Level 1 Fisheries Habitat Assessment

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- InStream Fisheries Research Inc.

2014

Level 1 Fisheries Habitat Assessment

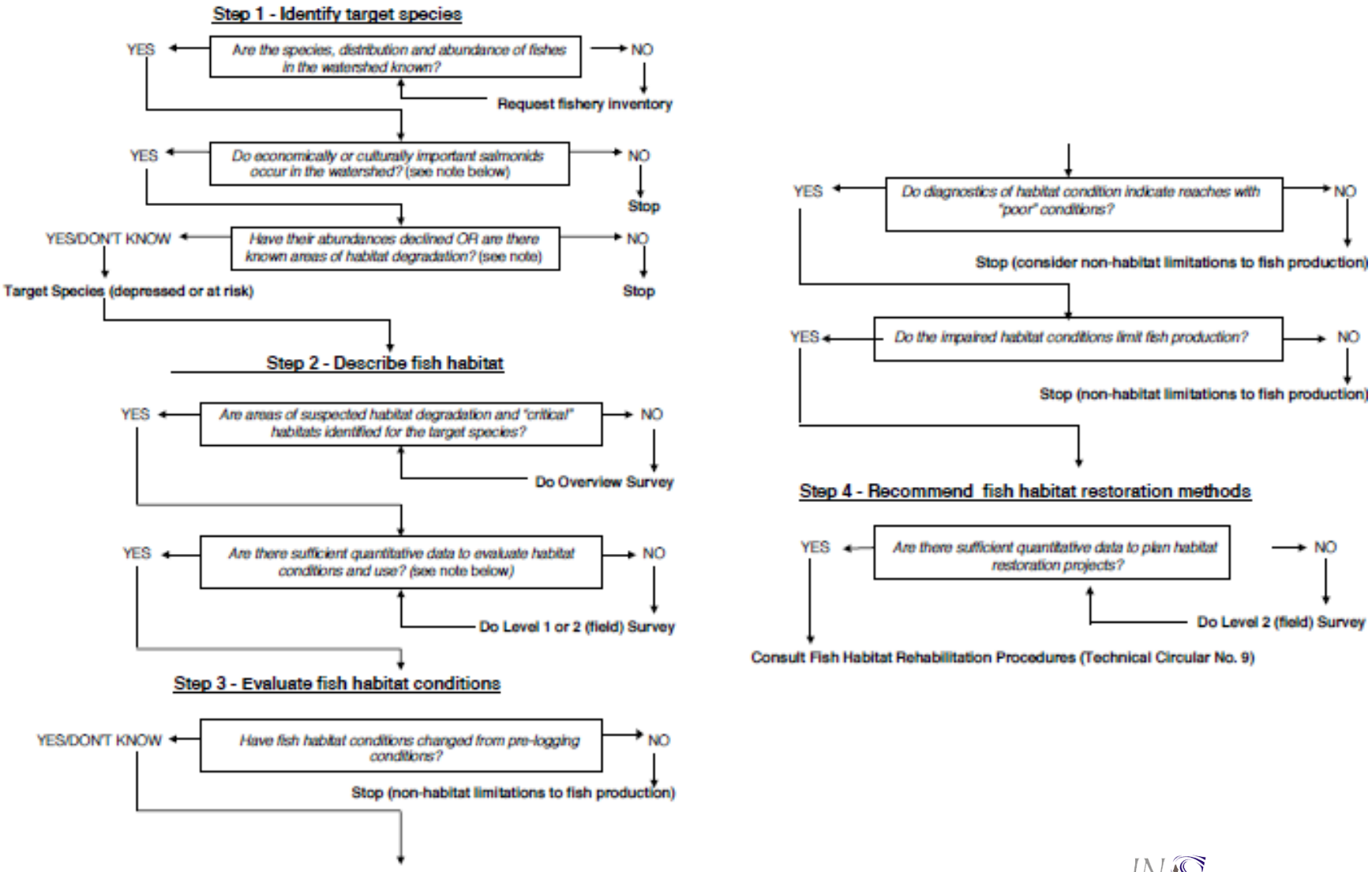
- The Watershed Restoration Program (WRP) was a provincial initiative undertaken for the restoration of lands impacted by past forest practices.
- A series of technical circulars were produced to assist in planning watershed restoration projects
- Johnson, N.T. and P.A. Slaney. 1996. Fish Habitat Assessment Procedures. Watershed Restoration Technical Circular No. 8.

Baseline Assessment Procedure

- Allows identification of opportunities to increase depressed stocks of salmonids in streams

1. Overview summary: existing information from maps, reports, databases, etc.
2. Reconnaissance Level 1 1Survey
3. Detailed site-specific Level 2 survey

Figure 1 - Flowchart of the fish habitat assessment process (see notes below).



Level 1 Fisheries Habitat Assessment

- Background Information:

Identify the watershed

Watershed code

Topographic maps

The Fisheries Information Summary System (FISS) provides spatially represented summary level fish and fish habitat data for waterbodies throughout British Columbia and the Yukon

EcoCat provides access to digital reports and publications, and their associated files such as maps, datasets, and published inventory information.

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Level 1 Fisheries Habitat Assessment

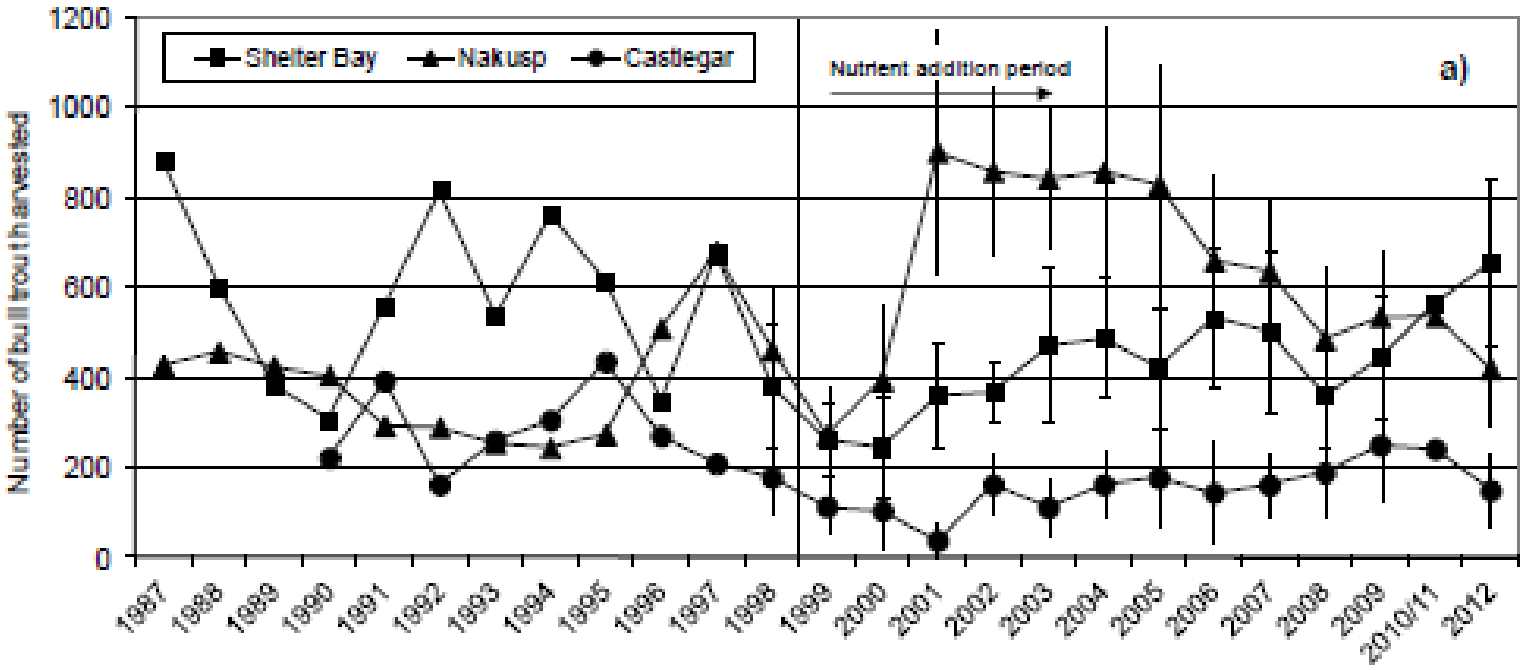
- Background Information:

- Identify the target species: Pacific salmon, kokanee, resident or anadromous trout and/or char

Level 1 Fisheries Habitat Assessment

- Background Information:

- Summarize trends in abundance from existing information



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Level 1 Fisheries Habitat Assessment

- Background Information:

- Establish stream reaches: homogeneous section of stream characterized by uniform discharge, gradient, channel morphology, channel confinement, and streambed and bank materials

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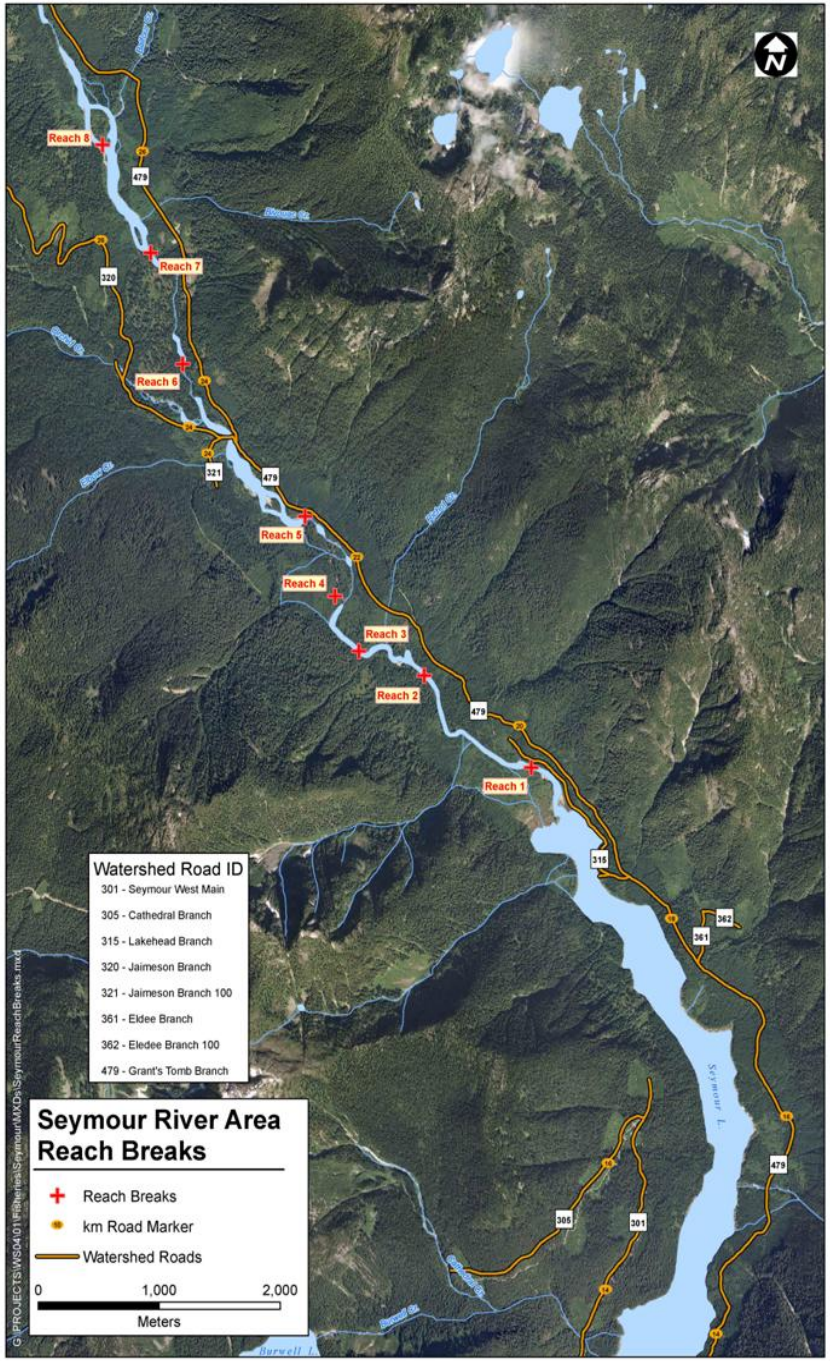
Reach 8
Reach 7
Reach 6
Reach 5
Reach 4
Reach 3
Reach 2
Reach 1
479
320
321
316
362
361
305
301
Seymour R.
Seymour L.
Burwell L.
Watershed Road ID
301 - Seymour West Main
305 - Cathedral Branch
315 - Lakehead Branch
320 - Jaimeson Branch
321 - Jaimeson Branch 100
361 - Eldee Branch
362 - Eledee Branch 100
479 - Grant's Tomb Branch
Seymour River Area
Reach Breaks
Reach Breaks
km Road Marker
Watershed Roads
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1,000
2,000
Meters
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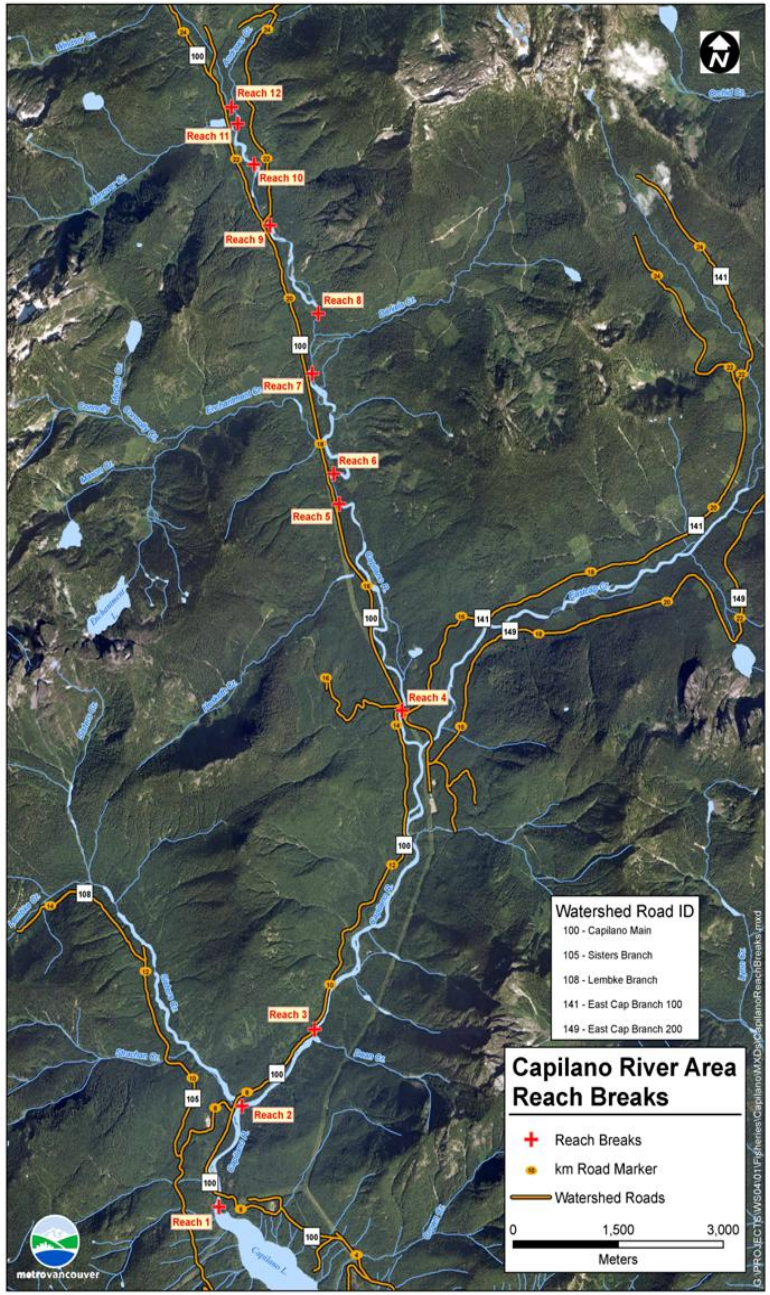
Reach 12
Reach 11
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Reach 6
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Reach 3
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Reach 1
100
141
149
108
105
Capilano R.
Capilano L.
Watershed Road ID
100 - Capilano Main
105 - Sisters Branch
108 - Lembke Branch
141 - East Cap Branch 100
149 - East Cap Branch 200
Capilano River Area
Reach Breaks
Reach Breaks
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Watershed Roads
0
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Level 1 Fisheries Habitat Assessment

- Background Information:

- Identify critical or heavily-used reaches
- Identify areas of special concern (e.g potential barriers)

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Level 1 Fisheries Habitat Assessment

- Background Information:

- Identify the target species: Pacific salmon, kokanee, resident or anadromous trout and/or char
- Summarize trends in abundance from existing information
- Establish stream reaches: homogeneous section of stream characterized by uniform discharge, gradient, channel morphology, channel confinement, and streambed and bank materials
- Identify critical or heavily-used reaches
- Identify areas of special concern (e.g potential barriers)

Level 1 Field Assessment

Provides the quantitative information needed initially to define and plan restoration projects

By using existing and overview information, you can usually restrict the level 1 field survey to a relatively small portion of the watershed where habitat information will be useful in defining opportunities for effective restoration projects

Level 1 Field Assessment

Provides the quantitative information needed initially to define and plan restoration projects

The habitat features of particular importance are:

1. **adult holding pools**
2. spawning gravel quantity and quality
3. (rearing) pool area and frequency
4. cover in pools and riffles
5. LWD frequency and distribution
6. substrate characteristics of the stream bed
7. off-channel habitat
8. nutrient concentrations during the summer growing season

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7. off-channel habitat
8. nutrient concentrations during the summer growing season


16
11
8
5.6
4
2.8
2
22.6
32
45
64
90
128
250

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8. **nutrient concentrations during the summer growing season**

IN STREAM

Level 1 Field Assessment

Provides the quantitative information needed initially to define and plan restoration projects

To evaluate habitat conditions, the level 1 assessment compares the values of the above habitat features within the reach to expected values. If watershed or regional criteria for habitat conditions do not exist, then use the diagnostic criteria of TABLE 5 to evaluate conditions in the reach

Table 5. Diagnostics of salmonid habitat condition at the reach level (from Anonymous 1993); see notes below.

Habitat Parameter	Gradient or W_b Class	Use	Quality		
			Poor	Fair	Good
Percent pool (by area)	<2 %, < 15 m wide	Summer/winter rearing habitat	< 40 %	40 - 55%	> 55 %
Percent pool (by area)	2-5 % , < 15 m wide	Summer/winter rearing habitat	< 30 %	30 - 40 %	> 40 %
Percent pool (by area)	>5 % , < 15 m wide	Summer/winter rearing habitat	< 20 %	20 - 30 %	> 30 %
Pool frequency (mean pool spacing)	<2 %, < 15 m wide	Summer/winter rearing habitat	> 4 channel widths per pool	2 - 4 channel widths per pool	< 2 channel widths per pool
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LWD pieces per bankfull channel width	all	Summer/winter rearing habitat	< 1	1 - 2	> 2
% wood cover in pools	< 5 %, < 15 m wide	Summer/winter rearing habitat	most pools in low category 0 - 5 %	most pools in moderate category 6 - 20 %	most pools in high category > 20 %
Boulder cover in gravel-cobble riffles	all	Summer/winter rearing habitat	< 10 %	10 - 30 %	> 30 %
Overhead cover	all	Summer/winter rearing habitat	< 10 %	10 - 20 %	> 20 %
Substrate	all	Winter rearing habitat	interstices filled: sand or small gravel subdominant in cobble or boulder dominant	interstices reduced: sand subdominant in some units with cobble or boulder dominant	interstices clear: sand or small gravel rarely subdominant in any habitat unit

Level 1 Field Assessment

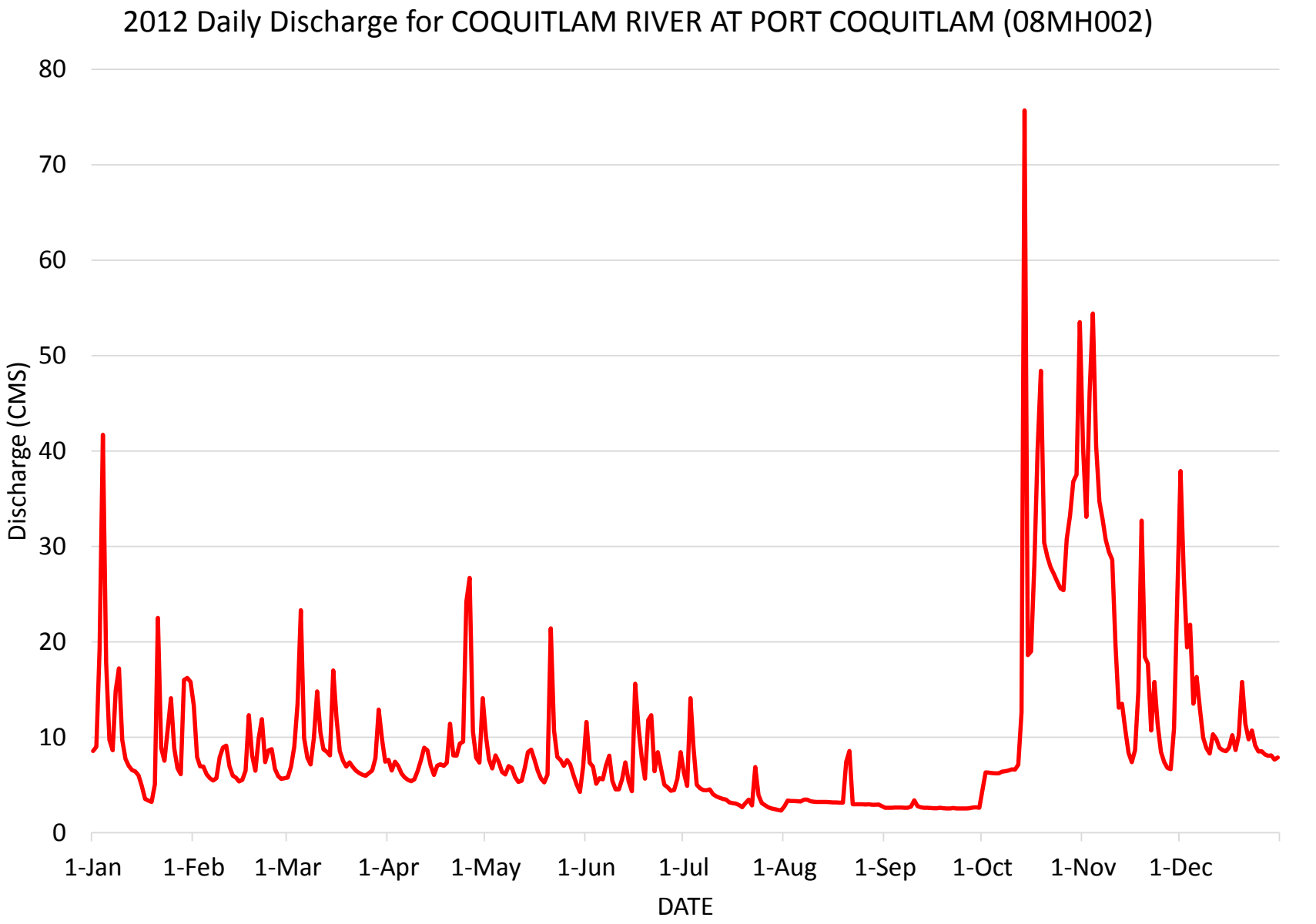
Pre-Survey Planning:

- survey locations and scope
- the survey design
- survey methods
- access and transportation constraints
- required permits and operational regulations
- training and safety issues
- the roles and responsibilities of the field crew

Level 1 Field Assessment

Pre-Survey Planning:

Because habitat characteristics may vary with discharge, do the survey under summer base flow conditions. Examine seasonal discharge patterns for the stream or for nearby streams from Water Survey of Canada discharge records to identify likely base flow conditions. Avoid doing surveys during changes in flow conditions (e.g., after a rainstorm or during snowmelt). Be aware of regional timing windows for instream fisheries work that might affect your survey


2012 Daily Discharge for COQUITLAM RIVER AT PORT COQUITLAM (08MH002)
Discharge (CMS)
80
70
60
50
40
30
20
10
0
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
DATE

Level 1 Field Assessment

Habitat Unit Type:

The level 1 fish habitat assessment divides each stream reach into strata consisting of distinct, naturally-occurring habitat units

The habitat units distinguished in a level 1 assessment are:

- **pools (both scour pools and dammed pools)**
- non-turbulent fast-flowing water (glides, broadly defined),
- turbulent fast-flowing water (riffles, broadly defined),
- cascades (higher-gradient "riffles"), and
- other (wetland complexes that lack an identifiable primary channel, sloughs, lakes, areas of sub-surface flow, or areas where the channel cannot be observed (e.g., under large log jams)

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Level 1 Field Assessment

Habitat Unit Type: POOLS

Pools are areas of (relatively) slower, deeper water with a concave bottom profile, finer sediments, and a water surface gradient near 0%

The residual depth is the difference between the maximum pool depth and the depth at the pool outlet, and approximates the pool depth at zero flow

Maximum depth in m (± 0.05 m) at the deepest point

Riffle crest depth in m is the water depth measured at the riffle crest (i.e., at the pool overflow or pool control element) of the pool.

Pool-like habitat units must have both the following minimum dimensions

Bankfull Channel Width (m)	Minimum Area (m^2)	Minimum Residual Depth (m)
0 - 2.5	1.0	0.20
2.5 - 5	2.0	0.40
5 - 10	4.0	0.50
10 - 15	6.0	0.60
15 - 20	8.0	0.70
> 20	10.0	0.80

Level 1 Field Assessment

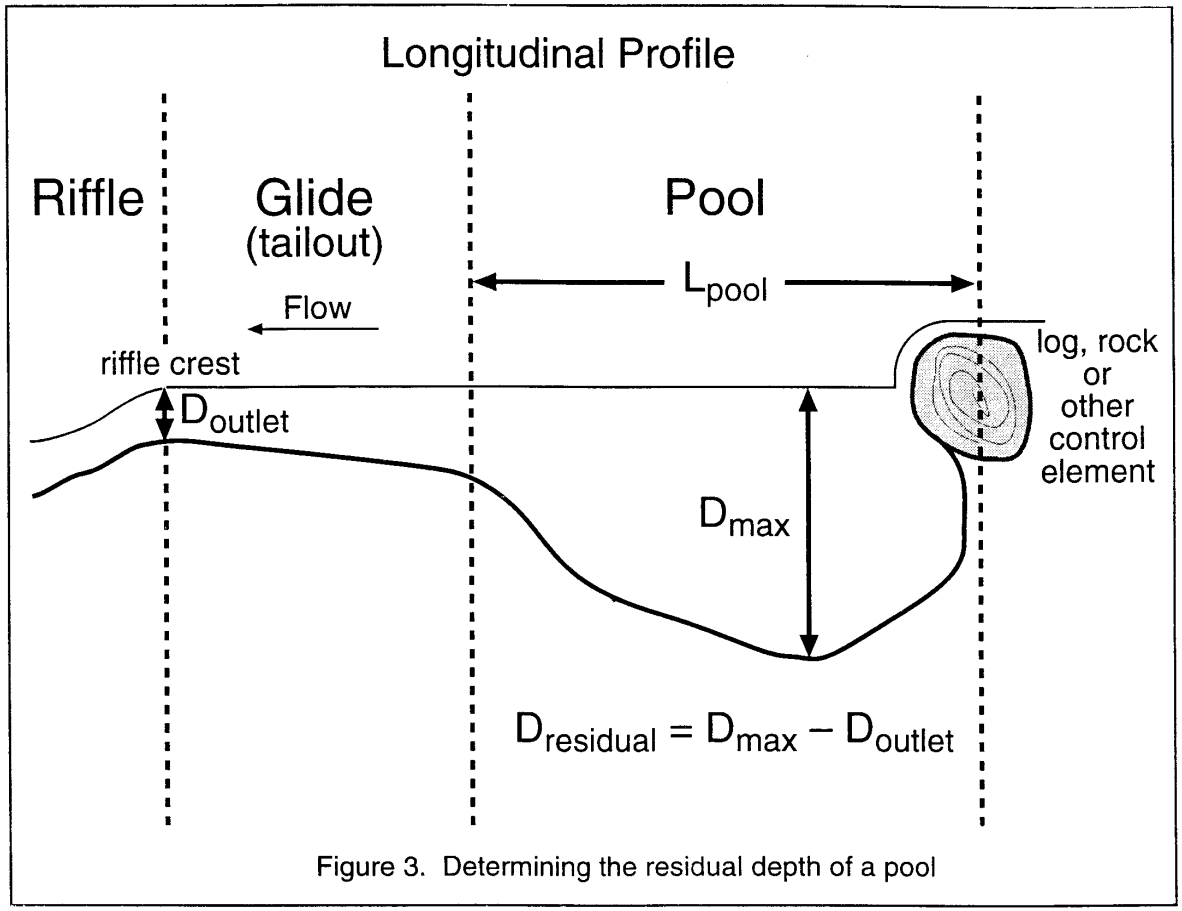

Figure 3. Determining the residual depth of a pool

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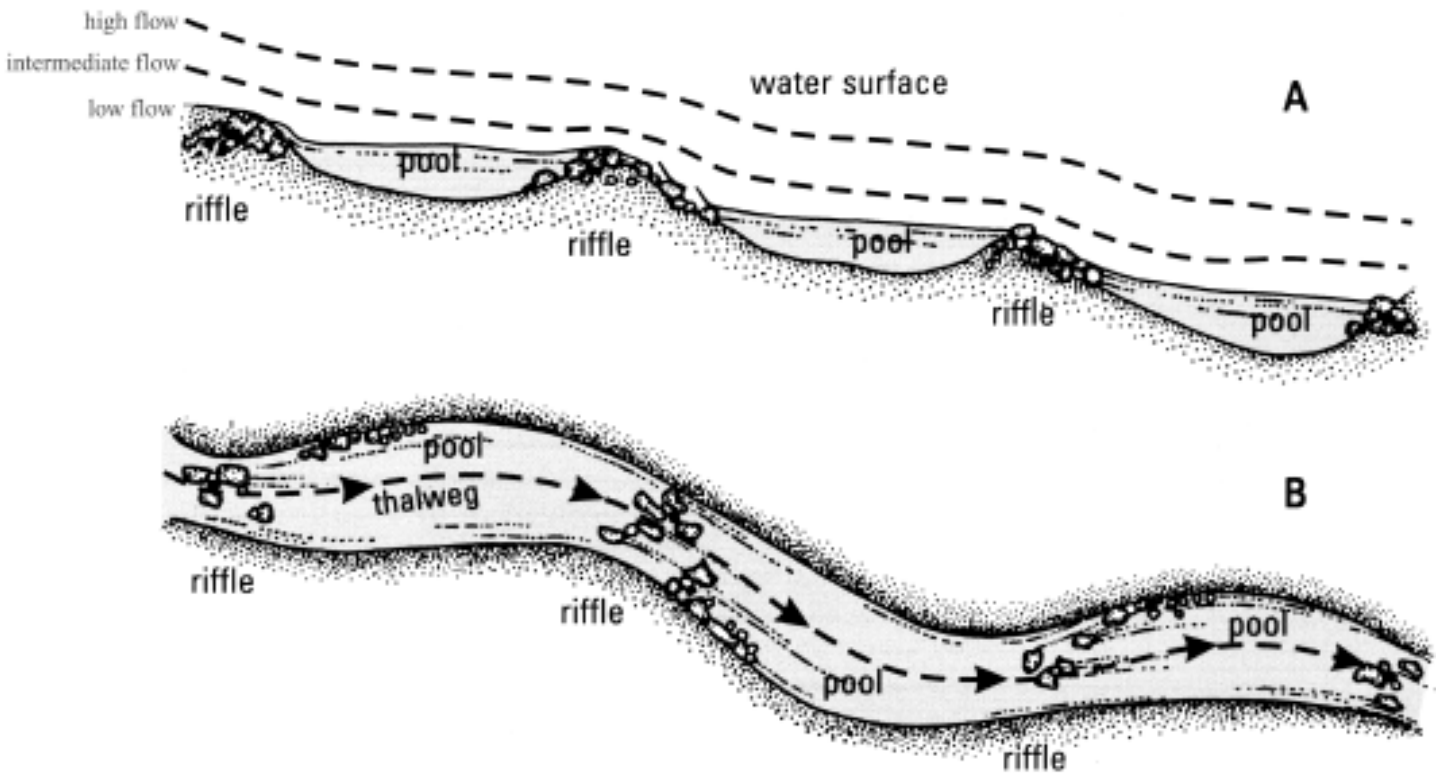
Habitat Unit Types:

RIFFLES are areas of turbulent, fast-flowing water. In alluvial reaches, they are commonly shallow, moderate-gradient areas with gravel or cobble substrates, bed material projecting above the water surface, and with obvious surface turbulence.

GLIDES include all areas of fast-flowing, non-turbulent water. Glides (and riffles) have relatively flat bottoms in cross-section. Pool tailouts, the elongated transitional zone of moderately-shallow, flat-bottomed water with smooth, laminar flow that occur between pools and riffles in low-gradient channels, are a common form of glide.

CASCADES are steep, stepped "riffles" of bedrock or emergent cobble or boulders in channels with gradients greater than about 4%


high flow
intermediate flow
low flow
water surface
A
pool
riffle
riffle
pool
riffle
pool
pool
thalweg
B
riffle
riffle
pool
pool
riffle

Level 1 Field Assessment

Survey Methods:

Level 1 fish habitat surveys require the following equipment:

1. fibreglass surveyor's tape (50 m length)
2. surveyor's rod or metre stick (0.01m divisions)
3. clinometer or Abney level
4. hip chain (metre divisions)
5. 1:20,000 (or larger) map
6. handheld Geographic Positioning System (GPS) unit
7. thermometer (or recording thermograph)
8. clip board
9. level 1 habitat survey forms
10. waterproof field note book
11. pencils
12. camera and film
13. first aid equipment
14. optical or electronic rangefinder (optional)
15. flow meter (optional).

Page_____of_____ **LEVEL 1 – HABITAT SURVEY DATA FORM** **INSTREAM FISHERIES RESEARCH**

Date:	Crew:	Daily Discharge (WSC):
Watershed	Start NTU:	
Stream/Sub-basin:	End NTU:	Weather:
Reach:	Survey Direction (U/D):	Camera Used:

Unit#	Hab. Unit		Length	Grad	Mean Depth (cm)		Mean Width (m)		Pool Depths (cm)			
	Type	Cat	(m)	%	Bank	Wet	Bank	Wet	Max.	Crest	Res.	Type

Unit#	Bed Material					Total LWD	Functional LWD			Cover				Off-channel Hab.			
	Dom	Sub	Spawn		D-90		10-20	20-50	>50	Type	%	Type	%	Type	Access	Length	Width

*F < 2mm, SG 2-16mm, LG 16-64mm, SC 64-128mm, LC 128-256mm, B 256-4000mm, Bedrock < 4000mm

Unit#	Disturbance Indicators Type & Length			Riparian Vegetation			Useable Area		Velocity	Photo#		Comments (use back if need)
				Type	Structure	Closure				U/S	D/S	

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Level 1 Field Assessment

General Information:

You will have the gazetteered name and watershed code from your Overview Assessment. Note weather conditions and other factors that might affect the survey

Record the habitat unit type for sampled units as:

- P = pool
- G = glide
- R = riffle
- C = cascade, or
- O = other. Record the nature of the “other” habitat unit in the comment field.

Level 1 Field Assessment

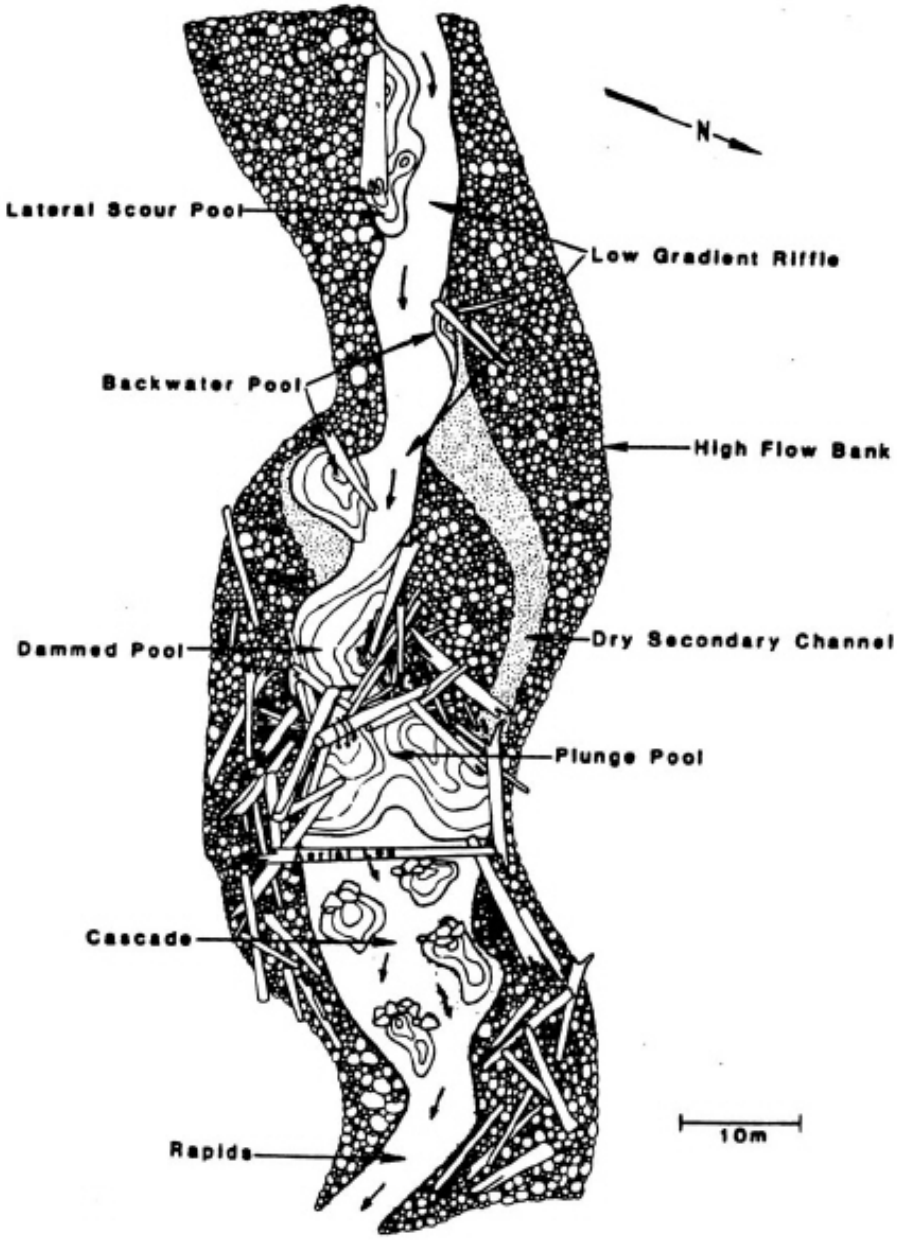
Habitat Survey Data Form:

Habitat Unit Category

You should distinguish habitat units in secondary channels or small habitat units that do not span the main channel from major habitat units in the main channel. Do not neglect secondary channels; they are often important habitats for juvenile fish. Categorize habitat units as:

1 = primary habitat units. Primary units are habitat units in the main stream channel which occupy more than 50% of the wetted width.

2 = secondary habitat units. Secondary units occur in minor channels that are isolated from the main channel by a vegetated island with perennial plants greater than 1 metre in height. In braided reaches, where many secondary channels occur, record only the habitat units in the dominant channels and note that the channel is braided.


N
Lateral Scour Pool
Low Gradient Riffle
Backwater Pool
High Flow Bank
Dammed Pool
Dry Secondary Channel
Plunge Pool
Cascade
Rapids
10m

Level 1 Field Assessment

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3 = tertiary habitat units. Tertiary units are significant, identifiable habitat units within the main stream channel that meet the minimum size criteria but which occupy less than 50% of the wetted width (e.g., they are embedded within a larger habitat unit, or are separated from the primary unit by an obstruction or a gravel bar that lacks perennial vegetation). In a level 1 survey you would normally distinguish only those tertiary units that are significant as fish habitat (e.g., deep lateral scour pools); otherwise combine them with the larger adjacent unit that meets the minimum size criterion.

Level 1 Field Assessment

Habitat Survey Data Form:

Length (m)

Measure the length along the thalweg of the habitat unit in metres, using a calibrated surveyor's tape (or laser). If the thalweg is not accessible (e.g., because of water depth), take the length measurement at mid-point on the unit's boundary. For sinuous units, take the length as the sum of straight-line lengths along the thalweg

Gradient (%)

Use a clinometer or Abney level to measure the gradient (± 0.5%) of the water surface over the habitat unit. Mark the surveyor's rod at the eye level of the measurer. The rod man holds the surveyor's rod vertical at the far boundary of the habitat unit while the measurer sights the clinometer on this mark to make the gradient measurement

Level 1 Field Assessment

Habitat Survey Data Form:

Mean Water Depth (m)

Determine the mean depth (± 0.05 m) of the habitat unit by averaging 3 depths taken ¼, ½, and ¾ of the distance across a transect perpendicular to the flow at a "representative" site within the habitat unit

Survey multiple sites if the water depth is highly varied in a unit

Bankfull Water Depth (m)

Measure the vertical distance (± 0.05 m) from a horizontal line at the height of the bankfull width to the water surface at the "representative" site at which you measured the bankfull width

The presence of rooted vegetation often indicates the extent of bankfull width

Level 1 Field Assessment

Habitat Survey Data Form:

Mean Wetted Width, Ww (m)

Measure the wetted width (± 0.1 m) of the habitat unit as the horizontal distance perpendicular to the channel axis from water's edge on one side to water's edge on the opposite side at the "representative" site used above to determine mean depth

Mean Bankfull Channel Width, Wb (m)

Measure the bankfull channel width (± 0.1 m) at a "representative" site as the horizontal distance perpendicular to the channel axis between the tops of the streambanks on opposite sides of the stream

- do not include vegetated islands (i.e., islands with perennial terrestial vegetation more than 1 metre in height). If multiple channels are separated by vegetated islands, sum the separate bankfull channel width measurements

Level 1 Field Assessment

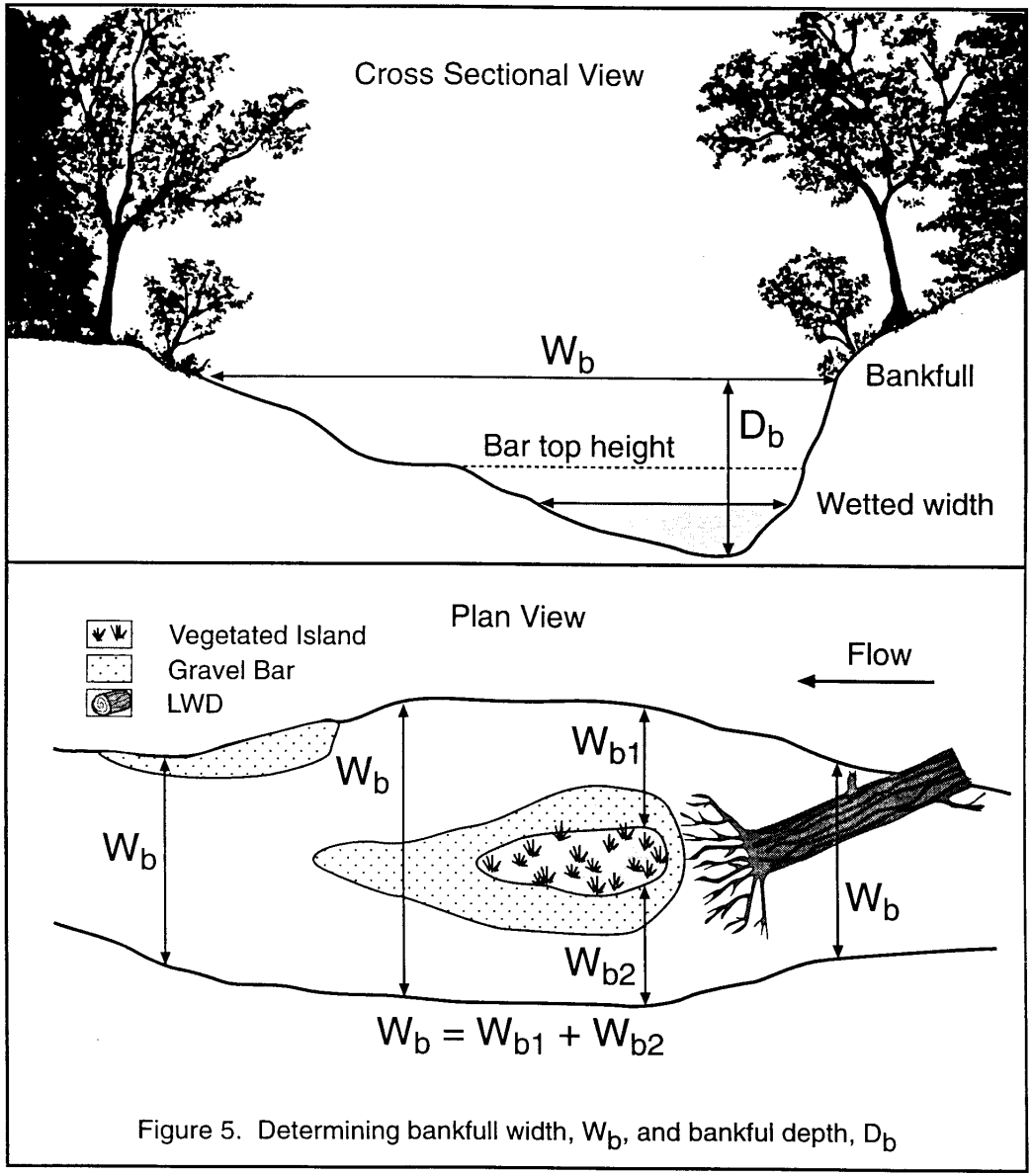

Figure 5. Determining bankfull width, W_b, and bankful depth, D_b

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Level 1 Field Assessment

Habitat Survey Data Form:

Maximum Pool Depth (m)

For pools, measure (or estimate, if necessary) the maximum water depth (± 0.05 m).

Riffle Crest (Pool Outlet) Depth (m)

For pools, measure the water depth (± 0.05 m) at the pool outlet

Residual Depth (m)

Calculate the residual depth (± 0.05 m) of the pool as the difference between the maximum pool depth and the riffle crest depth (or pool outlet depth). Note that pools must meet both minimum surface area and minimum residual depth criteria to be counted.

Level 1 Field Assessment

Habitat Survey Data Form:

Pool Type

Record the pool type as:

S = scour pool, formed by scouring around or adjacent to an obstruction such as a log, boulder, or root wad or by flow convergence where two channels join

D = dammed pool, formed by impoundment behind a channel spanning obstruction such as a beaver dam, log, or log jam

U = unknown (unable to classify)

Level 1 Field Assessment

Habitat Survey Data Form:

<u>Dominant and Sub-Dominant Bed Materials</u>

Estimate and record the size-class of the substrate material that covers the largest proportion (dominant) and the second-largest proportion (subdominant) of the habitat unit. Categorize substrates as:

- F = sands, silts, clays or fine organic material (< 2 mm diameter)
- SG =small gravels (2 - 16 mm)
- LG =large gravels (16 - 64 mm)
- SC = small cobble (64 - 128 mm)
- LC = large cobbles (128 - 256 mm)
- B = boulders (256 - 4000 mm)
- R = bedrock (> 4000 mm)


0
50
100
150
200
250
300
128
250
90
16
11
8
5.6
4
2.8
2
45
32
22.6

Level 1 Field Assessment

Habitat Survey Data Form:

Spawning Gravel Amount and Type

Spawning gravels are gravels that are located in areas where water depths greater than 15 cm and water velocities between about 0.3 and 1.0 $m \cdot s^{-1}$ are expected during the spawning season. For anadromous salmon, spawning gravel patches should be 1-2 m^2 in area with a particle size between about 10-150 mm. For (small) resident trout and char, spawning gravel patches should be greater than 0.1 m2 in area with a particle size between 10-75 mm. Pay particular attention to pool tailouts and riffle crests as potential spawning sites.

Record the presence of suitable spawning gravels for the target fish species as:

- N = no suitable gravel patches in the habitat unit
- L = little suitable spawning gravels (e.g., isolated pockets)
- H = extensive areas of spawning gravels

Record the type of spawning gravel as:

- R = suitable for resident trout and char
- A = suitable for anadromous salmon
- AR = suitable for both resident trout and anadromous salmon

Level 1 Field Assessment

Habitat Survey Data Form:

Large Woody Debris Tally

Large woody debris (LWD) is a piece of dead wood, having a diameter 10 cm or larger over a minimum 2 m length, that intrudes into the bankfull channel

Functional LWD

Influence channel geomorphology by causing scour or impoundment. Count as functional LWD only those LWD pieces that are the primary cause of the formation or geometry of a pool.

Tally functional LWD by three size classes (10-20 cm diameter, 20-50 cm diameter and > 50 cm diameter)

Level 1 Field Assessment

Habitat Survey Data Form:

Cover (% by type)

Cover is a structural element in the wetted channel or within 1 metre of the water surface that serves to visually isolate fish and/or to provide suitable microhabitats where fish can hide, rest or feed

Estimate the percentage of the total surface area of the habitat unit that is covered by the following cover types:

- SWD = small woody debris (i.e., smaller than the criteria given previously)
- LWD = large woody debris, as defined above
- B = boulders
- C = undercut banks
- DP = deep pool (i.e., the portion of a pool with a depth > 1 m)
- OV = overhanging vegetation within 1 metre of the water surface
- IV = instream vegetation
- O = other (i.e. rip-rap)

Level 1 Field Assessment

Habitat Survey Data Form:

Cover (% by type)

Record the percentage of the total surface area of the habitat unit for (up to) the three dominant cover types. Record the amount of cover as:

- N = no cover in the habitat unit,
- TR = cover element is present but likely comprises less than 2% of the habitat unit area, or
- Numeric value = the estimated percentage of the total area by cover type.

INSTREAM

Level 1 Field Assessment

Habitat Survey Data Form:

Off-channel Habitat

Record the presence of off-channel habitat that may be used by fish as refuges or rearing areas at high flows. Pay particular attention to relict channels in the adjacent floodplain which have been isolated by lateral movement of the stream and which could be re-connected to the stream as a restoration project.

Note any ground water flows within isolated sidechannels.

Level 1 Field Assessment

Habitat Survey Data Form:

<u>Off-channel Habitat</u>

Categorize off-channel habitat as:

- SC = sidechannels
- SL = sloughs (blind-ended channels)
- PD = off-channel ponds
- WL = seasonally-flooded wetlands

Measure or estimate the length and area of the off-channel habitat unit, and note fish access to the off-channel area as:

- N = no access to fish
- P = accessible only at high flows
- G = accessible at most flows

Level 1 Field Assessment

Habitat Survey Data Form:

Disturbance Indicators: Record type and length

Table 2. Indicators of recent channel disturbance

	Indicator Feature	Code
Bed Characteristics	1. Extensive areas of scour	
	2. Extensive areas of (unvegetated) bar	DW
	3. Large, extensive sediment wedges	WG
	4. Elevated mid-channel bars	MB
	5. Extensive riffle zones	LR
	6. Limited pool frequency and extent	FP
Channel pattern	1. Multiple channels (braiding)	MC
Banks	1. Eroding banks	EB
	2. Isolated sidechannels or backchannels	BC
LWD	1. Most LWD parallel to banks	PD
	2. Recently formed LWD jams	JM

Level 1 Field Assessment

Habitat Survey Data Form:

Riparian Vegetation Type

Record the dominant vegetation type in the riparian area within 20 m of the stream channel as:

- N = largely unvegetated, with much bare mineral soil visible
- G = grasslands or bog
- SH = shrub/herb, dominated by herbaceous or shrubby vegetation
- D = deciduous forest
- C = coniferous forest
- M = mixed deciduous-coniferous forest

Level 1 Field Assessment

Habitat Survey Data Form:

<u>Riparian Structural Stage</u>

Record the structural stage of the dominant vegetation in the adjacent riparian area as:

- INIT = the non-vegetated or initial colonization stage following disturbance, with less than 5% cover
- SHR = shrub/herb stage with less than 10% tree cover
- PS = pole-sapling stage, with trees overtopping the shrub layer, usually less than 15-20 years old
- YF = young forest. Self-thinning is evident and the forest canopy is differentiating into distinct layers. Stand age is typically 30-80 years
- MF = mature forest with well-developed understory

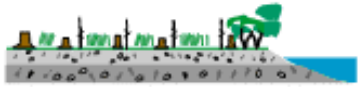
Year 300
Old forest

Proper functioning condition

Stands in proper functioning condition maintain all of the required riparian attributes necessary for sustained management of riparian ecosystems including: components of wildlife and fisheries habitat, channel stability, water quality and floodplain development.

Year 6
Shrub herb

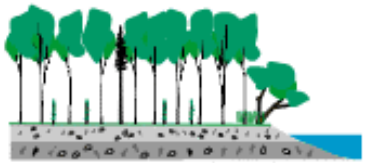
Past harvesting in riparian areas commonly removed all conifer and deciduous overstorey. These sites were often extensively disturbed by falling and yarding, road construction and burning. Rich, moist riparian sites are often invaded by rapidly growing shrubs and deciduous trees species that can lead to impaired riparian function.

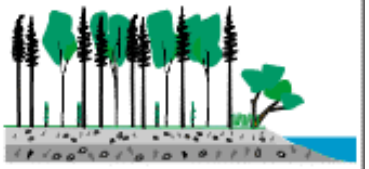


Deciduous dominated | **Mixed conifer/deciduous**

Year 25
Pole sapling

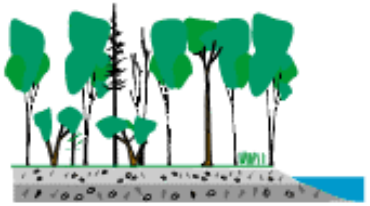
Re-establishing riparian function begins early. Sites dominant to deciduous crowd out conifers, resulting in low conifer stocking densities that can persist through subsequent stages of forest development.

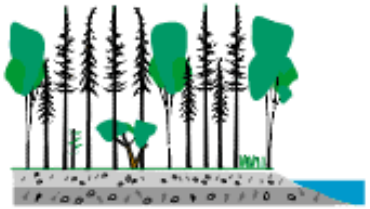




Year 70
Young forest

Mixed conifer/deciduous sites retain a greater ability to re-establish those complex stand characteristics that provide for all riparian functions. Deciduous sites can achieve some, but not all of the desired characteristics.

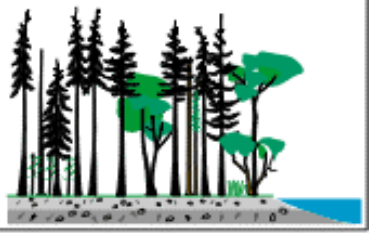




Year 150
Mature forest

Dysfunctional stands can persist for many years, depending on site characteristics. Restoration can speed the recovery of these sites by rectifying unfavorable species mixes and growth conditions.

Desired future condition



Year of structural stage varies with species of trees and between regions.

Level 1 Field Assessment

Habitat Survey Data Form:

<u>Overstream Canopy Closure</u>

Categorize the extent of canopy closure over the stream (i.e., the proportion of the surface area of the stream that is covered by the projecting riparian canopy) as:

0 = none

1 = 1-20% covered

2 = 21-40% covered

3 = 41-70% covered

4 = 71-90% covered

5 = > 90% covered

Level 1 Field Assessment

Habitat Survey Data Form:

<u>Fish Useable Habitat Area</u>

Useable steelhead fry and parr habitat was is visually estimated within each habitat unit.

Briefly, within a given habitat unit usable wetted area for steelhead trout was determined as a percentage of total wetted area by visual methods. Usable fry habitat was evaluated as being less than 20 cm in depth and with a velocity greater than 0.1 ms^{-1} but not exceeding 0.5 ms^{-1}. Usable trout parr habitat was evaluated as having a depth range of 20-50 cm and a velocity of 0.2 to 0.6 ms^{-1}

Date: 5 Aug 2024	Crew: NM	Daily Discharge (WSC): ~ 2.861
Watershed: COQUITLAM	Start NTU: 104 0516766 5460502	
Stream/Sub-basin: 4	End NTU: 104 0516519 5461510	Weather: 0% CC Sunny
Reach: 2A	Survey Direction (U/D): U	Camera Used: Fuji

Unit#	Hab. Unit Type	Hab. Unit Cat	Length (m)	Grad %	Mean Depth (cm) Bank	Mean Depth (cm) Wet	Mean Width (m) Bank	Mean Width (m) Wet	Pool Depths (cm) Max.	Crest	Res.	Type
67	G	2	13.5	0	20	29, 35, 33	12.8	11.6				
8	R	2	15.4	2.3	20	15, 18, 30, 5	9.3	7.3				
9	G	2	10.1	0	25	19, 70, 41	8.4	5.8				
10	R	2	30.3	2.8	15	24, 26, 27	10.2	8.7				
11	G	2	22.2	0.1	25	40, 25, 33, 35	13.6	13.6				
12	R	2	37.0	0.8	20	30, 38, 38, 25	13.9	12.7				

Unit#	Bed Material Dom	Sub	Spawn		D-90	Total LWD	Functional LWD 10-20	20-50	>50	Cover Type	%	Type	%	Off-channel Hab. Type	Access	Length	Width
7	LC	LG	AR	L	36, 31, 29		VII			B	TR						
8	LC	SC	AR	L	28, 30, 36		I			OV	TR	B	TR				
9	LC	B			34, 30, 29			I		OV	10	B	TR				
10	B	LC			30, 31, 30	III		II	LJ	LWD	15			SC	Good	>70	2
11	LC	SC			26, 34, 32		I			OV	3						
12	B	LC				II	I	I		B	4	OV	TR				

*F < 2mm, SG 2-16mm, LG 16-64mm, SC 64-128mm, LC 128-256mm, B 256-4000mm, Bedrock < 4000mm

Unit#	Disturbance Indicators Type & Length			Riparian Vegetation Type	Structure	Closure	Useable Area		Velocity	Photo# U/S	D/S	Comments (use back if need)
7	MC ~15	MB ~15		D	YF	1				2519	2520	Braiding
8				D	YF	1				2521	2522	
9				D	YF	4				2523	2524	
10				B	YF	3				2525	2526	
11				D	YF	2				2527	2528	
12				D	YF	1				2529	2530	

Table 7. Reach parameters for the mainstem Capilano River collected during summer 2010.

	Reach											
	1	2	3	4	5	6	7	8	9	10	11	12
Reach (m)	1678	1523	5352	3553	396	2213	1101	1296	935	518	262	887.4
Total wetted area (m^2)	45827	41235.8	128304.7	70233	8917	39996.1	13785.1	21404.3	12213.8	6471	2997.5	5849.4
Average gradient (%)	1.9	2.1	2.1	1.10	1.10	1.10	1.8	1.7	2.2	1.6	2.0	2.5
Mean bankfull width (m)	44.3	37.3	35.6	28.1	27.2	33.0	18.0	26.0	20.0	20.3	13.4	10.0
Mean wetted width (m)	28.7	27.96	23.2	18.3	22.5	16.4	12.0	15.3	13.0	11.5	10.9	7.0
Mean water depth (m)	0.52	0.72	0.52	0.846	0.66	0.64	0.51	0.47	0.45	0.37	0.33	0.51
Mean bankfull depth (m)	1.4	1.5	1.4	0.93	0.97	1.5	1.1	1.2	1.0	0.84	0.73	1.3
Mean pool spacing per channel width	12.6	20.4	50.2	5.7	7.3	4.8	61.2	49.9	9.4	25.5	-	11.1
Total number of LWD pieces per channel width	0.90	1.3	1.5	11.0	14.6	6.0	1.9	6.1	1.4	4.9	1.1	4.1
Number of functional LWD pieces per channel width	0.16	0.24	0.5	5.7	9.9	3.5	0.9	4.4	0.5	2.0	0.4	1.6
Dominant substrate	B	B	B	S/G	C/S/G	C/G	C/G	C	C	C	C	B
Dominant cover	B	B	B	LWD	LWD	LWD	B/OV/ LWD	LWD/B/OV	B	B	B/OV	B/LWD/ OV
Useable area SH fry (m^2)	1625.8	1194.4	7155.6	3542.4	929.6	1825.8	828.0	Data not collected	1487.1	825.3	176.8	671.1
Useable area SH parr (m^2)	3826.7	3421.1	16061.4	4225.4	241.8	1847.6	507.3	Data not collected	1175.4	868.2	166.5	109.0

Summary data – Used for Level 2 Assessment

		Steelhead Juvenile Habitat			Coho Juvenile Habitat			
	Reach	Fry habitat (% of total area)	Parr habitat (% of total area)	Boulder Cover	Pool Frequency	LWD	Off Channel habitat	Spawning Gravel
Upper Capilano River	1	4	8	Good	Poor	Poor	Fair	poor
	2	3	8	Good	Poor	Poor	Poor	poor
	3	6	13	Good	Poor	Poor	Good	poor
	4	5	6	Poor	Good	Good	Good	fair
	5	10	3	Absent	Good	Good	Absent	good
	6	5	5	Poor	Good	Good	Good	fair
	7	6	4	Poor	Poor	Poor	Fair	poor
	8		-	Fair	Poor	Good	Good	fair
	9	12	10	Good	Fair	Poor	Good	fair
	10	13	13	Good	Poor	Fair	Poor	poor
	11	6	6	Poor	Absent	Poor	Poor	poor
	12	11	2	Fair	Poor	Fair	Poor	poor
East Cap Cr.	1	6	14	Good	Absent	Absent	Poor	Absent
	2	10	11	Good	Absent	Poor	Fair	Absent
	3	5	9	Good	Poor	Poor	Poor	Poor
	4	11	12	Good	Poor	Good	Good	Poor
	5	9	7	Good	Absent	Fair	Good	Poor
Lower Capilano River	1	12	11	Good	Poor	Poor	Good	Poor
	2	5	18	Good	Good	Poor	Poor	Poor
	3	3	6	Fair	Good	Poor	Absent	Absent

Table 8. Habitat type by reach parameters for the mainstem Capilano River collected during summer 2010.

		Reach											
		1	2	3	4	5	6	7	8	9	10	11	12
Riffle	Length in reach(m)	623	598	2321	242	82	684	506	819	419	276	28	184
↓	Total wetted area (m^2)	20463.5	17723.3	57058.7	3917	1550	11934.6	6548.7	15269.2	6481.3	3546	448	1294
	Reach amount (%) of total area	44.7	43.0	44.5	5.5	17.4	29.8	47.5	71.3	53.1	54.8	14.9	22.1
Pool	Length in reach (m)	216	99	133	2083	216	781	35	42	119	52	-	69
↓	Total wetted Area (m^2)	5888	3489	3122	43300	5015	14593.7	385	377	1127.5	728	-	355
	Reach amount (%) of total area	12.8	8.5	2.4	61.7	56.2	36.5	2.8	1.8	9.2	11.3	-	6.1
Cascade	Length in reach(m)	295	325	1270	47	-	-	-	-	72	12	38	233.4
↓	Total wetted Area (m^2)	6640.5	7818	33958	581	-	-	-	-	994	216	526	1477.9
	Reach amount (%) of total area	14.5	19	26.5	0.8	-	-	-	-	8.1	3.3	17.5	25.3
Glide	Length in reach (m)	544	501	1628	1181	98	748	560	435	325	178	196	386
↓	Total wetted Area (m^2)	12835	12205.5	34166	22435	2352	13467.8	6851.4	5758.2	3611	1981	1943.5	2422.5
	Reach amount (%) of total area	28	29.6	26.6	31.7	26.4	33.7	49.7	26.9	29.6	30.6	64.8	41.4
Log Jam	Length in reach (m)	-	-	-	-	-	-	-	-	-	-	-	15
↓	Total wetted Area (m^2)	-	-	-	-	-	-	-	-	-	-	-	300
	Reach amount (%) of total area	-	-	-	-	-	-	-	-	-	-	-	5.1

Figure 13. Proportion of dominant cover types by reach in mainstem Capilano River. (IV=instream vegetation, OV=overhanging vegetation, DP=deep pool, C=undercut banks, B=boulders, LWD=large woody debris, SWD=small woody debris)

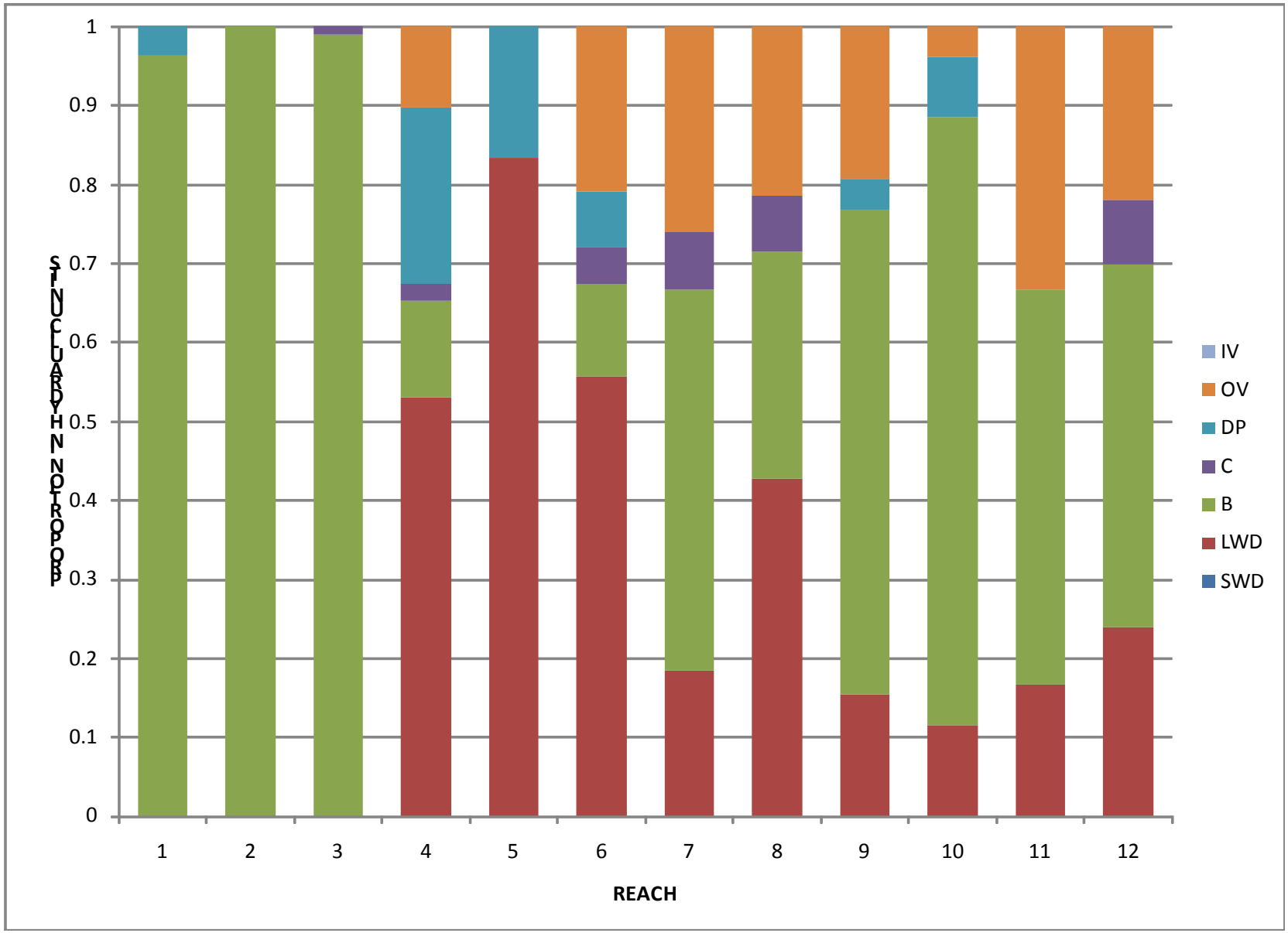
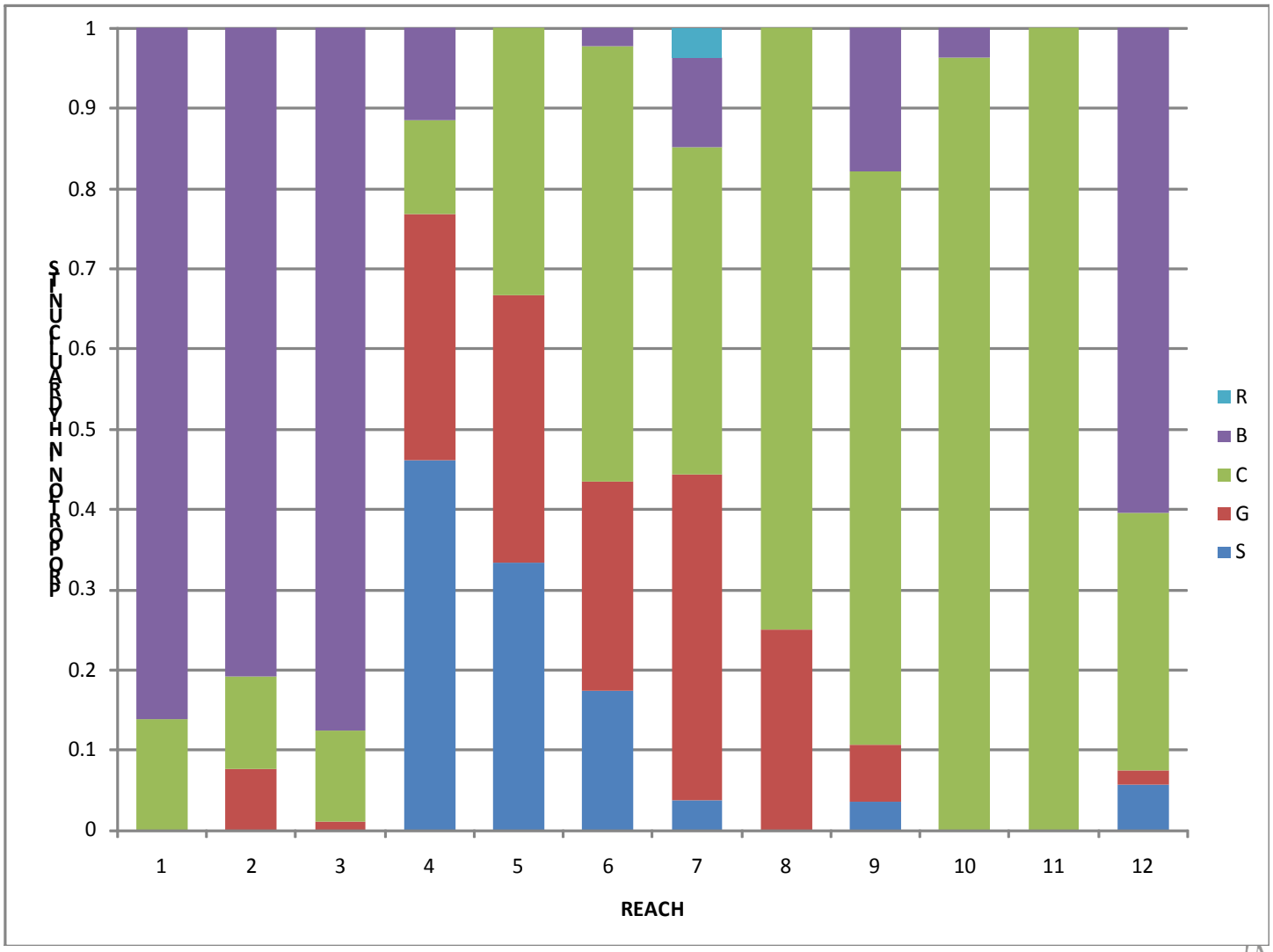


Figure 15. Proportion of dominant bed material types by reach in mainstem Capilano River. (R=bedrock, B=boulders, C=cobbles, G=gravels, S=sands).




Capilano Mainline Road (km 18.3)
North
UC6-2 Structure E
UC6-2 Structure D
UC6-2 Structure C
UC6-2 Structure B
UC6-2 Structure A
Upper Capilano River
Enchantment Creek Confluence
with Capilano R. 200 meters


North
UC6-3 Structure A
UC6-4 Structure A
UC7-1 Structure A
Reach 6/7 Break
UC6-3 Structure B
UC6-3 Structure C
UC6-3 Structure D
Upper Capilano River
Capilano Mainline Road (km 18.8)
Enchantment Branch