Kamloops
March 12, 2002

Pilot 2

Design and Installation of Embedded Culverts

Fish Stream Crossing Guidebook Training

Comprises 3 Modules

- Fish Stream Crossing Guidebook Overview
- Fish Habitat Assessment
- Design and Construction of Embedded Culverts

Design and Construction of Embedded Culverts

This training module is comprised of the following parts:

- Part 1- Introduction
- Part 2 - Design
- Part 3 - Installation
- Part 4 - Inspection and Maintenance

Part 1: Introduction

4 Main Topics

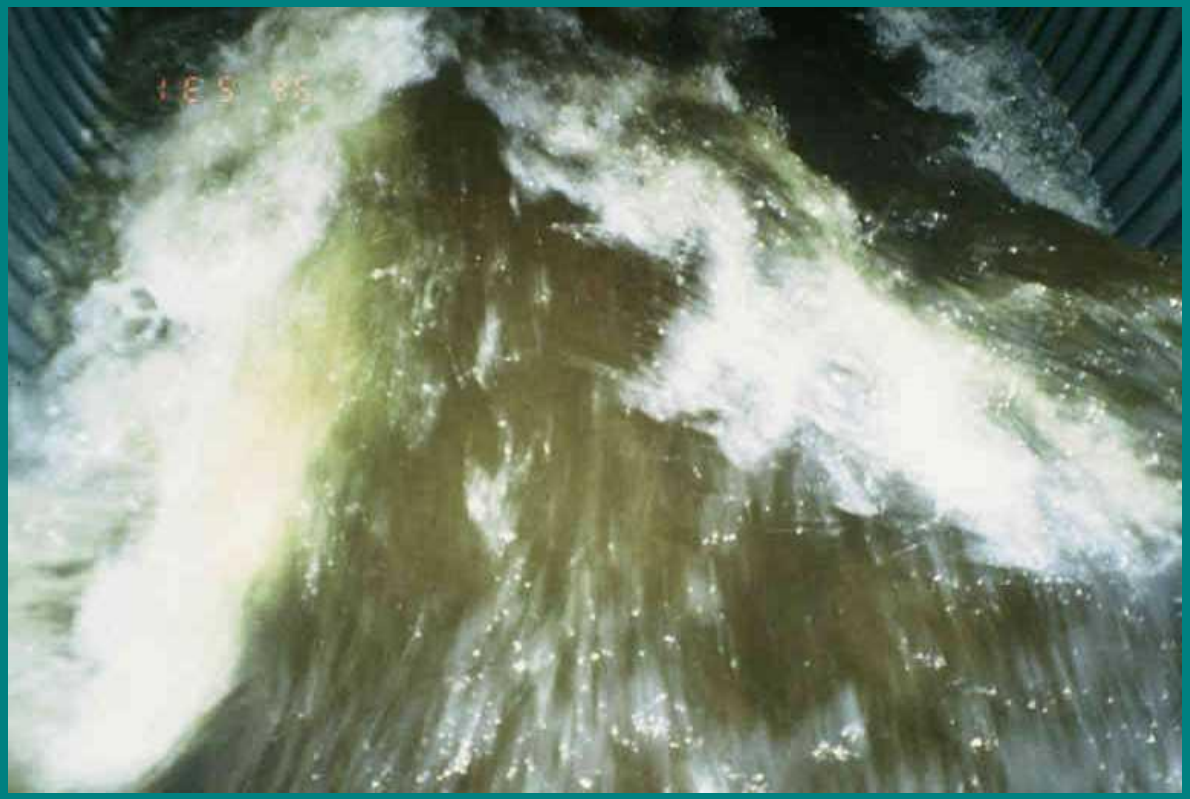
1. Background
2. Fish Stream Crossing Guidebook
3. Why Use Embedded Culverts?
4. Review Process and Approvals

1. Background

- **Embedded culverts are the only type of closed bottom structure (CBS) permitted within fish streams**

Why?

Non-embedded culverts have a poor historical record in providing fish passage due to:



High velocities

Perched culverts

and

Loss of streambed

Improvement is required if we are to continue using culverts in fish streams

2. Fish Stream Crossing Guidebook

Guidebook comprised of following sections:

- Review process
- Design and installation
  - open and closed bottom structures
  - other structures (i.e. ice bridges, snowfills)
- Fish stream protection measures
- Maintenance
- Deactivation

The Objectives of the Fish Stream Crossing Guidebook are:

1. The protection of fish and fish habitat and safe passage of fish when locating, designing, installing maintaining and deactivating stream crossings
2. An efficient submission and review process for proponents that addresses both federal and provincial authorities involved in the construction, maintenance and deactivation of stream crossing structures
3. Options that recognize the value and sensitivity of fish and fish habitat in balance with other environmental, social, resource and economic values

How do Embedded Culverts fit into FSCGB?

- One type of crossing option discussed in GB
- The only CBS available for fish streams

3. Why Use Embedded Culverts?

- Cost
- Alignment issues
- Durability
- Oregon experience

4. Review Process and Approvals

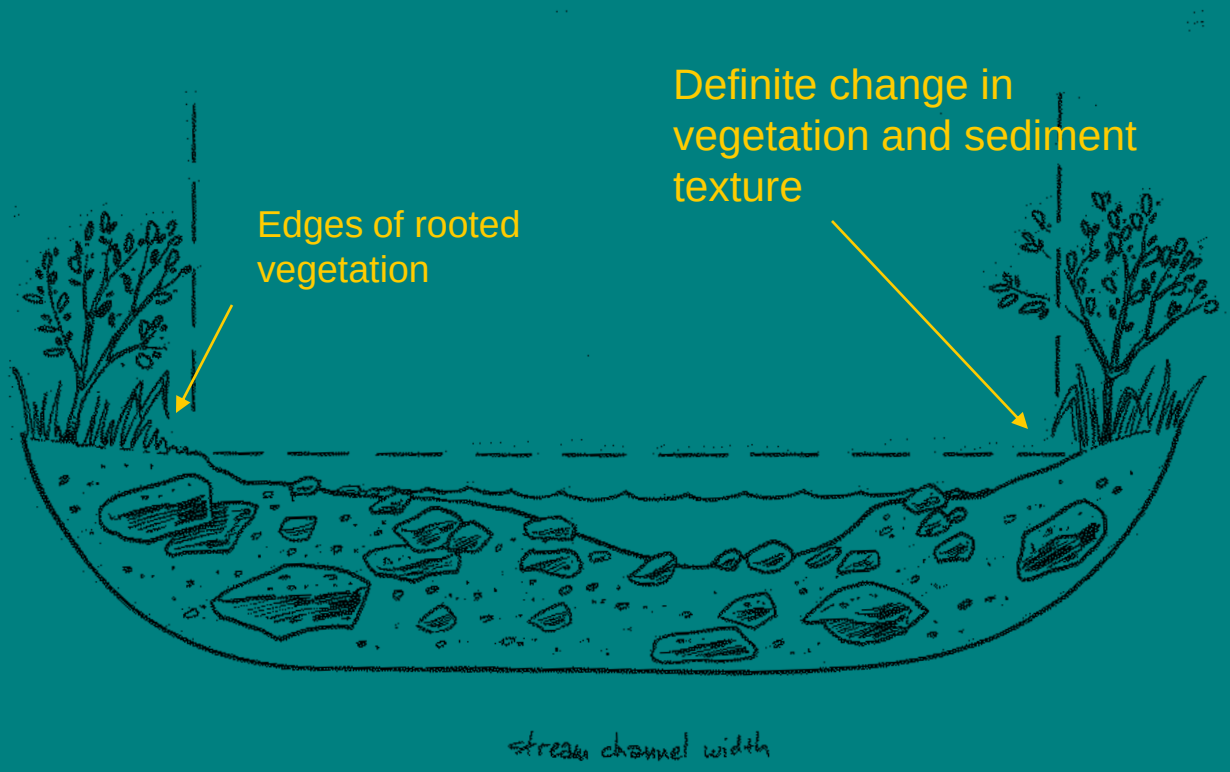
Review process potentially involves two level:

- Federal review
- Provincial review

Important concepts

- **Stream channel width**
  - **Similar to Fish Stream Guidebook**
- **Timing windows**
- **Fish habitat evaluation**
  - **Classed as critical, important or marginal**

Stream Channel Width



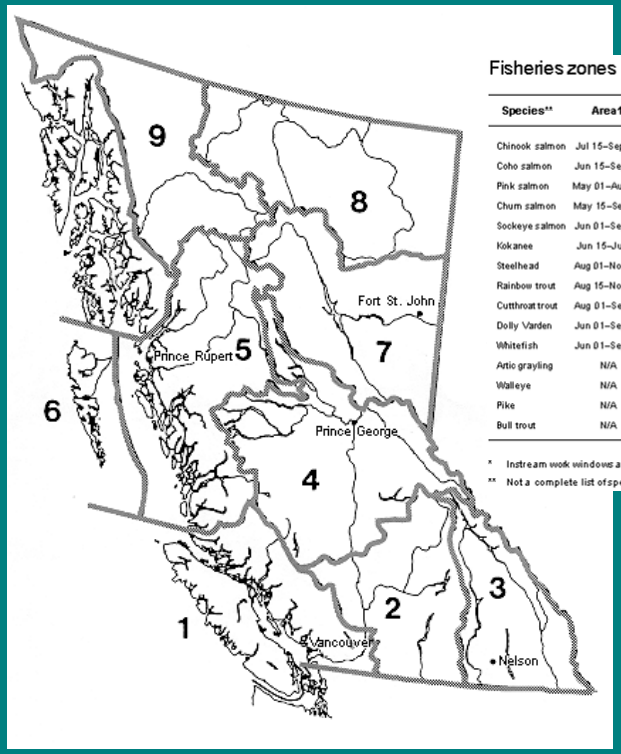
Stream Channel Width

Important concepts

- Stream channel width
  - Similar to Fish Stream Guidebook
- **Timing windows**
- Fish habitat evaluation
  - Classed as critical, important or marginal

Timing windows

- **Periods of time when instream work can be conducted with reduced risk to fish and fish habitat**



Fisheries zones

Species**	Area1	Area2	Area3	Area4	Area5	Area6	Area7	Area8	Area9
Chinook salmon	Jul 15–Sep 15	Jun 15–Jul 31	N/A	Jun 15–Jul 15	Jun 15–Jul 31	Jun 01–Jul 31	N/A	N/A	May 01–Jul 31
Coho salmon	Jun 15–Sep 15	Jul 01–Sep 30	N/A	Jun 15–Sep 30	Jul 01–Aug 31	Jun 15–Aug 15	N/A	N/A	Apr 01–Aug 15
Pink salmon	May 01–Aug 15	Jun 01–Aug 31	N/A	Jun 15–Aug 31	May 15–Aug 15	May 15–Aug 15	N/A	N/A	Mar 15–Jul 31
Chum salmon	May 15–Sep 15	N/A	N/A	N/A	May 15–Aug 31	May 15–Aug 31	N/A	Jul 01–Aug 15	Apr 01–Sep 15
Sockeye salmon	Jun 01–Sep 15	Jun 01–Jul 31	N/A	Jun 15–Jul 15	Jun 15–Jul 15	Jun 15–Jul 31	N/A	N/A	Apr 01–May 31
Kokanee	Jun 15–Jul 31	May 15–Aug 31	Jun 15–Aug 15	Jun 01–Aug 31	Jun 15–Jul 15	Jun 15–Jul 31	Jun 01–Aug 31	N/A	N/A
Steelhead	Aug 01–Nov 15	Jul 15–Oct 30	N/A	Aug 01–Apr 30	Aug 15–Dec 31	Aug 15–Nov 15	N/A	N/A	Aug 15–Nov 15
Rainbow trout	Aug 15–Nov 15	Aug 15–Sept 30	Jul 15–Mar 31	Jul 15–Apr 15	Aug 15–Jan 31	Aug 15–Jan 31	Jul 15–Mar 31	Jul 15–Mar 31	Sep 01–Apr 30
Cutthroat trout	Aug 01–Sep 30	Aug 15–Apr 15	Sep 15–Apr 30	N/A	Aug 15–Dec 31	Aug 15–Dec 31	N/A	N/A	Sep 01–Apr 30
Dolly Varden	Jun 01–Sep 15	N/A	Jun 15–Aug 15	Jul 15–Aug 31	Jun 15–Aug 31	May 15–Aug 31	Jun 01–Aug 31	Jun 01–Aug 31	Jun 15–Aug 31
Whitefish	Jun 01–Sep 15	Jun 01–Sep 15	Apr 01–Oct 31	Jun 01–Sep 15	Jun 01–Sep 15	N/A	Jun 15–Aug 31	Jun 15–Aug 31	Jun 01–Aug 31
Artic grayling	N/A	N/A	N/A	N/A	N/A	N/A	Jul 15–Mar 31	Jul 15–Mar 31	Jul 15–Mar 31
Walleye	N/A	Jul 30–Apr 01	N/A	N/A	N/A	N/A	Jul 01–Apr 30	Jul 01–Apr 30	N/A
Pike	N/A	N/A	N/A	N/A	N/A	N/A	Jul 01–Apr 30	Jul 01–Apr 30	N/A
Bull trout	N/A	Jul 01–Jul 31	Jun 15–Aug 15	Jun 15–Aug 15	Jun 15–Aug 31	N/A	Jun 15–Aug 15	Jun 15–Aug 15	Jun 15–Aug 31

* Instream work windows are approximations for a particular species over an entire specified area and should be considered time periods of reduced risk only.

** Not a complete list of species of concern. Proponent should consult regional fisheries staff with regard to species not listed here.

Local fishery agency should be contacted for current information

Important concepts

- Stream channel width
  - Similar to Fish Stream Guidebook
- Timing windows
- **Fish habitat evaluation**
  - **Classed as critical, important or marginal**

Habitat at the Crossing Site

	Habitat at Crossing Site		
	Critical	**Important**	**Marginal**
Definition	**Habitat that is critical in sustaining a subsistence, commercial, recreational fishery or species at risk (red and blue listed and cosewic list) – because of its relative rareness, productivity and sensitivity.**	**Habitat utilized by fish for feeding, growth and migration and utilization by fish is not deemed to be critical. This category of habitat usually contains a large amount of similar habitat that is readily available to the stock.**	**Low productive capacity that contributes marginally to fish production.**

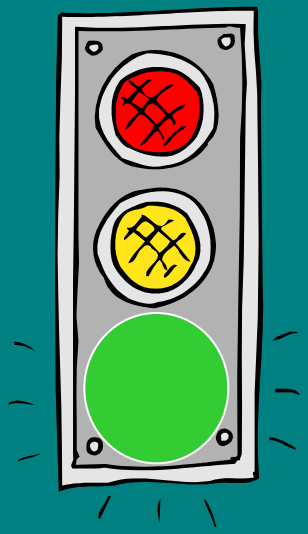
Type of review, and authorization required, depends on:

- Stream gradient
- Stream channel width
- Fish habitat at the crossing site (critical, important or marginal)

- **Review process is based on the red light, yellow light, green light concept**

Stream gradient	Habitat at crossing site: critical	important	marginal
6 %			
3 %			

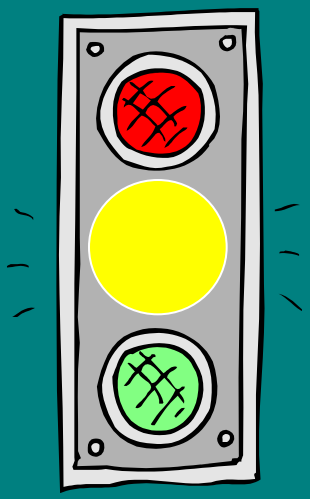
"Green Light"



Installation of CBS can proceed without site specific fishery agency approval provided:

- Fish habitat is classified as "marginal"
- Stream gradient is 6% or less
- Stream channel width is 2.5m or less
- Timing windows are complied with

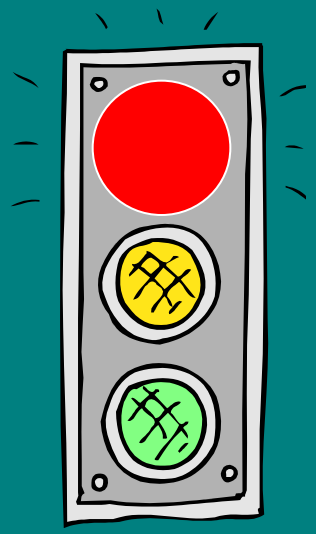
"Yellow Light"



Embedded culverts are subject to a "*Fisheries Act*" Sec. 35 (2) authorization where:

- Fish habitat is classified as "important", and
- Stream gradient is 6% or less

"Red Light"



Embedded culverts are generally unacceptable where:

Fish habitat is classified as "critical"

Stream gradient is greater than 6%

Stream gradient	Habitat at crossing site: critical	important	marginal
6 %			
3 %			

Summary

1. Embedded culverts are one type of crossing structure in the FSCGB and the only type of CBS allowed in fish streams.
2. We have to improve our track record if we are to continue to use metal culverts in fish streams.
3. Embedded culverts can be installed in fish streams where stream gradient is 6% or less, stream channel width is 2.5m or less and sufficient excavatable fill is present for embedment, provided they are installed as per the Fish Stream Crossing Guidebook.