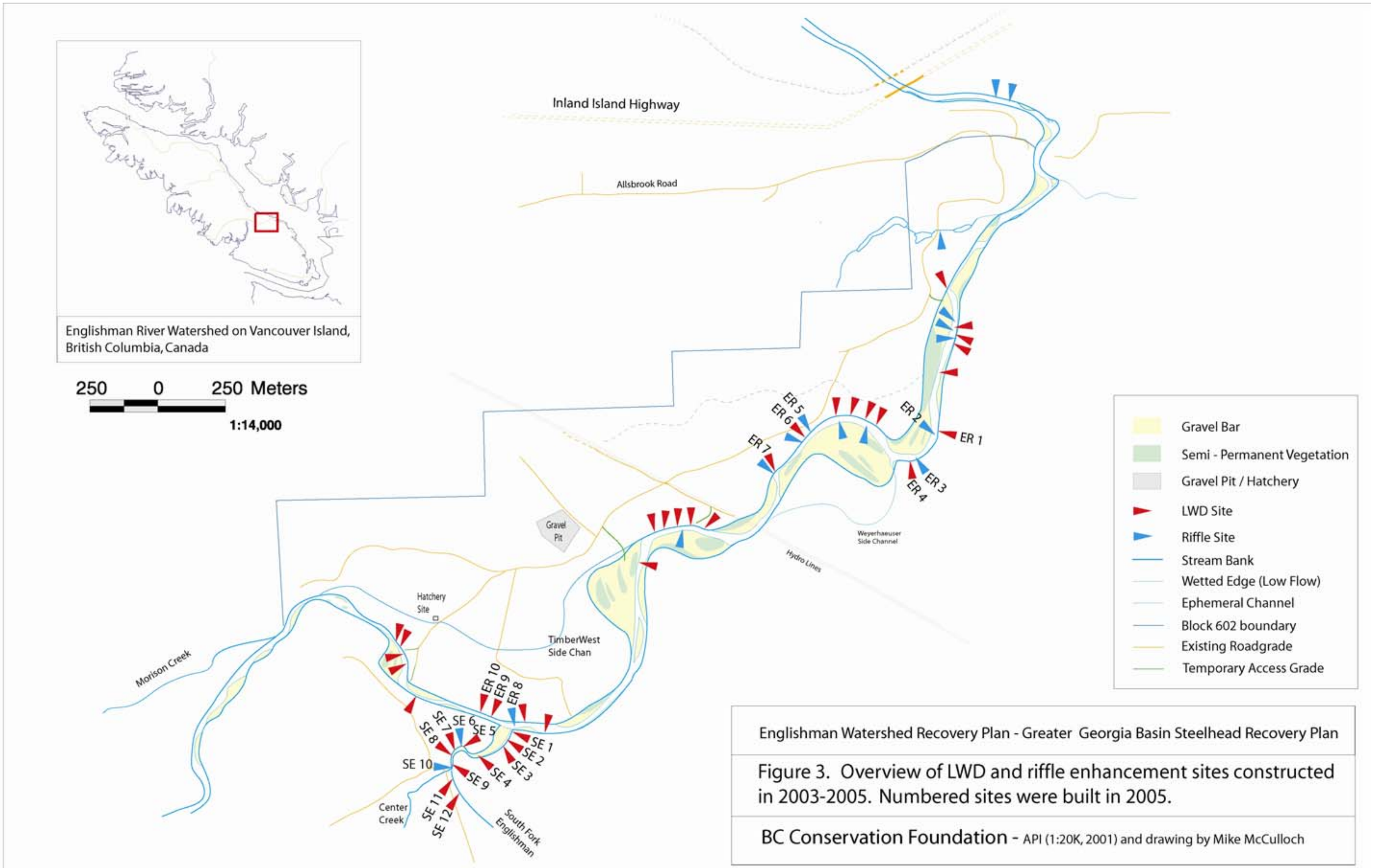
- Habitat Conservation Trust Fund - *Greater Georgia Basin Steelhead Recovery Plan* (27% of total project cost or $12,000);
- Ministry of Transportation - *Environmental Enhancement Fund* (34% of total project cost or $15,000);
- Pacific Salmon Endowment Fund - *Englishman River Recovery Plan* (23% of total project cost or $10,000); and,
- Island Timberlands – In kind donation of ballast rock from *San Juan Opportunistic Fund* (9% of total project cost estimated value of $4,000); and,
- TimberWest – In kind donation of trees (8% of total project cost or $3,000).

[5] DR Clough and Associates, Nanaimo, BC.

Table 1. Location and description of restoration sites constructed in the Englishman and South Englishman rivers, 2005.

Site reference	Site Chainage	Description	Pieces wood	Ballast @ 0.7 m	Riffle Rocks @ 0.5-1.0	Comments
	Access	Built in 2005				
ER 1	(E3) 5+960	Riffle development			**~50**	Riffle enhancement associated with LWD
ER 2	(E3) 5+970	Typical lateral LWD structure (Figure 2)	**6**	**22**		DS of Slough Hole on RB
ER 3	(E3) 5+990	Riffle Development			**~150**	Riffle enhancement associated with LWD
ER 4	(E3) 6+000	Typical lateral LWD structure (Figure 2)	**6**	**22**		DS of Slough Hole on RB
	Access	Built in 2003				
ER 5	(E3) 6+420	Typical lateral LWD structure (Figure 2)	**5**	**22**		Just DS of the riffle structure built 2003
ER 6	(E3) 6+450	Riffle Enhancement			**~50**	Builds on previous riffle development
ER 7	(E3) 6+560	Typical lateral LWD structure (Figure 2)	**4**	**22**		Replaces small structure built 2003
	Access	South Englishman				
ER 8	(E4) 8+280	Riffle Development			**~100**	SE confluence pool
ER 9	(E4) 8+370	Typical lateral LWD structure (Figure 2)	**4**	**22**		On LB at bottom of existing riffle
ER 10	(E4) 8+400	Typical lateral LWD structure (Figure 2)	**4**	**22**		On LB at bottom of existing riffle
	Access	To be Built in 2005				
SE 1	(SE1) 0+025	Typical lateral LWD structure (Figure 2)	**4**	**15**		On RB on outside of eroding bend
SE 2	(SE1) 0+040	Typical lateral LWD structure (Figure 2)	**4**	**15**		On RB on outside of eroding bend
SE 3	(SE1) 0+060	Typical lateral LWD structure (Figure 2)	**4**	**15**	**-**	On RB on outside of eroding bend
SE 4	(SE1) 0+200	Typical lateral LWD structure (Figure 2)	**3**	**10**	**-**	Mid channel structure on face of existing jam
SE 5	(SE1) 0+220	Typical lateral LWD structure (Figure 2)	**4**	**15**	**-**	On LB outside of eroding bend
SE 6	(SE1) 0+230	Riffle Enhancement			**25**	associated with LWD
SE 7	(SE1) 0+240	Small LWD Structure	**3**	**10**		Built on existing LB rootwad
SE 8	(SE1) 0+250	Modified LWD structure	**5**	**15**		Built on corner as a ramp
SE 9	(SE1) 0+300	Typical lateral LWD structure (Figure 2)	**5**	**20**		Center Creek confluence Pool (LB)
SE 10	(SE1) 0+310	Riffle Enhancement			**60**	Head of Center Creek confluence pool
SE 11	(SE1) 0+330	Typical lateral LWD structure (Figure 2)	**4**	**15**	**-**	US of the Center Creek Confluence on RB
SE 12	(SE1) 0+350	Typical lateral LWD structure (Figure 2)	**4**	**15**	**-**	US of the Center Creek Confluence on LB
	Totals	16 LWD Structures 6 Riffle Structures	**70**[6]	**281**	**445**	

[6] NB: Approximately eight transient LWD pieces (whole and/or partial trees) were identified in bar-top locations and incorporated into sites. Some of the whole trees harvested were cut into smaller pieces to act in secondary roles to meet demand.



Englishman Watershed Recovery Plan - Greater Georgia Basin Steelhead Recovery Plan

Figure 3. Overview of LWD and riffle enhancement sites constructed in 2003-2005. Numbered sites were built in 2005.

BC Conservation Foundation - API (1:20K, 2001) and drawing by Mike McCulloch

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APPENDIX A

Englishman River Statistics and Engineering Specifications

From

Fish Habitat Restoration Designs for the Englishman River (Gaboury 2003)

Summary of Wetted and bankfull channel measurements for each surveyed cross section (Gaboury 2003)

Site (m)	Wetted Width (m)	Wetted Depth (m)	Bankfull Width (m)	Bankfull Depth (m)	Bankfull Width to Depth Ratio	Bank Height (m)	Bank Height to Bankfull Depth
7+045	30.7	0.31	37.0	1.24	29.9	1.4	1.1
7+280	13.3	0.60	35.4	1.38	25.7	2.1	1.5
7+450	23.8	0.61	38.7	1.61	24.0	1.7	1.1
8+210	25.1	0.30	49.5	1.51	32.7	3.0	2.0
8+400	21.4	0.32	28.0	0.97	29.0	3.1	3.3
Mean	22.9	0.43	37.72	1.34	28.3	2.3	1.8

Estimates of Englishman River channel hydrology and morphology at flood discharges using Manning's equation.

Flood Event	Discharge (cms)	Channel Width (m)	Velocity (m/s)	Estimated n	Depth (m)	Slope (m/m)	Tractive Force (kg/m^2)
2 yr maximum daily	204	38.8	3.52	0.031	1.49	0.007	10.43
2 yr instantaneous	320	38.8	4.21	0.031	1.95	0.007	13.65
50 yr maximum daily	471	50	4.33	0.030	2.17	0.006	13.02
50 yr instantaneous	740	50	5.19	0.030	2.85	0.006	17.10

Note: 1) instantaneous discharge estimated at 1.57 x maximum daily flow (nhc 2002).
2) channel width, slope and roughness for 50 yr floods are approximate.

Ballast requirements and boulder size options for the LWD structures in Englishman River. Buoyancy and sliding safety factors > 1.5; ballast factor = 1; and specific gravity of LWD (S_L) = 0.5. (Modified after D'Aoust and Millar (1999); from Gaboury, 2003).

No. of Logs	Average Submerged Length of Each Log (m)	Log 0.5 @ 190 or 500 kg/m	Rootwad 660 kg/log (0.5x2x3m)	Total Mass of Ballast Required (kg)	Alternative Quantities for Each Boulder Diameter (m): 0.3 @ 35 kg	0.4 @ 90 kg	0.5 @ 190 kg	0.6 @ 300 kg	0.7 @ 480 kg	0.8 @ 700 kg	0.9 @ 1000 kg	1 @ 1400 kg
3	10	7800	1980	9780	279	109	51	33	20	14	10	7
4	10	7800	2640	10440	198	116	55	35	22	15	10	7
5	10	9500	1320	10820	309	120	57	36	23	15	11	8
6	10	15600	2640	18240	521	203	96	61	38	26	18	13
10	10	19000	2640	21640	618	240	114	72	45	31	22	15

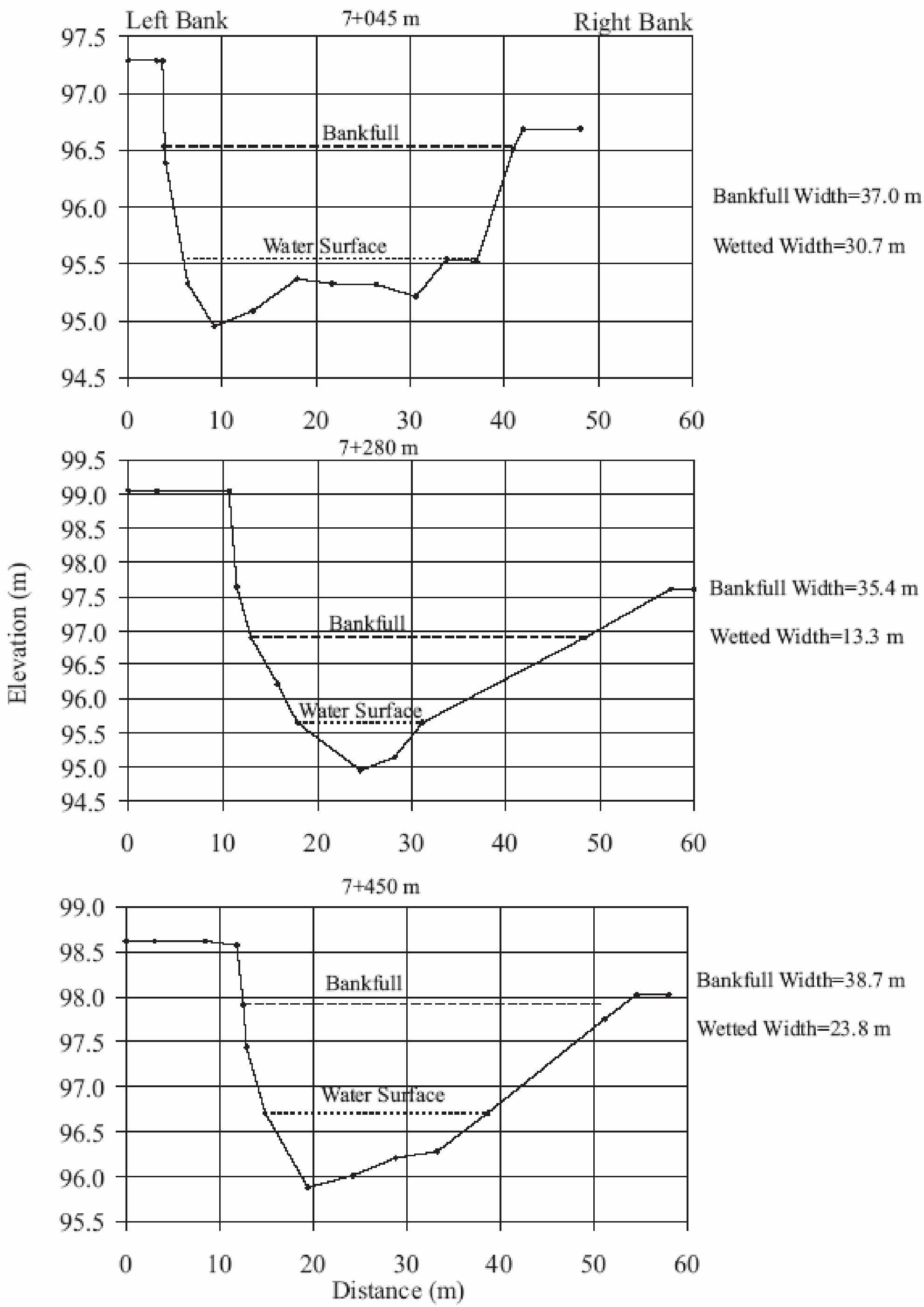

Figure 2. Representative cross sections in Englishman River near restoration Sites 7+120, 7+260 and 7+420 m.	LGL Limited

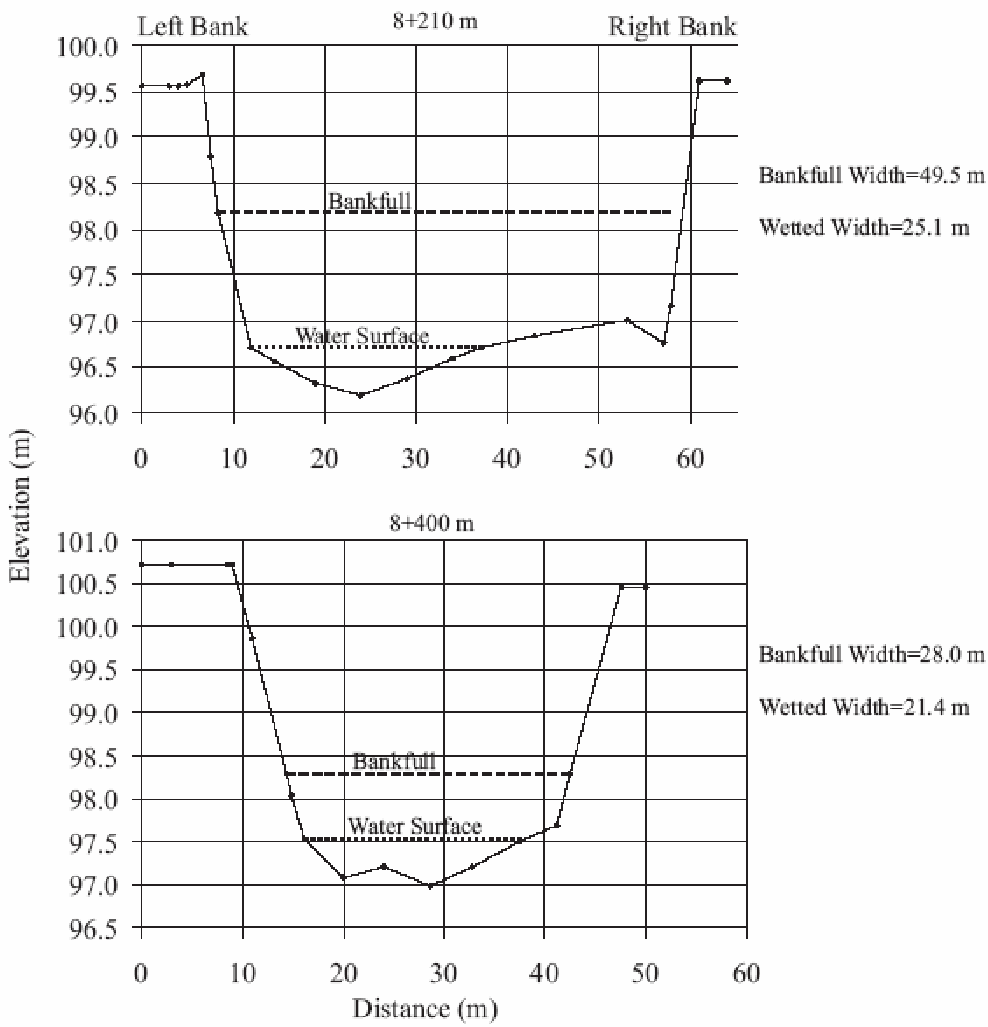

Figure 3. Representative cross sections in Englishman River near restoration Site 8+240 m.	LGL Limited

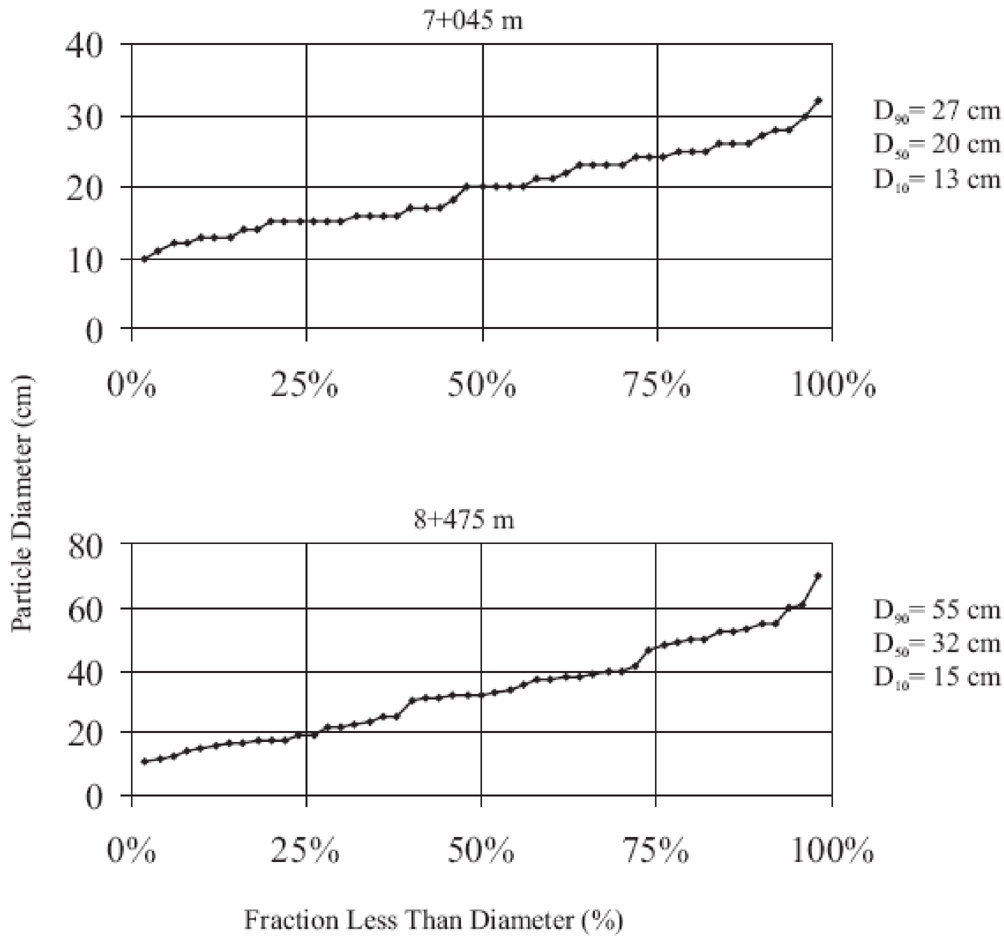

Figure 4. Substrate characteristics from pebble counts in Englishman River.	LGL Limited

APPENDIX B

Photo Documentation

Photo 1. Individual tree harvesting adjacent to restoration reach.

Photo 2. Ballast rock collection in the Rhododendron Pit (Island Timberlands).

Photo 3. Typical environmental controls (oil boom) installed in the South Englishman River.

Photo 4. Typical pool in the South Englishman, note riparian stumps and limited scour (depth).

Photo 5. Typical South Englishman pool, note non functional wood and bank scour.

Photo 6. Technician drilling ballast rock with a hammer drill (2003 project).

Photo 7. Key ballast secured to log with steel cable using a clove hitch and hog staples.

Photo 8. Mid-channel log jam splitting and diffusing flow in the South Englishman.

APPENDIX C

Notes from the Englishman River E3/E4 restoration discussion group, June 27, 2003.

Englishman River
Reach E3/E4 Restoration Discussion Group
June 27, 2003

Meeting Summary

In attendance:

Cornish	Carol	MVIHES	Streamkeeper
Craig	James	BCCF	Technician
Doucet	Russ	DFO	Engineer
Gaboury	Marc	LGL Ltd	Biologist
Guthrie	Rick	MWLAP	Geomorphologist
McCulloch	Mike	BCCF	Technician
Sheng	Mel	DFO	Biologist
Smith	Faye	MVIHES	Streamkeeper
Wightman	Craig	MWLAP	Biologist
Young	Jeff	EREG	Technician

After a brief discussion and review of recent high water photographs and aerial photography at Robin's (Parksville) the group arrived at the EREG hatchery site in TW Block 602 at approximately 10:30am. Discussion on the river was extensive. The flowing summary is intended to capture the key issues.

First stop was the TW side-channel intake, where RD outlined DFO plans (2004?) to improve the intake structure. Structure will be located further upstream ~30m and be larger to meet requirements of planned side-channel extension (extension will have a second outlet and therefore require more flow – up to 10% of whatever is in mainstem). BCCF/LGL has prescribed a LWD habitat structure near the upstream end of the intake pool for construction in 2003. Group agreed that habitat structure should not interfere with new intake location.

Group continued downstream accessing the river in two areas. Several issues were discussed:

ISSUE: Gravel bar stabilization
The amount of sediment moving through the mainstem annually is not documented.
Whether or not watershed is in "recovery mode" not definitively known.
According to nhc (2002), the main morphologic issues are lack of functioning LWD and sand and gravel deposition in pools and throughout riffles. They surmised that "sediment transport would maintain the existing substrate condition for many years." Though not confirmed, their feeling was that most course sediment below the falls is coming from alluvial mainstem reaches in the upper watershed such as E8-E10 (as opposed to slopes and tribs). They state that even if course sediment sources on slopes and tributaries are rehabilitated, decades would pass before stream substrate (i.e., steelhead overwintering) improves due to the volume of sediment stored along river and available for transport. They mention bar stabilization for E8-E10, but have no suggestions for anadromous reach sediment management.
Weyerhaeuser's recent draft Englishman River Watershed Assessment (Ostapowich & Pollard 2002) states that the majority of headwater reaches lack LWD that would normally retain sediment and that this will likely be a long-term problem as the riparian forest is too young for new LWD recruitment. They confirm that as a result of logging, accelerated transport of sediment from upstream reaches has increased deposition below the anadromous barrier. There appears to be no statement concerning whether the anadromous reaches are "in recovery" or not.
The group noted signs of recovery at several locations throughout the reach i.e., significant deciduous re-growth (8-20 foot alder and willow) on many bars, with 3-5 foot conifers interspersed.
MS supports efforts to increase sediment trapping and gravel bar stabilization, either through plantings or LWD "wind rowing", or both.
RG cautions that such treatments should be done sparingly with an eye to ensure that flood flows continue to be accommodated within the channel and that gravel bar treatments do not put undue pressure on adjacent stream banks.
RG retrospectively noted that there needs to be some consideration about overall approach to stabilization. Continued chasing of unstable gravel bars or beginning with upstream portions and sources and working downstream over several years. See related issues below.
MG noted that some LWD jams on bartops are already exerting pressure on nearby banks and suggested that adjustments to jam size and/or orientation may alleviate bank erosion.
The diversity of situations supports prescriptions on a site by site basis.

ISSUE: Clay bank (150m downstream of SF Confluence)
May or may not be an important issue (in the big picture).
Need to document rate of erosion. Guthrie suggests staking and monitoring over time unless there is sufficient evidence on historical photographs to estimate sediment contribution.
Failures due to water from upslope may be as significant as, or more significant than river cutting. Should be investigated. Are upslope water sources reasonable to turn off? RG notes that the site could be drained if critical, but solution may be expensive (unknown).
Need to investigate water seepage source from Block 564, particularly in light of imminent development in area (related to previous point).
Determine if this site is a significant problem before addressing. Caution: this is not the same as suggesting postpone any action on this site. Should not be overlooked until extent of contribution is known or more accurately estimated. Metric might be cubic metres of fines contributed annually, possibly in relation to other sources if that is identifiable.

The second area toured was the mainstem adjacent to the outlet of TW side-channel.

ISSUE: Need for parr habitat now.
With the current steelhead stock conservation concern, Wightman expressed urgent need for functioning LWD to increase parr rearing habitat (identified as limiting by Lough and Morley). As steelhead are mainstem rearing, LWD offering cover in and adjacent to fast water habitats is ideal. There may be risk associated with installing LWD in this relatively unstable reach, but stock status warrants that some degree of risk should be acceptable. Site selection should be done to maximize success rate and longevity.
During the recent review process and in light of the status of Englishman steelhead, the ERWRP Steering Committee supported mainstem LWD projects to create fish habitat despite the associated risks of doing so in a relatively unstable channel.
The group agreed that some sites would be more likely to erode behind installed LWD than others. In those cases, Doucet recommended rip rap groins being incorporated upstream of LWD to avoid the "end run" scenario as seen at the Parrys site. BCCF will consider adjustments to current prescriptions.

ISSUE: Need for a long term plan to restore these critical reaches (E3/E4)
A thorough, long term plan focused on restoring these reaches is required.
Involve Weyerhaeuser and their plans for the upper watershed.
Determine the watershed's current status and expected rate of recovery.
Both fisheries agencies and PSEF/ERWRP need to work together to ensure this plan is funded.
There was considerable discussion around reducing bank erosion at large elbows of the river. Discussion included some works suggested by MG. Again, considerable upfront time should be spent looking at the long term plan for this watershed and addressing the recovery in a complete way (RG's opinion, not necessarily that of all participants). It would be nice to see a realistic plan develop that looked at full restoration over a timeline, if not over a dollar amount. It might give the group realistic targets and small successes would be easier to measure.

ISSUE: Public safety and Navigable Waters Act.
With the recent tuber incident at Parrys RV, structure design and location in relation to public safety issues is more important that ever, particularly in streams adjacent to urban centres. Key issues discussed on June 25, 2003 with the regional Navigable Waters Protection Officer were:
1. Proponents of existing instream restoration projects should monitor same to ensure structures are and remain as safe as possible.
2. Proponents of current and future instream restoration projects must submit applications to the Navigable Waters Protection Officer using appropriate forms and attaching required documentation.
3. Proponents should evaluate risk associated with proposed projects on a site by site basis and avoid situations where risk is deemed to be high.
4. Proponents should where possible minimize the degree to which artificial structures block a stream channel's cross section.
5. Signage warning the public about instream structures is prudent. Highly visible signs with simple wording, placed on both sides of the channel upstream of structures, are recommended. Where reaches contain a high density of structures, access points and/or points every half kilometre should be posted.
6. Exposed cable extending into the channel should be avoided.

The third area toured was the "Long Run" downstream past the outlet of the M&B side-channel (Sheng and Doucet had commitments and were unable to attend).

Trees cabled to the left (west) bank along the Long Run were examined. These trees had fallen into the channel due to erosion/wind and were cabled to standing live trees to retain them as LWD by EREG. In all cases, the root plate of these trees had deflected high water flows and caused significant local erosion of the bank. Their unbranched boles were providing some habitat, though the group believed there was likely a net loss in light of the erosion. Root plates should either be lifted up on top of the bank or protected from scouring flows by keying boulder groins into the bank immediately upstream. Another option is to entirely move this wood to more appropriate locations. Should the wood stay, cable around anchor trees should be sheathed with protective hose to reduce girdling.

To highlight channel movement, BCCF noted an example of where the river's thalweg had shifted during the past season in the riffle that enters the Slough Hole (outlet of M&B side-channel).

Consideration was given to further complex the bottom of the M&B side-channel with LWD.

A large LWD jam sitting atop a mid-channel bar adjacent to the tailout of the Slough Hole appears to be pushing flood flows hard against the right (east) bank and causing new and relatively significant erosion. Gaboury highlighted this as an example where there is potential to re-orient portions of jam to widen the channel to better accommodate flood flows.

Tour ended at 3:30pm.

Subsequent to the tour, a brief comment was sought from Weyerhaeuser on the watershed's current state of recovery. The following was received from G. Horel of Ostapowich Engineering Ltd., the company that did the watershed assessment for Weyerhaeuser.

"With respect to the overall watershed condition, the watershed is trending toward recovery. Riparian forest along the disturbed alluvial reaches is becoming well advanced and seasonal erosion from these channel banks and bars is diminishing. There are still numerous sediment sources from the upper watershed (Middle Fork, Moriarty Creek and the upper Englishman) that deliver sediment to the Englishman River mainstem. A significant number of these sources are natural, and works in the lower Englishman should take into account that normal peak seasonal bedload transport in the mainstem will always be quite high. Because there are extensive bars and glaciofluvial deposits in the alluvial reaches, very high sediment loads can be mobilized during extreme storm events. One of the consequences of this is that channel switching in the lower alluvial reaches can occur during extreme storms, and this has happened historically. Old channels are visible in these reaches. Some of these take overflow during peak flow events.

In summary, the lower Englishman mainstem will always be subject to high bedload transport -- it is a natural behaviour in this watershed. As well, the main thread of the river can switch locations on the wide alluvial reaches during extreme storms."