GREATER GEORGIA BASIN
STEELHEAD Recovery Plan
www.SteelheadRecoveryPlan.ca

British Columbia Conservation Foundation

July 10, 2007

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<u>Lower Chehalis River Habitat Restoration Project</u>

Please find attached a information document, prepared on behalf of the Ministry of Environment (MOE). This document describes a MOE fish habitat restoration project to be completed by the Greater Georgia Basin Steelhead Recovery Plan (GGBSRP). The work (habitat restoration) will be conducted on the Chehalis River, to increase instream habitat complexing and possibly decrease present bank erosion problems. It's anticipated that the work will take approximately 14 days to complete. The main species of salmonids to benefit are coho salmon (*Oncorhynchus kistuch*) and steelhead trout (*Oncorhynchus mykiss*).

According to information obtained from the BC Land Surveyor General, there are parcels of private land along the Chehalis River within the proposed work area. Permission to access the area will be requested by the BC Conservation Foundation and under a written or verbal okay by the property owner the project will be conducted.

The information present in this document will also be sent to Fisheries and Oceans Canada, White Water Kayaking Association of BC, and Chehalis First Nation, ensuring that all parties are aware of the proposed works.

Project Location (see attached maps)

The habitat restoration project will be conducted on the Lower Chehalis River, located approximately 40 km east of the city of Mission, BC. The work will occur in a 1.6 km reach of the river located primarily downstream of Morris Valley Bridge along Morris Valley Road, with one small boulder cluster site being located directly upstream of the bridge (see figures below). The land mark that will be used in this project is the Chehalis River (lat. 49.2988 & long. 121.9354).

Figure 1. Proposed boulder cluster locations 10m upstream of the Morris Valley Bridge.

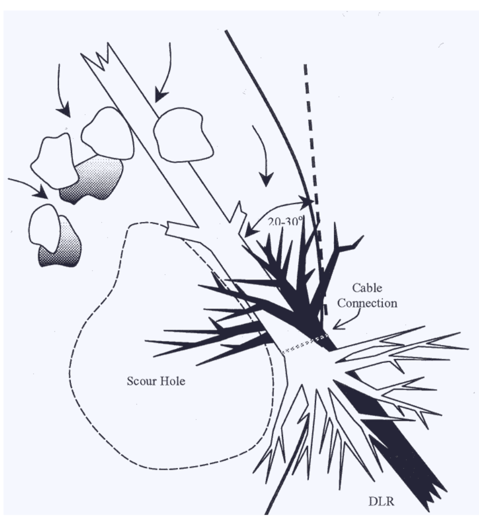
Figure 2. Proposed locations for the j-hook vein structures and boulder clusters downstream of the Morris Valley Bridge.

Reasoning

The Chehalis River currently supports the second largest steelhead fishery in the lower mainland with over 3,500 rod days annually (2003-04 SHA). The stock status has been relatively stable over the past few years, and the goal is to maintain or increase the fish population and angler opportunity. The Chehalis River watershed has seen extensive forest harvesting since the 1907 and a recently completed fish habitat assessment rated the lower river as "poor" lacking pool and woody debris cover. The addition of the large woody debris structures proposed for this reach will help create channel depth along the banks by continually scouring the substrate and creating pools and runs, which are optimal for juvenile steelhead. The addition of boulder clusters in select high velocity locations upstream and downstream from the Morris Valley Bridge will also aid in scouring the finer substrate and generate habitat cover for juvenile steelhead.

The focus of the restoration endeavors proposed for the lower Chehalis River are located immediately downstream of the Morris Valley bridge (lat. 49.298786 long. 121.935403), which crosses the Chehalis River approximately 4 km upstream from the confluence of the Chehalis River and the Harrison River. The lower 3 km is a braided alluvial zone with a network of alluvial channels that have created extremely shallow depths across the width of the channel in this reach. The confined nature of the bridge abutments/stream bank armoring to protect the bridge, followed by a non-restrictive section downstream of the bridge has created hydraulic conditions which provide material to be deposited. This accumulation of gravel and cobble has generated widening of the river and a reduced stream depth hence, reducing parr habitat.

J-hook vein structures have been designed to be low profile to the water surface, increase instream complexity, create scour and therefore increase pool depth, create cover for summer and winter rearing juveniles, and create cover for adult salmonids (figure 3). Additionally, structures will collect spawned out carcasses and hence, retain organic nutrients in the system for longer periods of time. The low profile design of the j-hook structures will ensure that recreational stream users will have no problems negotiating around the man made habitat.



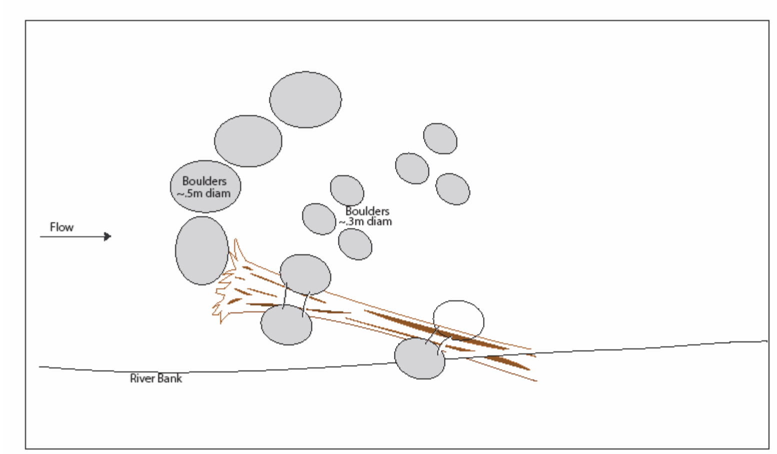


Figure 3. Two j-hook vein habitat structure designs drawings, demonstrating the low profile design that allows for easy watercourse navigation.

However, one instream fish habitat rehabilitation technique that can be applied with minimal paddler/floater/wader risk at the lower Chehalis River is the placement of large boulder clusters. Boulder clusters are typically placed (dark grey) in cobble riffle areas that alternate with pool/glide areas (blue) offering excellent areas of instream cover for juvenile salmonids (figure 4).

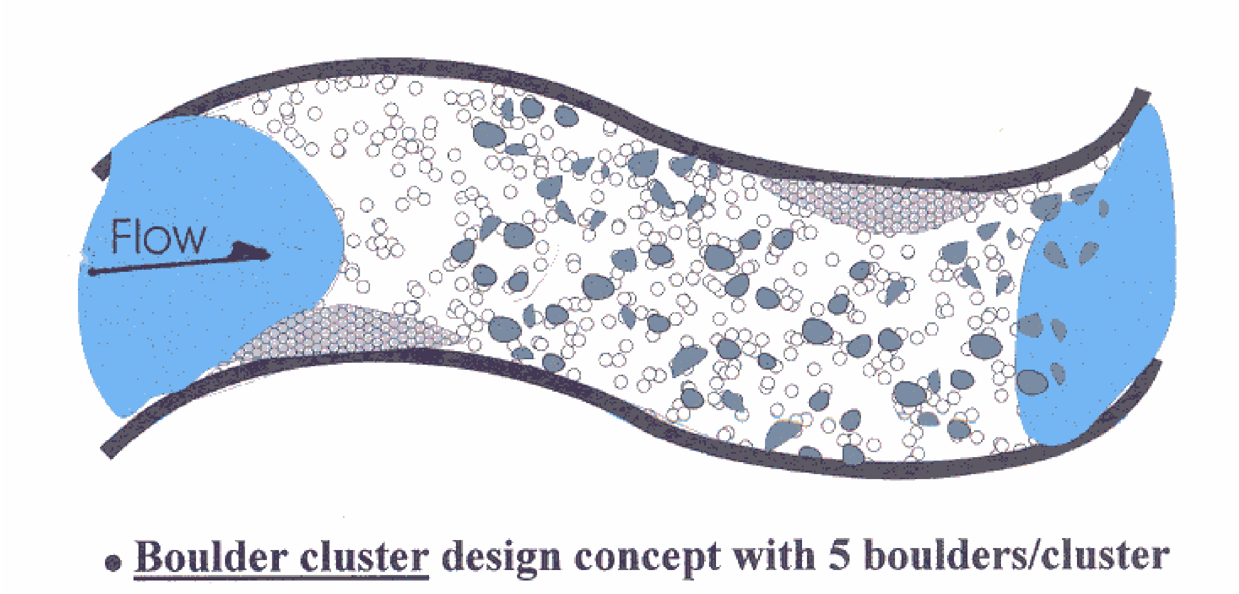


Figure 4. Graphic demonstrating the proposed boulder cluster design for the lower Chehalis River.

In larger streams, boulders are placed in riffles in clusters of five with the largest boulder set at the head of a cluster. Optimal spacing between boulders within a cluster is 0.5-1 m, with 3 m between clusters. The optimum configuration of clusters is a “staggered” pattern, as shown in the figure 4. Placements of boulder clusters in the uppermost riffle zone, as depicted in figure 4, is avoided because these boulders tend to frequently in-fill with bed-load gravels, eliminating their value as prime salmonid rearing habitats (Ward 1997).

Cluster boulders are sized according to the riffle slope and the average bank height, using an equation provided in Newbury et al. (1997), providing a stability safety factor of 1.5. Accordingly, stable riffle boulders placed upstream of the bridge would need to be 0.8 m in diameter and stable riffle boulders placed downstream of the bridge would need to be 0.6 m in diameter.

Proposed Work

<u>Restore habitat capacity</u>

Restoration of fish populations involves a combination of physical habitat restoration as well as restoring habitat productivity through nutrient addition. Methods employed have been developed and proved effective by the BC Watershed Restoration Program (Slaney and Zaldokas, 1997), related studies (Ashley and Stockner, 2003; Wilson et al. 2003, Ward et al. 2006), and in comprehensive assessments of similar restoration work in other areas of the Pacific NorthWest (Roni and Quinn 2001; Solazzi et al. 2000). This involves the replacement of mature tree boles and rootwads (large woody debris or LWD), boulder and spawning gravels, to rebuild stream stability and fish rearing and over wintering habitat. Increasing the productivity of freshwater habitat, by replacing marine derived nutrients once supplied by historic salmon spawning runs

(Bilby et al. 1998, Larkin and Slaney 1997), or by increasing fish growth and biomass in naturally degraded systems, enhances physical habitat restoration with large woody debris/boulder cover (Ward et al. 2006).

Habitat assessments and restoration prescriptions were completed on priority reaches of 12 steelhead streams in the Lower Mainland in 2003-05, documenting 36 km of the highest priority/most effective habitat restoration options. This included *Habitat Assessments and Restoration Prescriptions for Recovery of Steelhead Trout in Lower Chehalis River and Upper Silverhope Creek* (Slaney, 2003). The prescriptions completed in 2003 called for the construction of eight j-hook type structures and the placement of over 60 boulder clusters of five boulders (figure 5). The site was re-visited in 2007 by BCCF and MOE biologists and technicians to reassess the prescription created in 2003. It was found that minor changes to the stream bed in the restoration reach has occurred, but not sufficient enough to warrant a completely new set of prescription for this particular reach of river. Minor changes have been made to the 2003 prescribed structures mainly in the location of the habitat units, the exact number of boulder clusters and j-hook vein structures will stay the same as prescribed in 2003.

Figure 5. Conceptual site drawing of proposed j-hook and boulder cluster site on the lower Chehalis River.

The project coordinator will direct the excavator operators as well as the cabling crew members to construct and secure the large woody debris structures as per the designs in the 2004 habitat restoration prescription report. The in-house hydraulic engineer will conduct a desktop and on-site review of the proposed j-hook structures to ensure adequate boulder ballasting and suitable structure locations have been considered.

A crew of three, including two members of the BC Conservation Foundation and one volunteer support worker or first nation member will secure the j-hook structures to ballast rock and existing stream bank trees. The log structures will be stabilized and held down from the continual effects of hydraulic buoyancy with the aid of galvanized steel cables secured to ballast rocks.

Benefits

Wood structures have been designed to increase instream complexity, create scour and therefore increase pool depth, trap, create cover for summer and winter rearing juveniles, and create cover for adult salmonids. Additionally, structures will collect spawned out carcasses and hence, retain organic nutrients in the system for longer periods of time.

The greatest risk that would be incurred during this type of project is the potential loss of an LWD structure. To reduce the chances of this happen all of the structures will be properly ballasted to a 2.5 times safety factor. This means that each structure will have 2.5 times the required amount of ballast need weighting it down. Secondly, the j-hook vein structures will be properly cabled to ballast boulders and secures to on-shore trees to prevent structure loss. BCCF staff members have three seasons of cabling experience with LWD structures in lower mainland river systems.

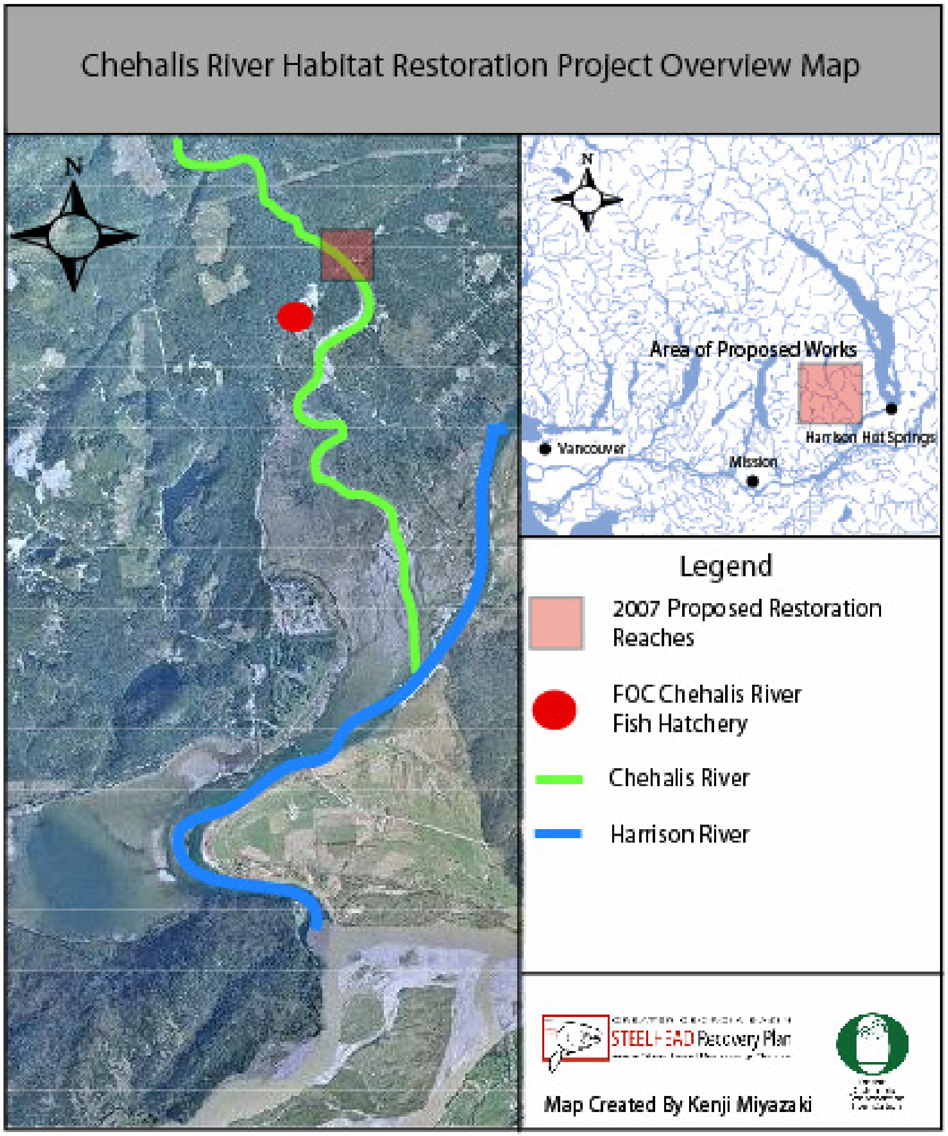
If you have any questions you can contact me at (604) 576 -1433

Sincerely,

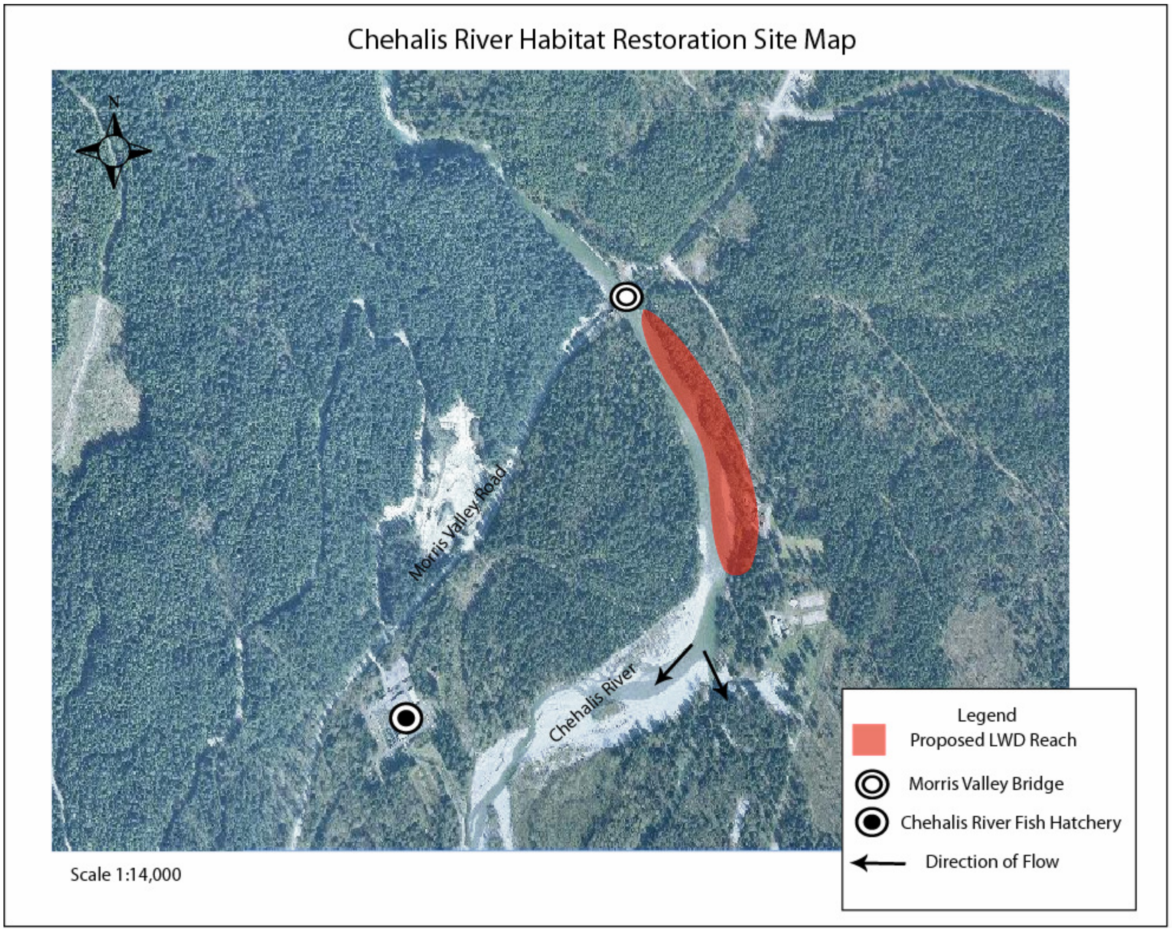
Kenji Miyazaki
Fisheries Technician
BC Conservation Foundation

Part 2 – Supporting Documentation

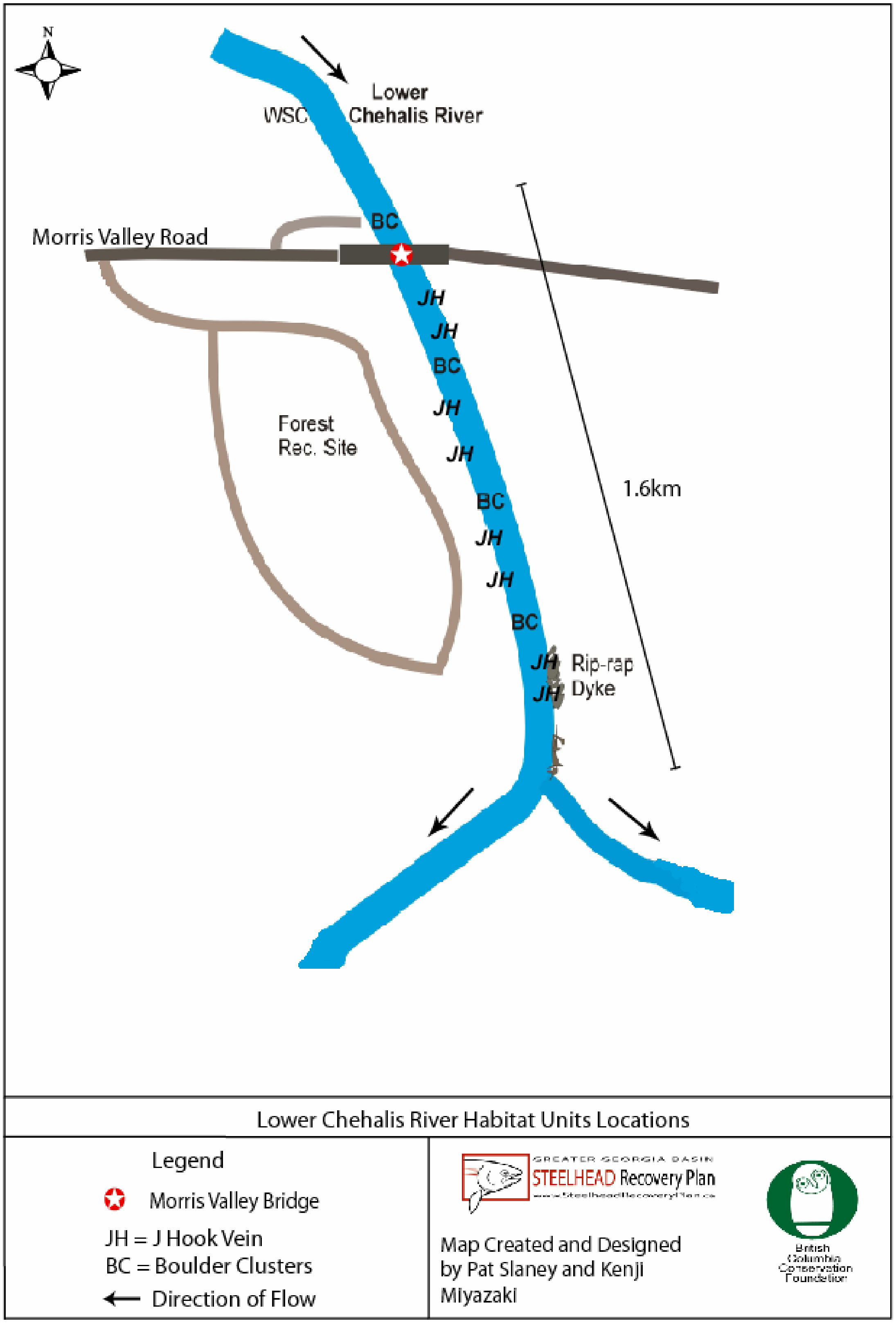
i). Maps - see attached



General location of the Chehalis River habitat restoration project within the lower mainland.



Overview map highlighting proposed restoration reach and major landmarks in the area.



Lower Chehalis River habitat restoration reach showing the habitat units to be installed and their proposed locations.