

Shuswap Watershed Mapping, Inventory and Guidance Documents

A photograph of a stream with many salmon swimming in the water, framed by green and yellowing leaves in the foreground. The water is clear, and the salmon are visible in various stages of their run. The leaves in the foreground are some green and some yellow, suggesting an autumn setting.

**Bob Harding Habitat Partnership and Stewardship
Coordinator BC Interior 250 851-4918**

Shuswap Watershed Mapping, Inventory and Guidance Documents

- Project Background
- Mapping Products
- Key Findings
- Guidance Documents
- Observations
- Questions

Large Area Limited Capacity



Knowledge Capture and Transfer



Large Scale Foreshore Development



Changing Regulatory Processes





Recreational “Water Use” Conflicts

Slalom courses, cigarette boats noise/ speed, ballast boat wakes/erosion, tubers-LWD, lack of community boat launches/parking, grey water and petroleum, increasing vessel use of tributary streams, maximum boating carrying capacity etc





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Pacific Region Operational Statement Dock and Boathouse Construction in Freshwater Systems

Version 3.0 ([PDF](#))

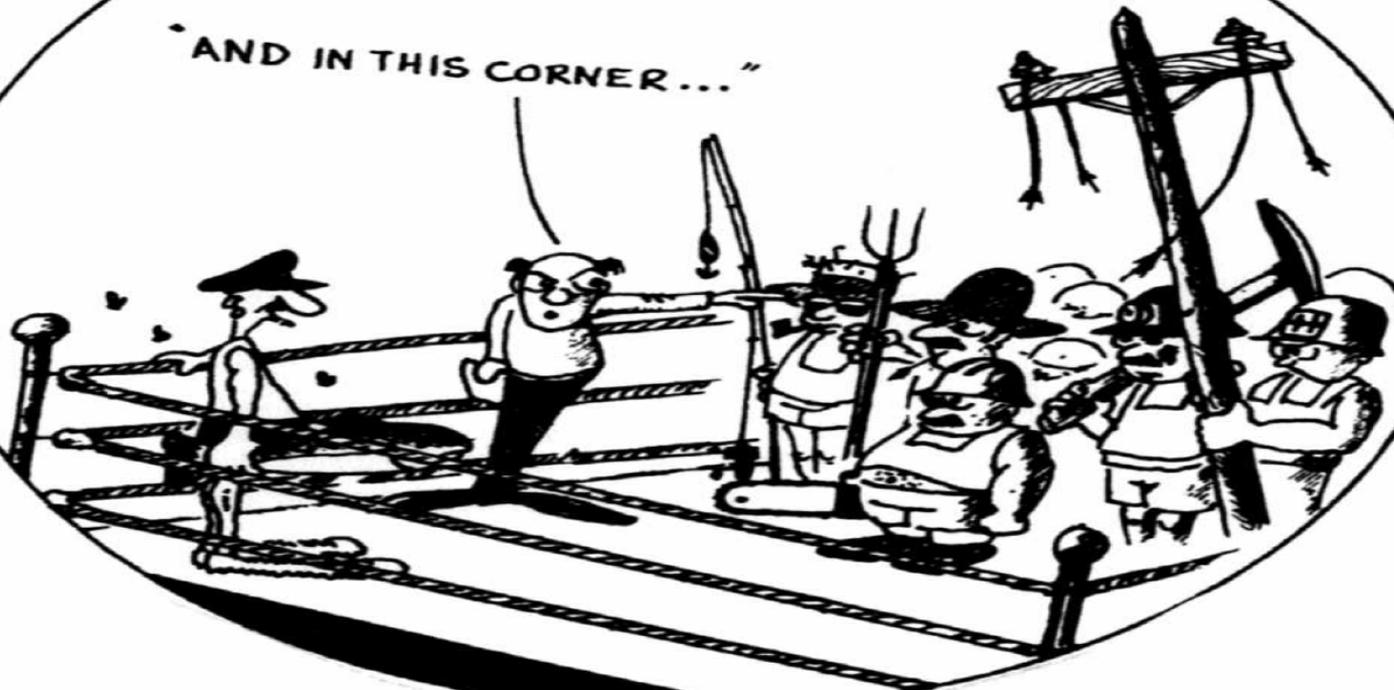
Docks and boathouses are common features on the shorelines of lakes and rivers in Canada and are an important part of the recreational use of our waterways. This Operational Statement applies to docks which consist of floating platforms or those supported by pipes, poles or cantilever arms. The shoreline area in front of your cottage or waterfront property is also important habitat for a variety of aquatic organisms, including fish. Fish lay their eggs, feed and hide from predators in these shoreline areas.

Building a dock or boathouse along your waterfront can impact this important habitat by covering spawning habitat, removing rocks and logs that provide shelter, causing erosion and sedimentation from bank disturbance, introducing deleterious substances if improper building materials are used and disrupting sensitive fish life stages.

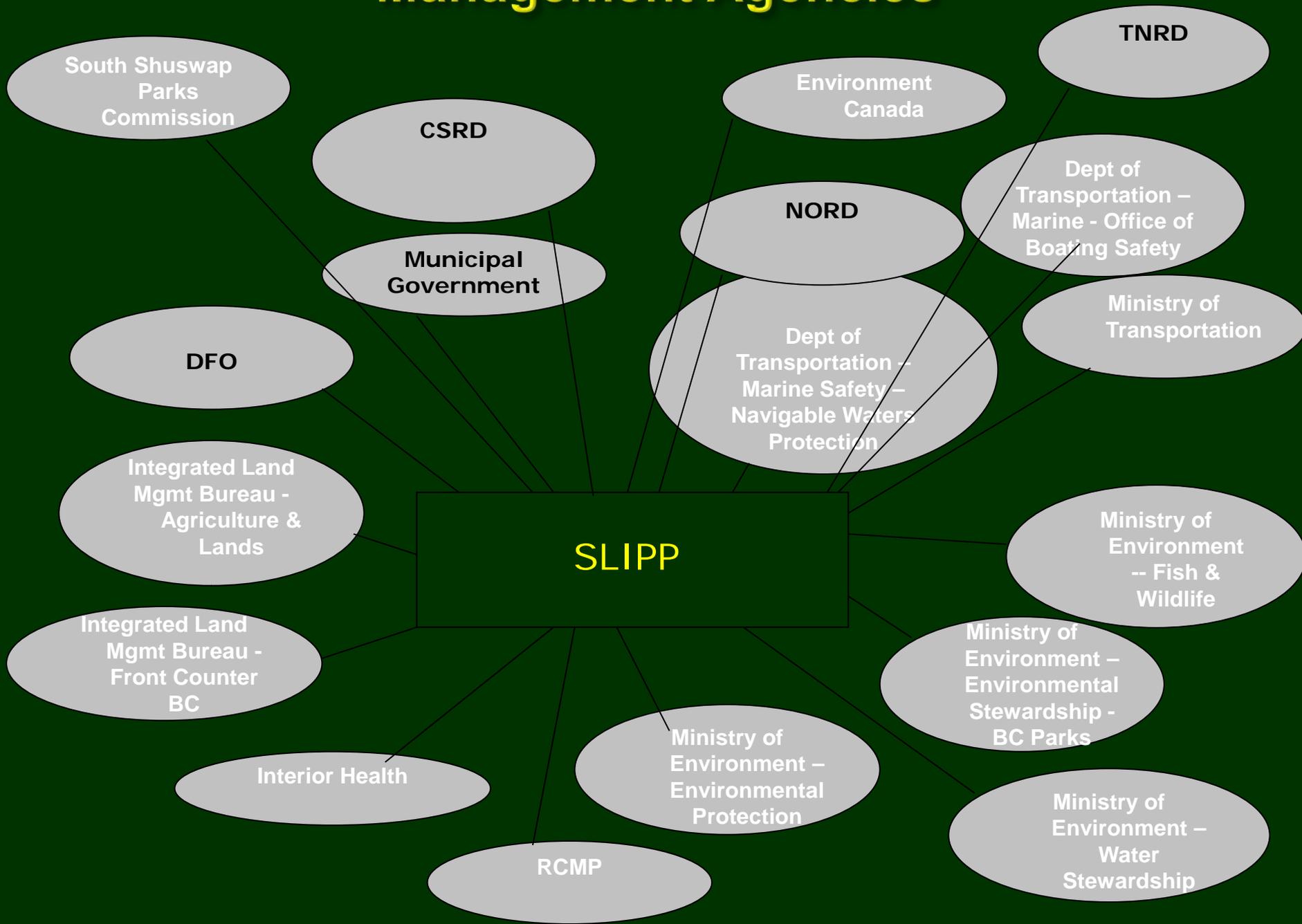
Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to incorporate into your project in order to avoid negative impacts to fish habitat. You may proceed with your dock or boathouse project without DFO review when you meet the following conditions:

"AND IN THIS CORNER..."



Management Agencies



SLIPP Vision and Goals

Healthy communities that support the ecological integrity of the Shuswap and Mara lakes now and in the future

Development that balances environmental, economic and social interests

Water quality that provides public and ecosystem health

Diverse recreational experiences that are safe and sustainable

SLIPP objectives / strategies

- Creating a comprehensive foreshore and upland area site sensitivity map for Shuswap and Mara Lakes.
- Tool development to support the Foreshore Development Interagency Technical Committee to manage cross agency development applications and lake issues.
- Tool development to support improving the development application process.

Shuswap River Watershed Sustainability Plan

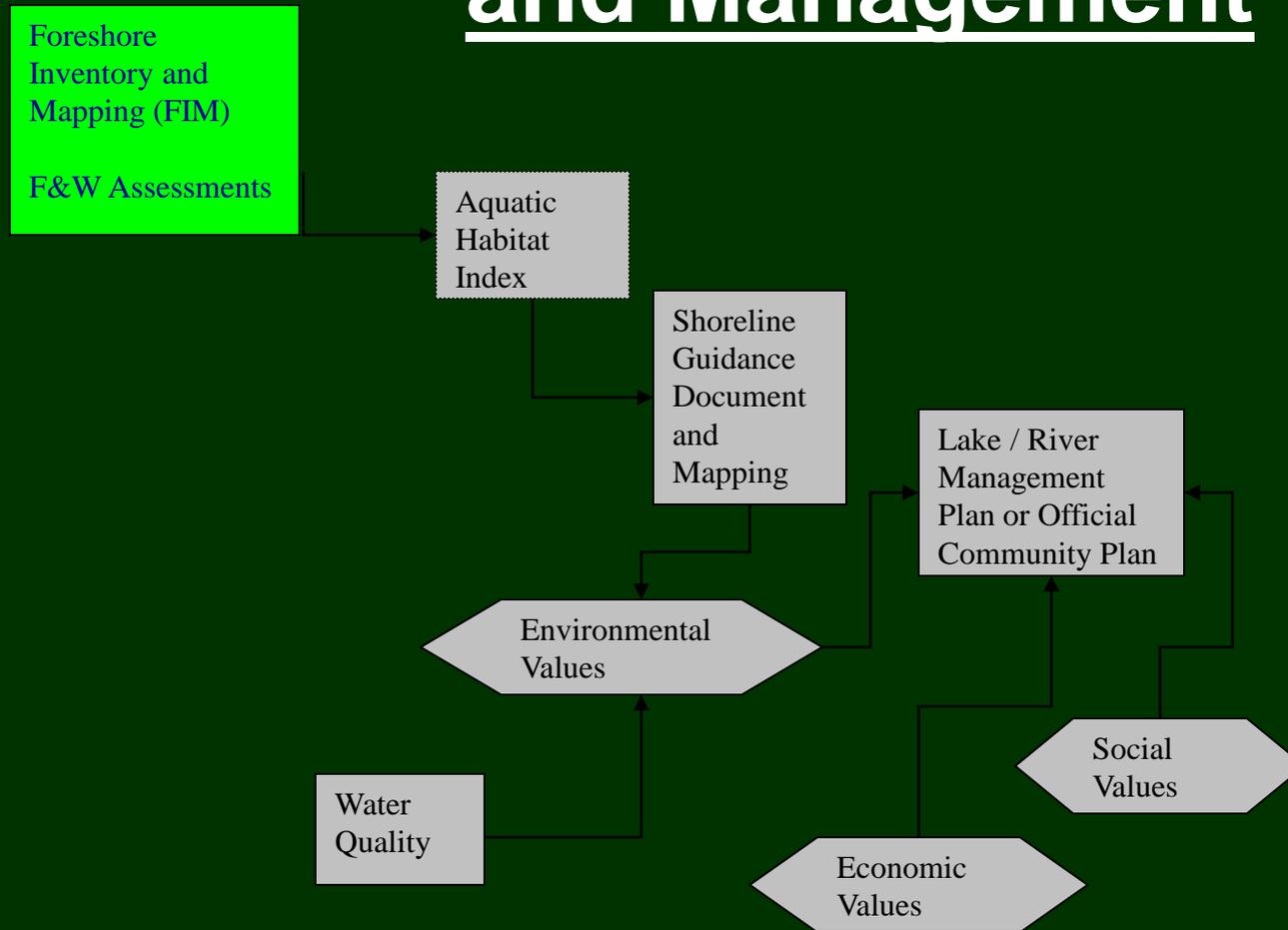
Purpose

- **Create a common long-term vision for the management of the Shuswap River Watershed (which includes its tributaries) that all stakeholders and community members agree to and strive to achieve.**
- **Create a comprehensive plan that will guide agencies and the community in decision making with regard to land and water planning within the Shuswap River Watershed.**

Goals

- **Establishing the current state of the watershed. Identifying issues, challenges and problems**
- **Establishing both short and long term management objectives and develop strategies.**
- **Highlighting management recommendations.**
- **Implementing a monitoring program in an effort to improve the aquatic and terrestrial ecosystems.**

Lake and River Shoreline Inventory and Management



Shuswap Lakes Foreshore Habitat Inventory Mapping (FIM)



Foreshore Inventory and Mapping

What is it?

FIM is a standardized GIS shoreline mapping tool:

1. Biophysical Characteristics (e.g., shore type, substrates, etc.)
2. Land Use (e.g., Commercial / Single Family residential, etc.)
3. Riparian Condition
4. Collect Data on Modifications (e.g., docks, groynes, etc.)

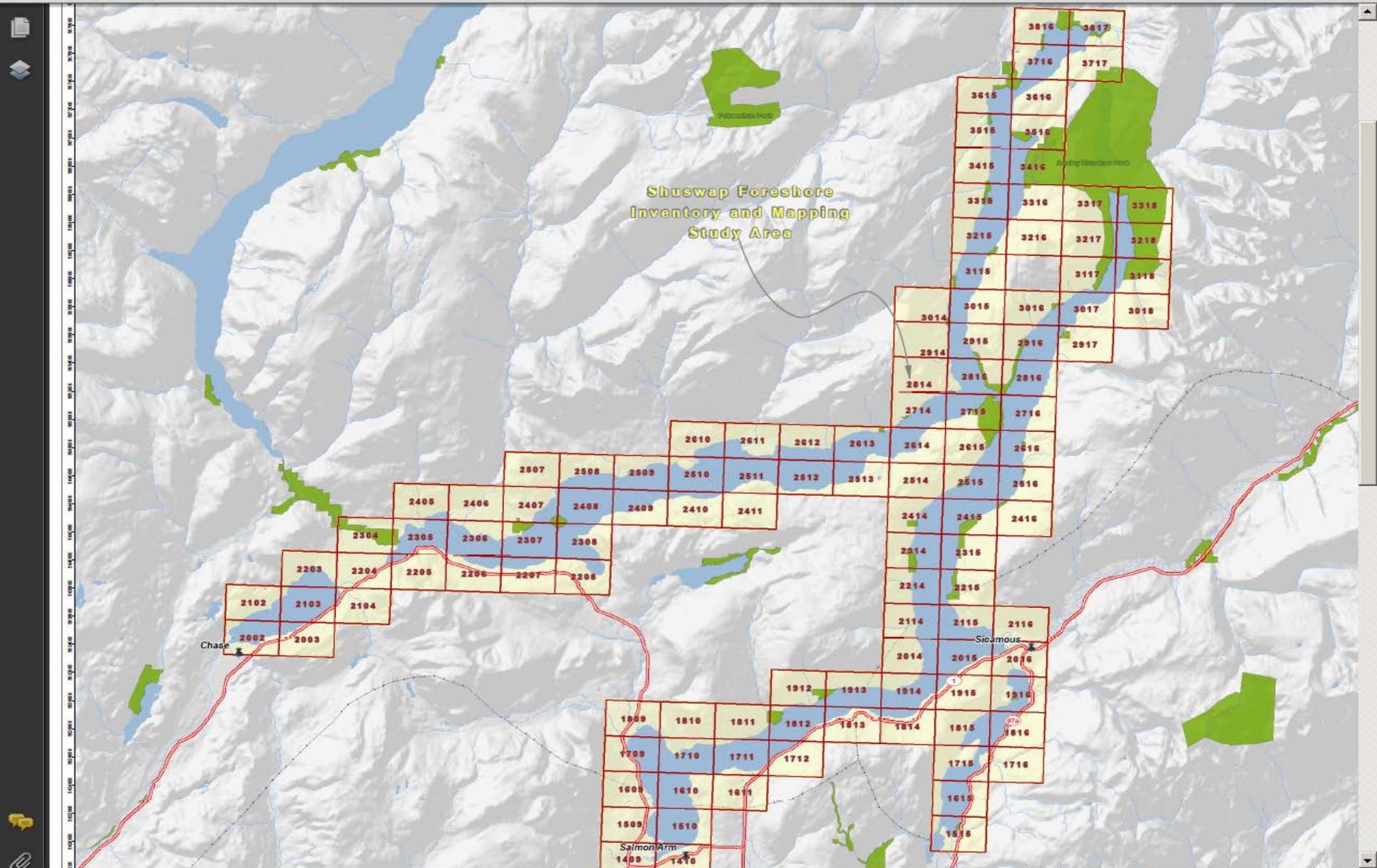
Fisheries and Other Biological Data

1. Shore spawning sockeye
2. Juvenile Rearing Areas
3. Staging and Migration locations

FIM provides a baseline understanding of our shoreline areas

Mapping Products

- Digital GPS stamped video (approximately 640 km)
- 30 cm ortho photography (lake)
- 20 cm ortho photography (tributaries)
- Digital GPS stamped photographs
- 331 lake & 106 river segments with bio-physical
- Final Report (Methodology & AHI)
- Information and Interactive Mapping Tool on the Community Mapping Network – Summary Maps on CSRD web site.
- Digitization of historic salmon spawning in large tributaries of the Shuswap system



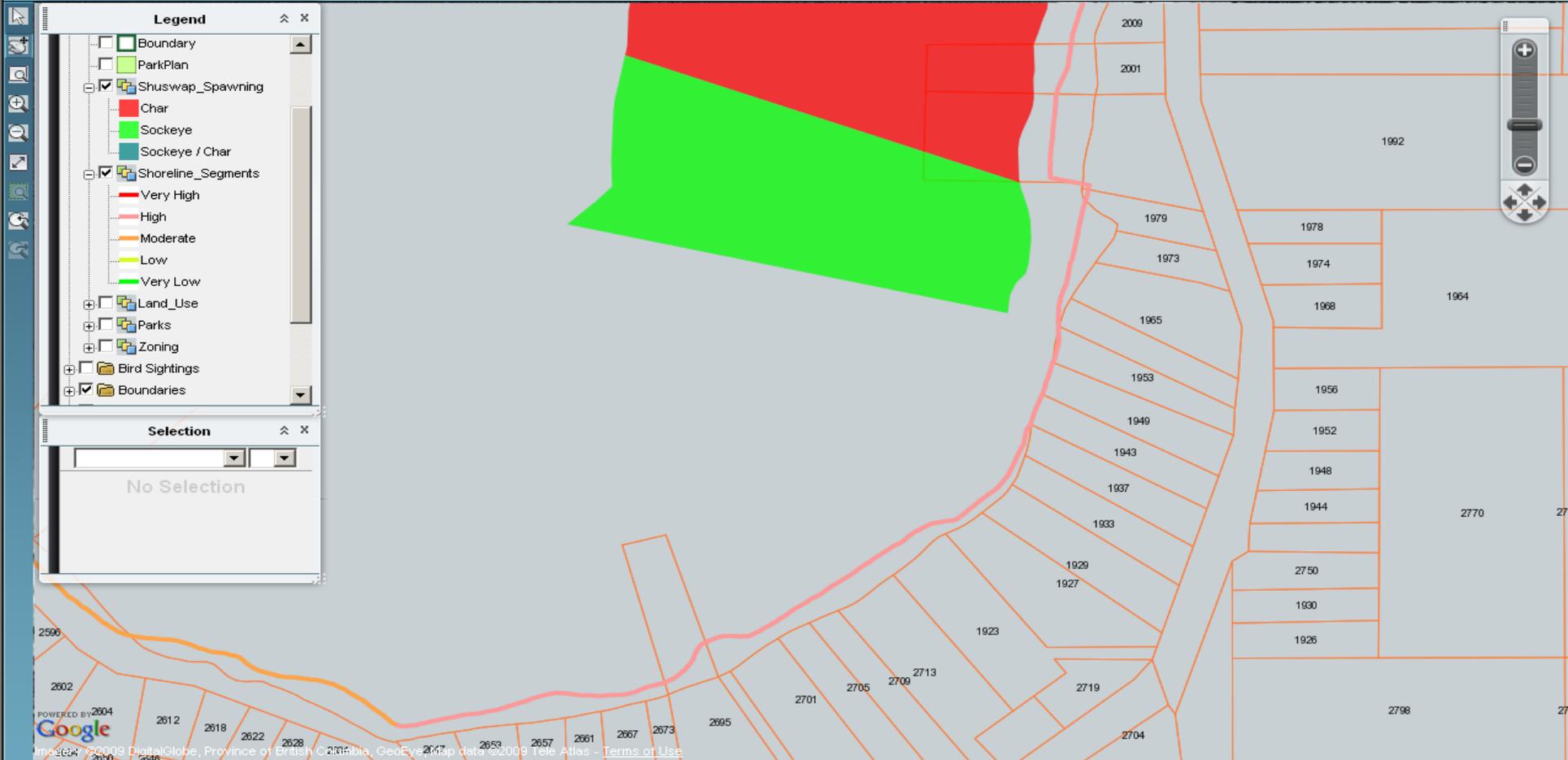
Columbia Shuswap Regional District Watershed Atlas

Legend

- Boundary
- ParkPlan
- Shuswap_Spawning
 - Char
 - Sockeye
 - Sockeye / Char
- Shoreline_Segments
 - Very High
 - High
 - Moderate
 - Low
 - Very Low
- Land_Use
- Parks
- Zoning
- Bird Sightings
- Boundaries

Selection

No Selection



Mabel Lake

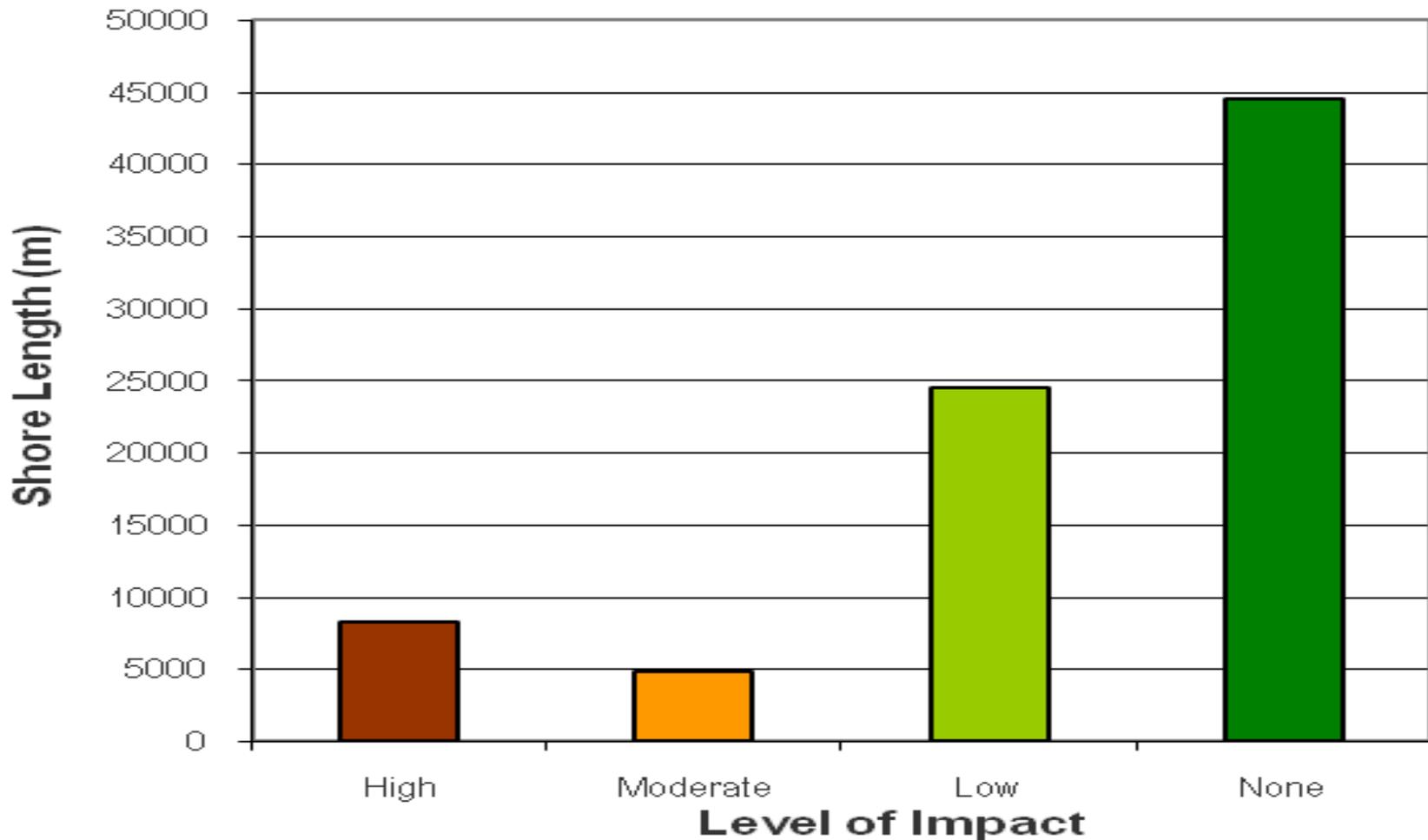
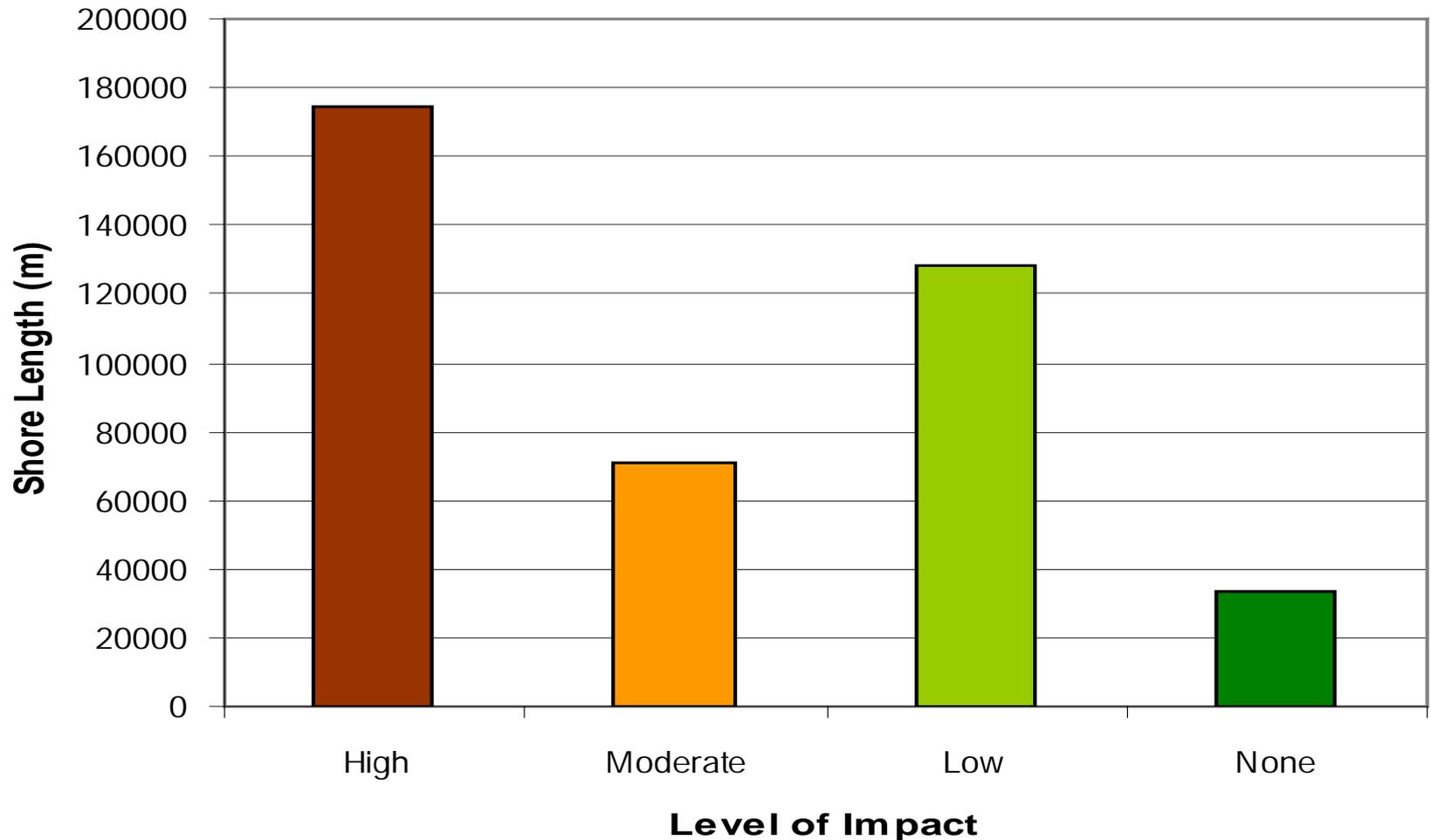


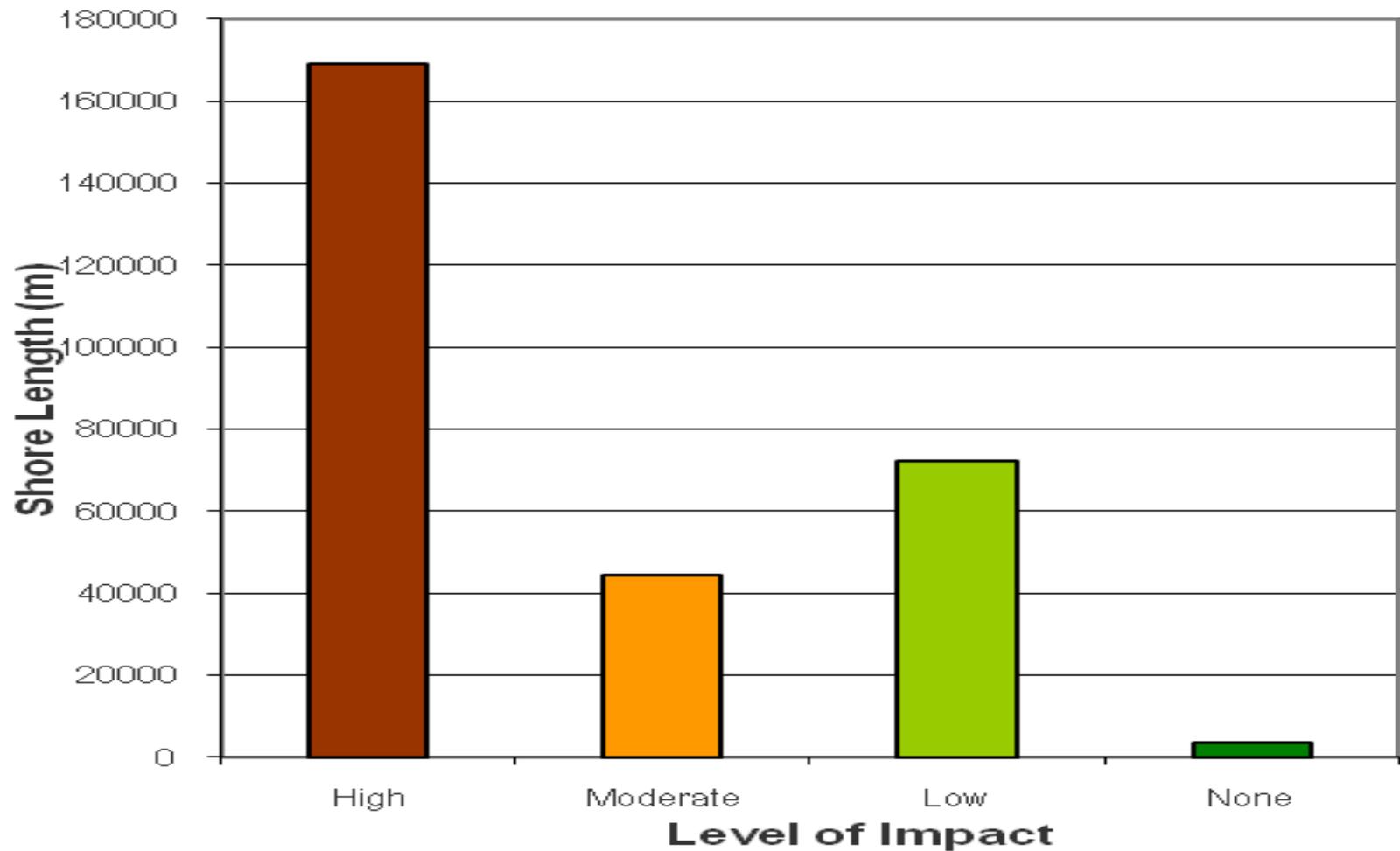
Figure 9 presents the level of impact (High 8.3 km or 10%, Moderate 4.8 km or 5%, Low 24.5 km or 30%, and None 44.4 km or 55 %) observed along Mabel Lake.

Shuswap Lakes

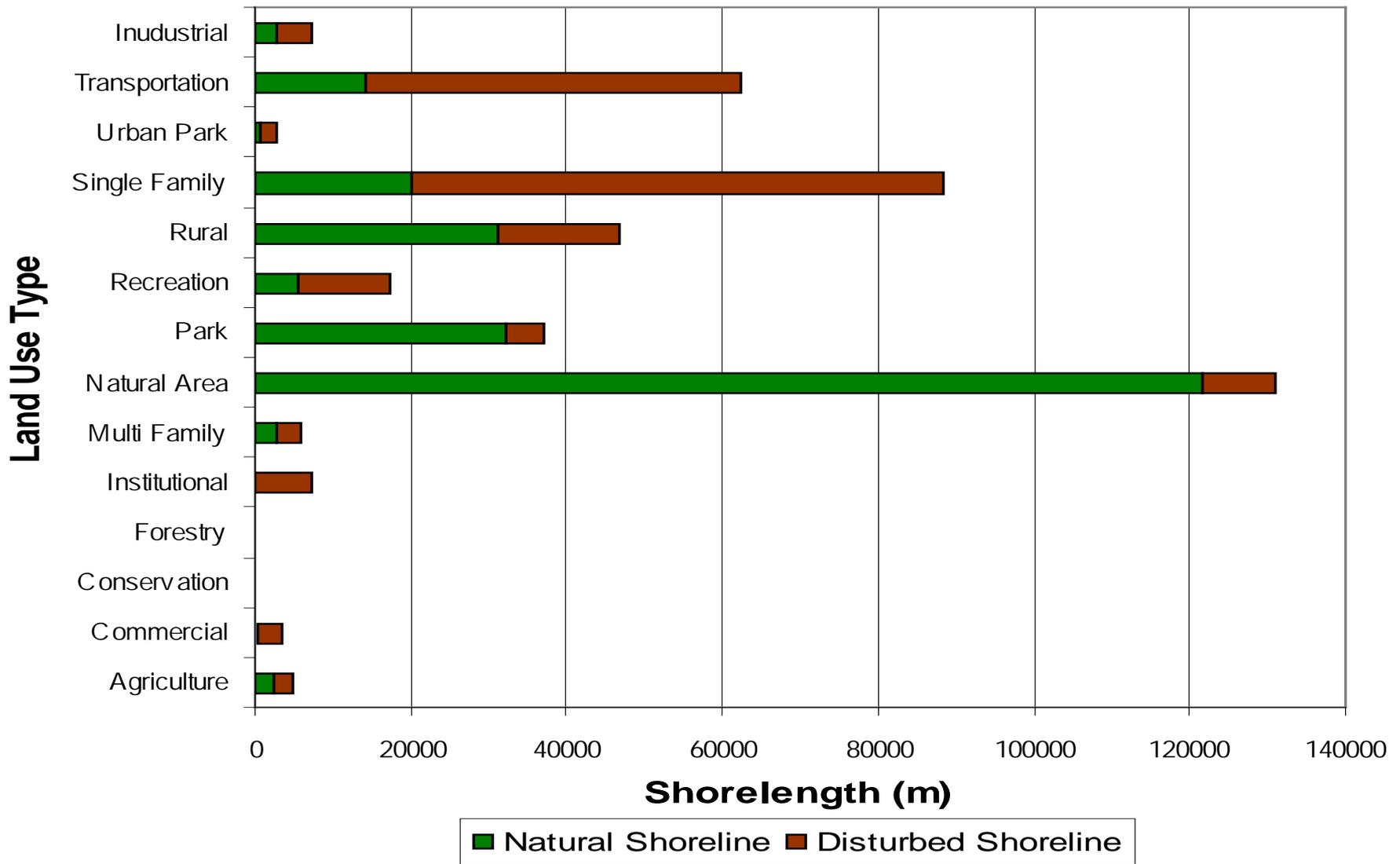


- Level of Impact High 43% or 174km, Moderate 17% or 71km, Low 31% or 128km & None 8% or 33km

Okanagan Lake



Conversion of natural to disturbed occurring at 1-2% yr



- The total natural and disturbed shoreline length by each different land use type observed.

Foreshore Modifications





Over 1100 groynes or
substrate windrows

11 N 0361766 5657199

340 m

10/16/2008 11:01:40 AM

Loss of Emergent Vegetation Communities



Fine Substrate Migration





Moorage



>2700 docks

Proliferation of Moorage buoys

Docks







Beach Modifications



Sand Imported

Removal of
foreshore
vegetation

Aquatic vegetation only
occurs along 22.7 % of
shoreline.

Retaining Walls



>1500 retainer walls - 60% of private properties – about 52 km or 13% of shoreline converted.

50% below MAHWM

Majority of walls are for retaining upland fill and landscaping

Boat Launches



200 boat launches



Riparian Area Encroachment



Significant amount of new development
would not comply with RAR standards

Erosion of Emergent Vegetation



More chronic in small bay areas coinciding with high boat traffic

Often associated with stripping of larger cobble beaches.

Crown Lands Trespass



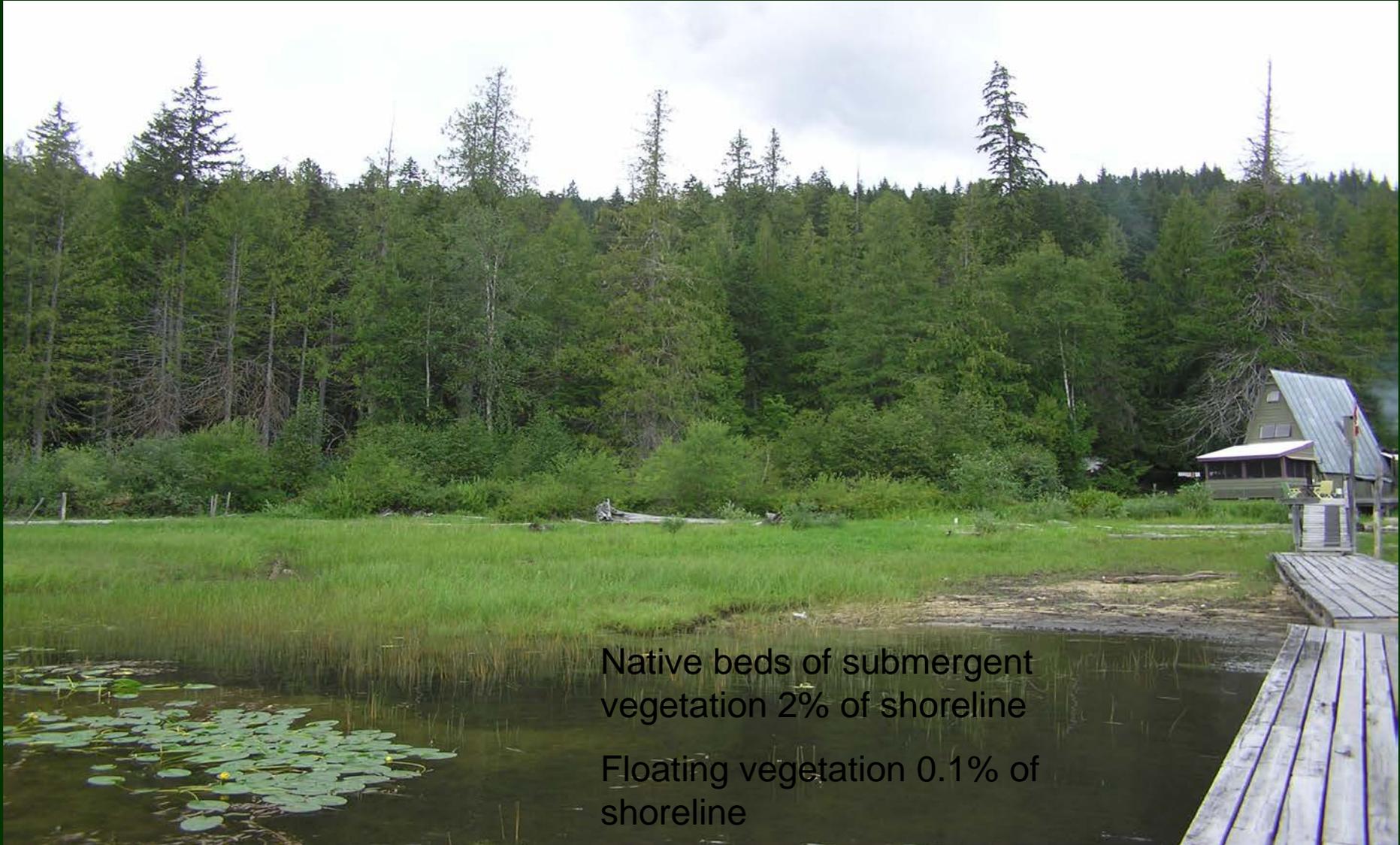
2008 / 5 / 25

N 50° 48.907' W 118° 59.538'

341 m

05/25/2008 9:15:11 AM

Rare Habitats



Native beds of submergent
vegetation 2% of shoreline

Floating vegetation 0.1% of
shoreline

Sockeye Spawning on Fan of Tsuius Creek 2010

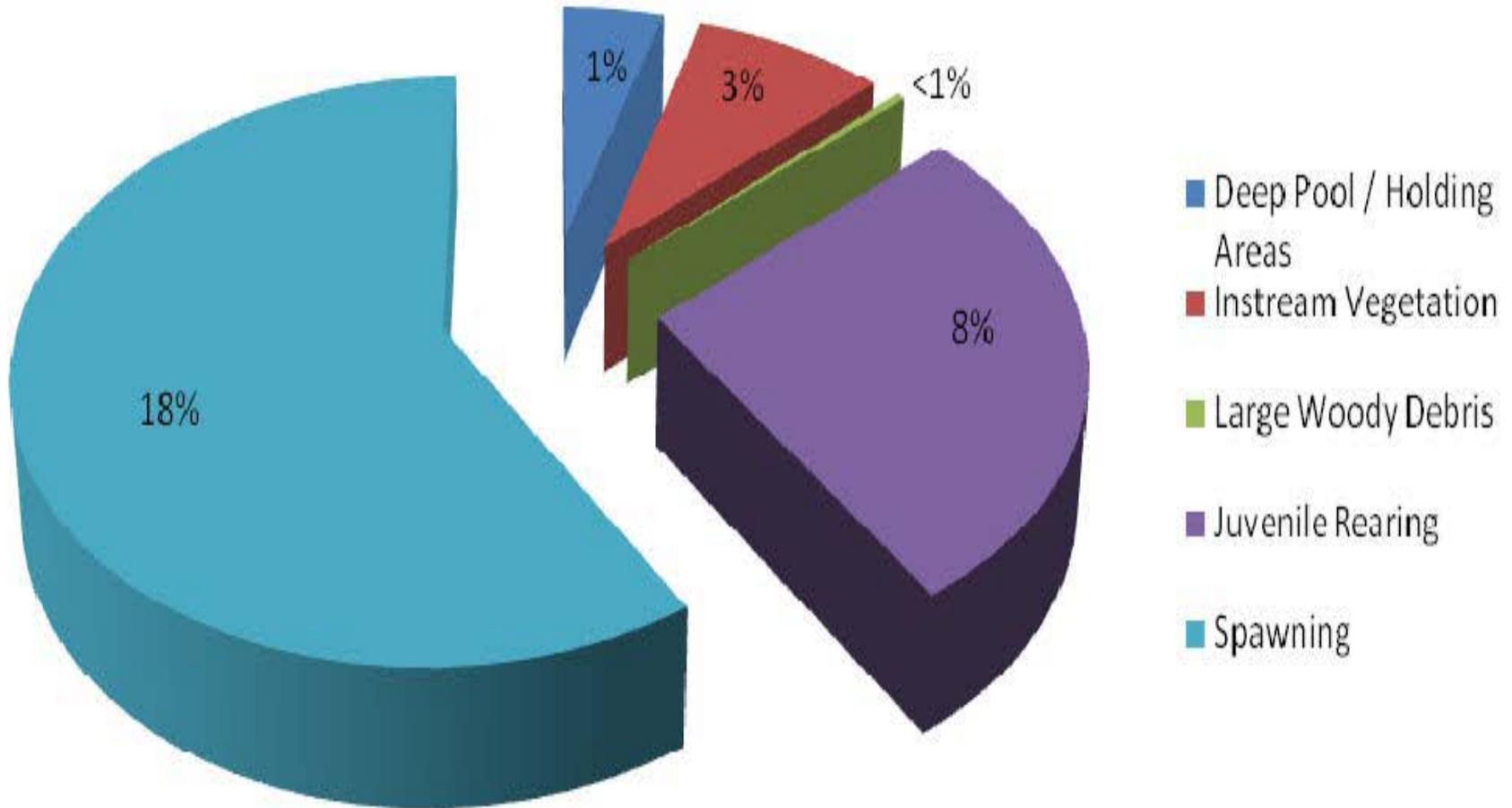


Lower Shuswap River Modified SHIM



- 35 km (43%) of the left bank and 47 km (60%) of the right bank have been modified.
- Deep holding pools limited below Enderby and overall <2% of LSR
- 18% of river has suitable spawning habitat for salmonids
- Human induced isolation of middle and low flood benches

Lower Shuswap River



Mapsheet - 8

Lower Shuswap River Inventory and Mapping

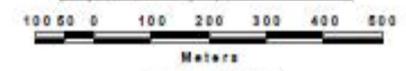
Riparian Habitat, Hydraulic, and Instream Feature Classification

Location: Lower Shuswap River
 Project No.: 10-842
 Prepared for: Department of Fisheries and Oceans
 Prepared by: Ecoscape Environmental Consultants Ltd.
 Drawn by: Robert Wagner
 Checked by: Kyle Hawes
 Projection: NAD83-UTM Zone 11
 Date: May, 2011

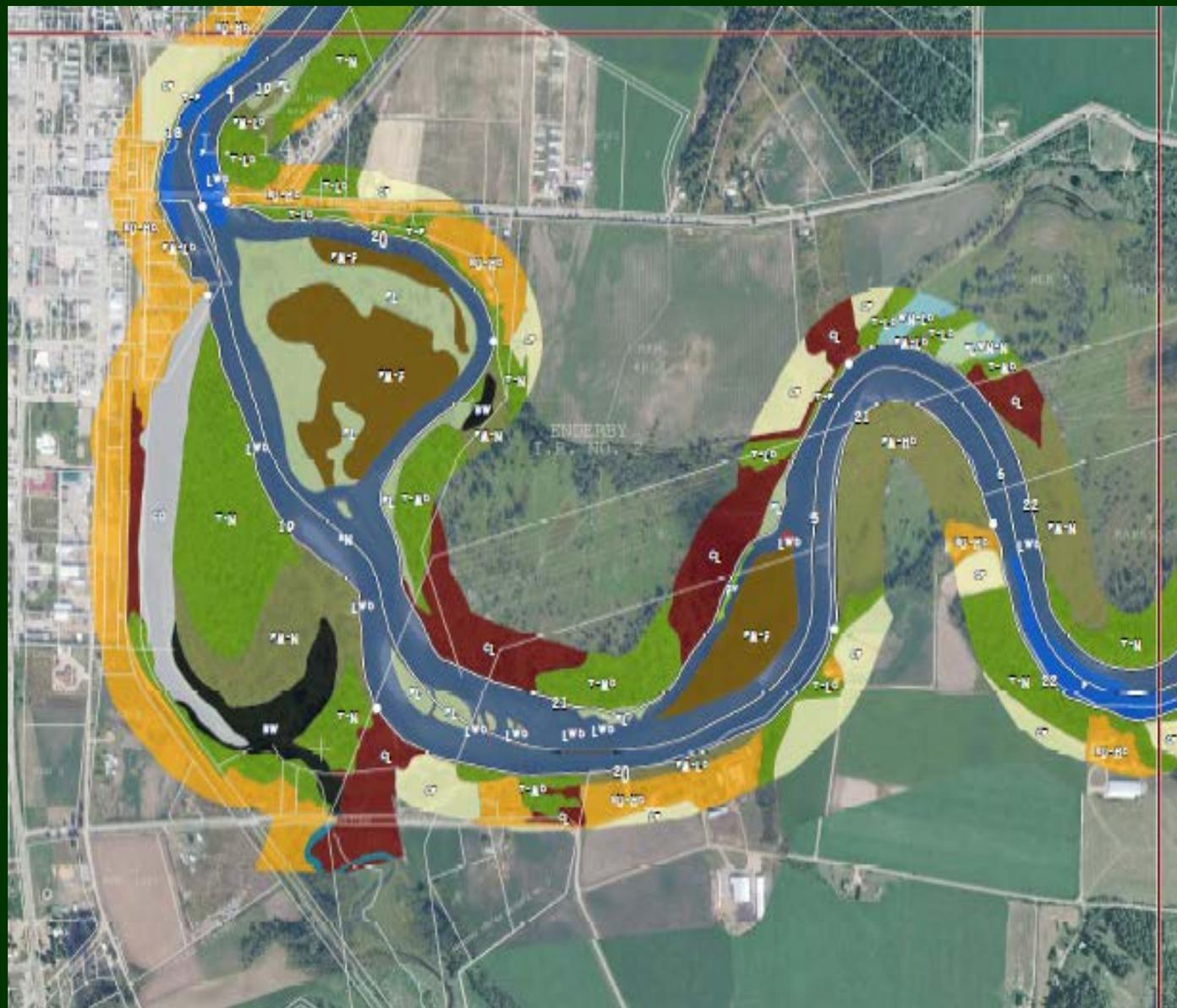
Legend

- Reach/Segment Break
 - Shuswap River Reach/Segment
- | | |
|---|--|
| Riparian Habitat Classification | Hydraulic and Instream Feature Classification |
| <ul style="list-style-type: none"> Beach (B) Cultivated Field (CF) Cleared (CL) Mid Flood Bench (FM) River (R) Rural (RU) Treed (T) Wetland (W) | <ul style="list-style-type: none"> Backwater (BW) Cascade (CA) Confluence (CO) Instream Vegetation (IV) Island (I) LWD (LWD) Low Bench Flood (FL) Pool (P) Rifle (RF) Riverine Marsh (RM) Run (RN) Side Channel (SC) |
- Riparian Habitat Classification Label - '10'
- Hydraulic and Instream Feature Classification Label - '10'

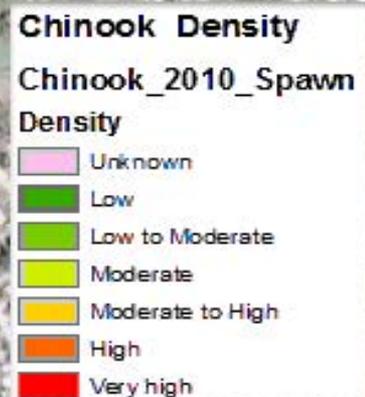
Riparian Habitat Classification Key	
Code	Qualifier
B	Beach
CF	Cultivated Field
CL	Cleared
FM	Mid Flood Bench
R	River
RU	Rural
T	Treed
W	Wetland
F	Fringe
HD	High Disturbance
MD	Moderate Disturbance
LD	Low Disturbance
N	Natural



1 : 5,000



River_Na: Chinook
Species: South Thompson River
Hold_spawn: Spawning
Density: Very high
Area_m2: 22967.2665419
Notes: Except on clay intrusions
Notes2: 2010 Spawning
Consultant: Digitized from:
South_Thompson_2008_20cm_east_mosaic.ecw
Source: Golder Associates Ltd.



Sockeye	River Name	Species	Type	Area Summary (m²)
	Adams River	Sockeye	Spawning	444,557
	Eagle River	Sockeye	Spawning	634,252
	Middle Shuswap R.	Sockeye	Spawning	634,769
	Seymour River	Sockeye	Spawning	531,061
	South Thompson R.	Sockeye	Spawning	29,053

Sockeye combined total:

2,273,692



Photo Plate. 1928 georeferenced air photo (left) and 2007 orthophoto (right) showing alluvial fans of Brash Creek and Ashton Creek. The white line indicates the channel limits of the Lower Shuswap River in 2007.

Public Education and Awareness Tool



Aquatic Habitat Index

What is it?

AHI is an index used to describe shoreline sensitivity / condition:

1. Biophysical Characteristics (e.g., shore type, substrates, etc.)
2. Fisheries Information (e.g., Juvenile Rearing Areas, Shore Spawning, etc.)
3. Riparian Condition
4. Modifications

AHI provides a basis of comparison to understand areas of higher relative sensitivity

Aquatic Habitat Index

Index Values

Category	Criteria	Maximum Point	Percent of the Category	Percent of the Total	Logic	Uses Weighted FIM Data	Value Categories
Biophysical	Shore Type	15	31	10	% of Segment * Shore Type Value	Yes	Stream Mouth = Wetland (15) > Gravel Beach = Rocky Shore (12) > Sand Beach (8) = Cliff /Bluff (8), Other (5)
	Substrate	12	25	8	% Substrate * Substrate Value	Yes	Cobble (12) > Gravel (10) > Boulder = Organic = Mud = Marl (8), Fines = Sands (4) > Bedrock (2)
	Percentage Natural	5	10	3	% Natural * Natural Score	No	
	Aquatic Vegetation	5	17	6	% Aquatic Vegetation * Aquatic Vegetation Score	No	
	Overhanging Vegetation	4	8	3	% Overhanging Vegetation * Overhanging Vegetation Score	No	
	Large Woody Debris	4	8	3	# of Large Woody Debris/km * Relative Value * LWD Score	No	Relative Value >15 LWD/km = 1 > 10 to 15 LWD / km = 0.8 > 5 - 10 LWD/km = 0.6 > 0 - 5 LWD/km = 0.4 > 0 LWD/KM = 0

Mapsheet - 7

Mabel Lake Foreshore Inventory and Mapping

Location: Mabel Lake
 Project No: 09-455
 Prepared for: Department of Fisheries and Oceans
 Prepared by: Ecoscape Environmental Consultants Ltd.
 Drawn by: Robert Wagner
 Checked by: Jason Schaepe
 Project: NAD83 - TM Zone 11
 Date: November 18, 2010

Legend

- Foreshore Inventory and Mapping (FIM) Segment Number
- FIM Segment Break
- Cadastre
- Boat Launch
- Gravel
- Landslide
- Rail
- Creek / River Mouth
- Aquatic Habitat Index Rating
- Very High
- High
- Moderate
- Low
- Very Low
- Emergent Vegetation (EV)
- Floating Vegetation (FV)
- Low Flood Bench (LFB)
- Marsh (M)
- Mid Flood Bench (MFB)
- Overlapping Vegetation (OV)
- Sparse Emergent Vegetation (SEV)
- Sparse Floating Vegetation (SFV)
- Submerged Vegetation (SV)

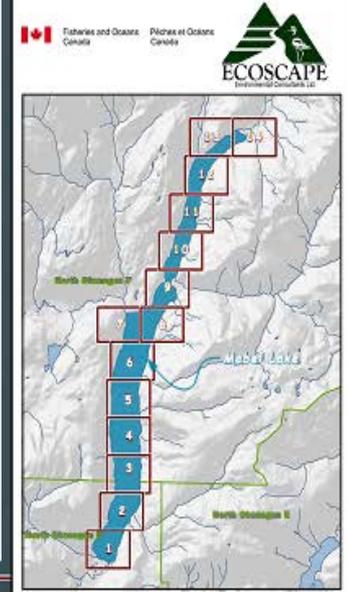
0 50 100 150 200 250 300 350 400 450
 Meters
 1 : 5 0 0 0



Segment Number: 60
 Habitat Index Rating: High
 Shore Type: Stream Mouth
 Land Use: Single Family
 Level of Impact: High (>40%)
 Juvenile Rearing: High
 Staging: Yes
 Migration: Yes
 Mussel Presence: Yes

Segment Number: 59
 Habitat Index Rating: High
 Shore Type: Sand
 Land Use: Single Family
 Level of Impact: High (>40%)
 Juvenile Rearing: High
 Staging: Yes
 Migration: Yes
 Mussel Presence: Yes

Segment Number: 58
 Habitat Index Rating: Moderate
 Shore Type: Sand
 Land Use: Commercial
 Level of Impact: High (>40%)
 Juvenile Rearing: High
 Staging: Yes
 Migration: Yes
 Mussel Presence: Yes



Fisheries and Oceans Canada
 Ecoscape Environmental Consultants Ltd.

Purpose

1. To develop a risk based framework following existing legislation for activities that may impact fish and/or fish habitats along the shore line that all agencies can follow

Advantages

1. Clearly outlines the regulatory framework and review process for different activities and their associated risks.
2. Allows activities that pose a lower risk to fisheries resources to proceed faster by reducing regulatory review requirements (i.e., professional reliance/BMP model)
3. Focuses review efforts on activities that pose a high risk to fish and aquatic habitats.

Definitions for Very High & High Risk Activities

Very High

- Pose very high risk of harm to fish habitat.
- Most works will require authorization under *Fisheries Act* to legally proceed.
- Significant challenges to prevention of harm through relocation, redesign and mitigation measures or to compensation for fish habitat losses that may occur.
- Professional planning and assessment is required; costs to the proponent may be high.
- Mitigation and compensation costs to the proponent may be high.
- DFO review is required and may determine the risk of harm to fish habitat is unacceptable and not grant *Fisheries Act*, section 35(2) authorization

High

- Pose high risk of harm to fish habitat.
- Many works will require authorization the *Fisheries Act* to legally proceed.
- Include significant challenges to prevention of harm through relocation, redesign and mitigation measures or to compensation for fish habitat losses that may occur.
- Professional planning and assessment is required; costs to the proponent may be high.
- Mitigation and compensation costs to the proponent may be high.
- DFO review is required and may determine the risk of harm to fish habitat is unacceptable and not grant *Fisheries Act*, section 35(2) authorization

Definitions

Moderate

- Pose moderate risk of harm to fish habitat.
- Some works will require authorization the *Fisheries Act* to legally proceed.
- Harm to fish or fish habitat can usually be prevented with mitigation measures
- Professional planning and assessment is required; costs to the proponent may be high.
- Mitigation and compensation costs to the proponent may be high.
- DFO review is not required if a QEP certifies and documents that harm to fish habitat will not occur if works proceed as planned
- Notify DFO 10 working days before starting your work including certification of no harm to fish habitat by a qualified environmental professional.
- DFO review is required if a QEP cannot certify and document that harm to fish habitat will not occur if works proceed as planned

Low

- Pose low risk of harm to fish habitat.
- Harm to fish habitat can usually be prevented if BMPs followed
- Supervision of works by a qualified environmental professional is recommended
- DFO review is not required if works follow endorsed BMPs
- Project proponents are responsible for ensuring provisions of *Fisheries Act*.
- Notify DFO 10 working days before starting your work

Shuswap Watershed Activity Risk Matrix

Water Withdrawal and Use						
Activity	Activity Risk by Known Shore Spawning Location and Rank					
	Known Sockeye Spawning One Location¹	Very High (16% of total shore length)	High (20% of total shore length)	Moderate (26% of total shore length)	Low (34% of total shore length)	Very Low (4% of total shore length)
Waterline - directional drilling	H	H	M	DFO Pacific : Directional Drilling		
Waterline - open excavation	VH	VH	VH	H	M	L
Geothermal heating/cooling - commercial, industrial, strata or multi-family	VH	VH	VH	H	H	H
Geothermal heating/cooling - single family residence	VH	VH	H	M	M	M

Shuswap Watershed Activity Risk Matrix

<i>Docks, Marinas, and Erosion control</i>						
<i>Activity</i>	<i>Activity Risk by Known Shore Spawning Location and Rank</i>					
	<i>Known Sockeye Spawning One Location</i>	<i>Very High (16% of total shore length)</i>	<i>High (20% of total shore length)</i>	<i>Moderate (26% of total shore length)</i>	<i>Low (34% of total shore length)</i>	<i>Very Low (4% of total shore length)</i>
<i>Docks</i>	<i>Design and Assessment Flow Chart for Private Moorage on the Mabel Lake System⁴</i>					
<i>Marinas</i>	<i>Design and Assessment Flow Chart for Commercial and Strata Moorage on the Mabel Lake System⁴</i>					
<i>Erosion Control</i>	<i>Design and Assessment Flow Chart for Lakeshore Erosion Control on the Mabel Lake System⁴</i>					
<i>Land Development (within 30 m of HWL)</i>	<i>BC Fish Protection Act, Riparian Areas Regulation³</i>					

1. A baseline inventory of Shuswap & Mabel Lake and the Lower Shuswap River has been completed
2. An Aquatic Habitat Index has identified sensitive habitats and restoration opportunities
3. A risk assessment for shoreline developments has been generated for Shuswap & Mabel Lake
4. An integrated approach to shoreline management has been developed by SLIPP
5. The shoreline policies alleviate the need for review by DFO in cases where risks are low enough they can proceed with a QEP and following BMPs
6. High risk activities still require review by DFO prior to proceeding
7. Data gaps have been identified and require STAD & other expert support.
8. SLIPP Education, Outreach, Restoration and Enforcement Activities are Progressing.

Observations

- Development and urban impacts to Foreshore and Riparian areas around CL similar to those found in BCI
- Ask do you have all the needed participant representatives on the CWB & Technical Committees i.e. Timber West, Waterfront Owners Association, Realtors, Contractors, TC
- Consider the need for an interagency technical committee to manage cross-agency development applications and lake issues
- Complete Step 1 FIM for Cowichan Lake including riparian area digitizing and report out to CWB, public, waterfront owners and Timber West
- Participate in discussions regarding modifications to Step 2 AHI
- Consider developing a recreation management plan for Cowichan Lake and River
- Consider establishing a coordinated annual education, compliance and enforcement planning process. Are C&E and CO staff available to work on Water Act Section 9 un authorized works. BMP delivery to waterfront owners
- What is TimberWest's position on environmental stewardship of the Cowichan Lake bed, trespass by upland owners and liability of un authorized structures on their property.
- Has the LOG considered foreshore zoning to control the future type, design and scale of new works. i.e CSRD dock and buoy regulations
- Complete needed fish inventories and or complete literature reviews. i.e. Shuswap Lake sockeye foreshore use, Okanagan Lake impacts of docks on shore spawning kokanee
- Consider modified SHIM for Cowichan River & AHI restoration analysis

Questions?

