
Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Site Card Field Guide

Prepared by
Ministry of Environment
Ecosystems Branch
for the
Resources Inventory Standards Committee

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For further information about the Resources Information Standards Committee, please access the RISC website at:
<http://ilmbwww.gov.bc.ca/risc/index.htm>

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Introduction

The Reconnaissance Level Stream Field Inventory consists of both office and fieldwork. This *Field Guide* is to assist in the collection and recording of the relevant Physical Fish Habitat field data on the *Site Card*. This *Field Guide* includes information on definitions, methods, and recording procedures. More detailed standards regarding the inventory can be found in the *Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Standards and Procedures Manual*. Additional information on methodology for Site Card field data collection can be found in the *Reconnaissance Level Stream Survey Toolkit* at http://www.env.gov.bc.ca/fish/pdf/recce_stream_survey.pdf. Site Card information that is required for the minimum data submission standards of a BC Scientific Fish Collection Permit is described on the Fish Data Submission website at http://www.env.gov.bc.ca/fish_data_sub/index.html.

This *Field Guide* is organized into sections that correspond to the *Site Card*. Complete all fields of the card for which it is possible to collect data. When a particular field cannot be completed for the site (e.g., wetted widths cannot be obtained for a dry channel) use a squiggly line to strike through the blank field or write N/A. This distinguishes the field as not applicable rather than one that was omitted. Explain why a particular field was not completed, reference in the comment indicator box and record in the comments section.

Each *Site Card* section has comment indicator box(es) which are shaded light green. These boxes refer to comments made about data recorded within the section. For example, the number 1 written in the comment indicator box in the Cover Section and the number 2 written in the comment indicator box to the right of RIP.VEG in the cover section would refer to statements written in the comments section. These additional comments could be written in the comment section as: 1.LWD is abundant but only a few pieces are functioning, 2.The mixed riparian veg. was composed of 40% coniferous and 60% deciduous.

There is a variety of methods used to collect data. Always record the method used within the method box (MTD or mthd) provided. Refer to the *Appendix* for codes not explained in the body of the *Field Guide*.

SITE CARD

Definition of a stream

A stream is any reach, flowing on a perennial or seasonal basis. It has a continuous channel bed, whether or not overhanging, bridging vegetation or soil mats locally obscure the bed or banks of the reach. It has a continuous channel if the channel bed is scoured by water or contains observable deposits of mineral alluvium deposited by water that has flowed on a perennial or intermittent basis.

Referencing Information

Stream Name (gaz.):

Definition: The official name of the stream being surveyed as listed *BC Geographical Names*.

Method: Determine from *BC Geographical Names* at <http://ilmbwww.gov.bc.ca/bcnames/>.

Recording Procedure: Record official name. If not official, enter "unnamed."

Stream Name (local):

Definition: An unofficial or locally used stream name.

Method: Obtain from old lake summary reports, regional Ministry of Environment (MoE) offices, etc.

Recording Procedure: Record the local/alias name.

Watershed Code:

Definition: A 45-digit, unique number assigned to the watersheds in British Columbia.

Method: Obtain using the *BC Watershed Atlas*. See *User's Guide to the British Columbia's Watershed/waterbody Identifier System, RISC (2004)*, or obtain from *Fisheries Inventory Data Queries (FIDQ)* at <http://a100.gov.bc.ca/pub/fidq/main.do>.

Recording Procedure: Record the complete code to the first set of zeros.

Interim Locational Point Map Number (ILP Map #):

Definition: The number of the mapsheet used to identify assigned ILP numbers.

Method: Read from the map for waterbodies without watershed codes and/or waterbody identifiers. See *User's Guide to the British Columbia's Watershed/waterbody Identifier System*, March 31, 2004, Version 3.0.

Recording Procedure: Record the mapsheet number (e.g., 92L.005).

ILP Number (ILP #)::

Definition: A number unique to any particular point on the mapsheet, used to identify waterbodies lacking a watershed code and/or waterbody identifier.

Method: Refer to the *User's Guide to the British Columbia's Watershed/waterbody Identifier System*, March 31, 2004, Version 3.0.

Recording Procedure: Record the five-digit user defined ILP number (e.g., 00091).

NID numbers:

Assigning NIDs is a method of identifying features on a mapsheet. Each feature identified on a mapsheet is assigned a five-digit number, unique to that mapsheet, such as 00001, 00002, etc. The mapsheet number followed by this feature identifier number forms a *complete* NID reference code that is unique to the project. Only the unique, five-digit feature identifier is marked on the mapsheet, adjacent to each feature. On the data forms, however, both the mapsheet number *and* the feature identifier are recorded in their respective, corresponding columns, as explained below.

NID Map No:

Definition: The number of the mapsheet on which the specific NID number occurs.

Method: Read from map.

Recording Procedure: Record the mapsheet number (e.g., 92L.005).

NID Number:

Definition: A unique-five digit number that identifies the feature on a mapsheet.

Method: N/A

Recording Procedure: Record the five-digit NID number unique to mapsheet in the corresponding NID Map No. column (e.g., 00012).

Reach Number (#):

Definition: A reach is a channel segment with relatively repetitious and homogenous sequence of physical processes and habitat types (e.g., homogenous slope, discharge, habitat, channel type, and riparian features); lakes and wetlands are also considered reaches for the purpose of planning. Reach number is the number given to individual reaches.

Method: The reach number is assigned to the reaches in a sequential, upstream, ascending order, starting at (1) at the downstream end of the stream. If an additional reach needs to be added, a decimal system is used. For example if it is discovered in the field that reach 2 was really three reaches, then the reach would be renumbered using the decimal system. The recommended reach renumbering in this case would then be 1, 2.1, 2.2, 2.3, 3...

Recording Procedure: Record the reach number. If additional reaches are identified during fieldwork (after planning has been completed), they are recorded as (1.1-), (1.2-), etc.

Site # - Site Identifier

Definition: A section/segment of a stream or wetland reach where the sampling is conducted. The site number is the unique number given to each site within a reach.

Method: Generate in the field/office. The site number is given to the sites in a sequential, upstream, ascending order where possible.

Recording Procedure: Record the site number in the SITE # field.

Field UTM - Site UTM coordinates

Definition: Universal Transverse Mercator (UTM) coordinates identify the location of the site. They are field or office generated.

Method:

1. Determine the UTM at the downstream end of the site using listed methods.
2. Obtain UTM coordinates in NAD 83 (North American Datum 1983).

Recording Procedure: Record the UTM coordinates. (Zone/Easting/Northing) to the metre level and record code.

Code	Method Type
MAP	Map interpretation
GIS	Geographical Information System
AP	Aerial photo interpretation
GP1	Geodetic survey grade
GP2	Survey grade GPS
GP3	Recreational grade GPS
GPU	Uncorrected GPS
O	Other (specify type in comments)

Site LG - Site Length

Definition: The linear measure following the section of stream sampled.

Method:

1. Measure site length following the stream channel, including its bends and curves.
2. If Wb is less than 10 m wide, sample a minimum of 100 m of the stream.
3. If Wb is > 10 m wide, multiply the width generated from the first Wb measurement by 10 to determine the minimum length of the sample site required.
4. Increase the site length to adequately capture habitat sequences.

Recording Procedure:

1. Record the site length to the nearest 1.0m or $\pm 5\%$.
2. Record code. Refer to Appendix.

Identify and number additional reaches

Definition: A reach is a channel segment with a relatively repetitious and homogenous sequence of physical processes and habitat types (e.g., homogenous slope, discharge, habitat, channel type and riparian features).

Number new additional reaches as the original reach number followed by a decimal and numeric value in order of delineated reaches (e.g., 1.1, 1.2, and 1.3).

Access

Definition: The main mode of transport to the site.

Method and Recording Procedure: Record the main mode.

Code	Mode	ATV	All terrain vehicle
FW	Fixed wing plane	B	Boat
H	Helicopter	FP	Float Plane
V2	Two wheel drive	HO	Horse
V4	Four wheel drive	O	Other
FT	Foot	NA	Not applicable

Date - Survey Date

Definition: The date of field survey.

Method and recording procedure: Record as yyyy/mm/dd (e.g., 2008/06/03).

Time - Survey Time

Definition: The start of survey at the site.

Method and Recording Procedure: Record local time using a 24-hour clock (e.g., 1:30 p.m. as 1330).

Agency

Definition: The code of the agency conducting the inventory.

Method and Recording Procedure: Record the code of the organization contracting to complete the inventory. Format is C # # #. Crews should have this number from MoE prior to going into the field.

Crew - Initials

Definition: Those of crew conducting the inventory.

Method and Recording Procedure: Record 2 to 3 letter initials of up to 3 principal individuals.

Fish Form (S)

Definition: A separate field record sheet that documents detailed information obtained from fish sampling.

Method and Recording Procedure: Check the appropriate Y (Yes) or N (No) boxes to indicate whether or not a Fish Collection Form(s) was completed for the site.

CHANNEL

Channel width (m) - (W_b)

Definition: The distance between the tops of the stream-banks measured at right angles to the general orientation of the banks.

1. Measure to ± 0.1 m the distance from right bank top to left bank top. Repeat a minimum of 6 times at equally spaced intervals (e.g., equal to the channel width at the first measurement). If 6 measurements cannot be obtained use the comment indicator boxes and record the reason(s) why.
2. Exclude vegetated islands and use the sum of each Bankfull width in a cross section as the total Bankfull width.
3. Include all unvegetated gravel bars in the measurement. These generally show signs of recent scouring of deposition.
4. Look for changes in vegetation, sediment, texture and topographic breaks to determine bankfull boundary.

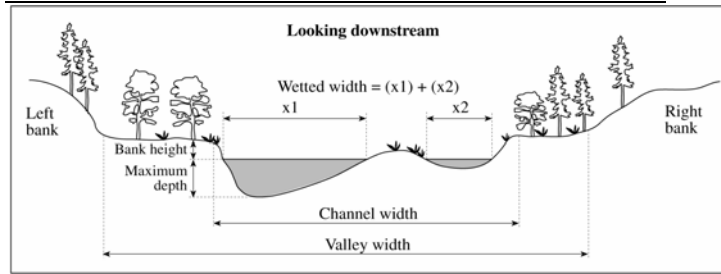


Figure 1: Measuring channel and wetted widths

Recording Procedure:

1. Record the dominant method to the nearest 0.1m ($\pm 5\%$) and the method code.
2. Identify alternate techniques in the comment indicator box. Refer to Appendix.

Wetted Width (m)

Definition: The width of the water surface at the time of survey measured at right angles to the direction of flow. Measure at the same cross-section as channel width.

Method:

1. Measure to $\pm 0.1\text{m}$ the distance of the wetted surface from the right to the left side of the channel. Repeat a minimum of 6 times at equally spaced intervals in conjunction with the channel measurements. If 6 measurements cannot be obtained, use the comment indicator boxes and record the reason(s).
2. Include water under undercut banks, protruding rocks, logs, and stumps.
3. Repeat measurement in conjunction with W_b measurements.
4. Add widths of multiple channels for a total W_w .

Recording Procedure:

1. Record wetted width measurements to the nearest 0.1m.
2. Record the code of the dominant measuring device in the method box. Refer to Appendix.

Res. Pool Depth (m) - Residual Pool Depth

Definition: The difference between the maximum pool depth and the outlet crest depth (the depth of the water at the pool outlet just prior to entering the downstream riffle, cascade, or step).

Method:

1. Measure the outlet crest depth and subtract it from the maximum upstream pool depth.
2. Repeat this measurement at a minimum of 6 riffle-pool, cascade-pool, or step-pool sequences within the site.
3. Classify glides as large morphology.
4. If 6 measurements cannot be obtained use the comment indicator boxes and record the reason(s)

Recording Procedure:

1. Record the residual pool measurements to the nearest 0.1 m and in the method box record the code of the measuring device. Refer to Appendix.
2. If more than one method was used to determine the different residual pool widths use the procedure described above in channel width.

Wb Dp (m) - Bankfull Channel Depth

Definition: The depth of the channel at Bankfull flow measured at the outlet crest.

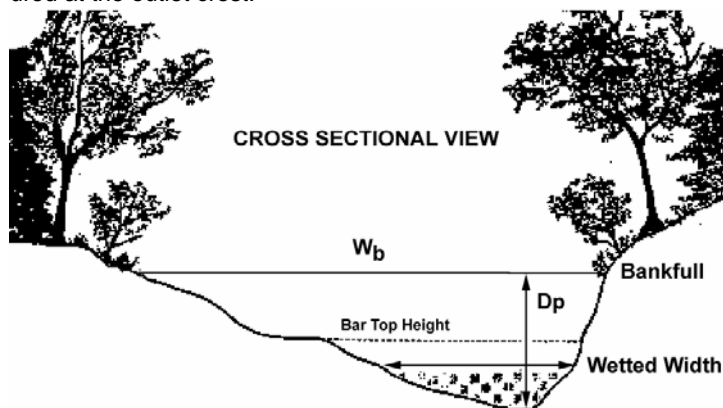


Figure 2: Measuring Bankfull channel depth

Method:

1. Identify the top of both banks (Refer to channel width description).
2. Extend the metre tape from left banktop to right banktop to simulate Bankfull water level.
3. Using a rod or metre stick, measure the difference in elevation from the tape to the channel bed at a riffle-pool, cascade-pool, or step-pool break beneath the cross-section.
4. Place the rod or metre stick at the deepest point in the channel along the cross-section at a riffle-pool, cascade-pool, or step-pool break.
5. If there is more than one channel (e.g., there are vegetated islands separating the flow), measure the W_b depth in the main channel (usually the channel with the deepest and fastest flowing water).
6. Collect a minimum of 3 measurements. If it is not possible to measure 3 explain in comments.

Recording Procedure:

1. Record the Bankfull depth measurements to the nearest 0.1 m and in the method box record the code of the measuring device used. Refer to the appendix for the table of codes.
2. If more than one method was used to determine the different Bankfull depths use the method described above in channel width.

Gradient %

Definition: The slope, or rate of vertical drop per unit of length, of the channel bed.

Method: Measure at a minimum of two sites along the sample site over as long a distance as possible.

Recording Procedure: Record the method code to the nearest 0.5%. Refer to Appendix.

Method Type	Code
Ground Estimates	GE
Clinometer	C
Abney type level	AL
Map interpretation	MAP
Surveying equipment	S
Geographic Information Systems	GIS
Other	O
Not specified	NS

Elaboration:

1. Keep the length of channel as long as possible. Measure in upstream and downstream directions to maximize the distance.
2. When shorter sections of channel are used, make sure measurements are sighted from similar habitat units (e.g., riffle crest to riffle crest).

Stage - Stage of Stream Discharge

Definition: The amount of water passing through the channel at the time of survey.

Data collection:

1. Observe the amount of water in the channel in relation to the Bankfull depth.
2. Look for low flow indicators including:
 - Distinct sequence of riffles and pools, or steps and pools.
 - Wetted width significantly less than channel width.
 - Dry, unvegetated channel bars.
3. Look for high flow indicators including:
 - Distinction between riffles and pools or steps and pools is difficult to determine.
 - Water level at or over bank tops.
 - Wetted width similar to or greater than channel width.
 - No visible bars or bank sides.

Recording Procedure: Circle the appropriate code:

Code	Definition
L	Low (0-30% of Bankfull)
M	Moderate (30-90% of Bankfull)
H	High flow levels (>90% of Bankfull).

No Vis. Ch. - No Visible Channel

Definition: Site assessment in the field reveals no visible channel.

Method: Visually assess the area for the absence of a stream or channel and take photo.

Recording Procedure: Check the No Vis. Ch. Box.

Elaboration:

Use caution when labeling a site as having no visible channel. Write detailed comments about the vegetation and other characteristics of the area.

Dry/Int - Dry/Intermittent

Definition: A dry channel is void of water or has separated pools along the channel at the time of the field survey. This stream may be intermittent (also known as ephemeral or seasonal) and be dry due to seasonal variations in flow.

Recording Procedure: If the stream channel is dry or intermittent, check the Dry/Int. box. The field crew may not be able to obtain wetted widths, residual pool depths and cover (total amount and location). Check either Dry/Int. or DW; not both.

DW - Dewatering

Definition: Where sediment accumulation has elevated the channel bed above the water's surface. There is usually a wetted channel upstream and downstream of the dewatered section. Dewatering often occurs in association with sediment wedges upstream of recently formed logjams or constrictions.

Method: Visually assess.

Recording Procedure: If channel dewatering is present, check the DW box and fill all possible fields. Record any difficulties encountered in the Comments section.

Tribs. - Tributaries

Definition: Waterflow into the site is considered a tributary if it can be defined as a stream. Refer to page 5.

Method: Identify any tributary streams to the sample site area that are not identified on the 1:20,000 scale base map.

Recording Procedure:

1. Check the box to indicate the presence of unmapped tributaries.
2. Identify any tributaries which are deemed important as fish habitat in the Features Section (recorded aspect is useful for mapping).

COVER

Total Cover

Definition: Cover is any structure in the wetted channel or within 1 m above the water surface that provides hiding, resting or feeding places for fish. A percentage estimate (out of 100%) of the cover provided to the stream by all forms of cover present.

Method: Observe the entire stream channel (including primary, secondary and off-stream channels) within the site and visually estimate total cover.

Recording Procedure: Record the code.

Code	Definition
N	None – No cover exists at the site
T	Trace – Cover exists over <5% of the site
M	Moderate - Cover exists over 5-20% of the site
A	Abundant - Cover exists over more than 20% of the site

Cover Types, Amount and Location

Definition: The type of structure (material) that provides cover (hiding, resting or feeding places for fish).

Method:

1. Locate cover types within the wetted channel or within 1 m above the water surface.

Code	Cover Type	Description
SWD	Small Woody Debris	Any debris with a diameter < 10 cm which provides in-channel cover for fish.
LWD	Large Woody Debris	Woody material, including root wads, with a min. diameter >10cm and providing in-channel cover for fish. LWD does not have to be attached or embedded in the stream or bank to provide cover but must be within 1m of the water surface.
B	Boulders	Stream substrate particles with a b-axis >256mm. Provide cover when they create a turbulent white water surface layer, create scoured out pools, and overhang the stream.
U	Undercut Banks	Streambanks where the base is cut away by the water and overhangs part of the stream.
DP	Deep Pools	A portion of stream with reduced current velocity at low to moderate flow, deeper than the surrounding area and usable by fish for resting or cover.
OV	Overhanging Vegetation	Vegetation that projects over the stream and is <1 m above the water surface.
IV	Instream Vegetation	Vegetative materials within the wetted channel that provide cover.

1. Estimate the relative amount (AMT) of cover that the individual cover type provides the entire site, including all the channel types present.
2. Differentiate between the three channel locations (LOC): (1) primary, (2) secondary, and (3) off-channel (side and back). Islands and other permanently vegetated landmasses separate the primary channel from secondary channels by bars and from off-channels.

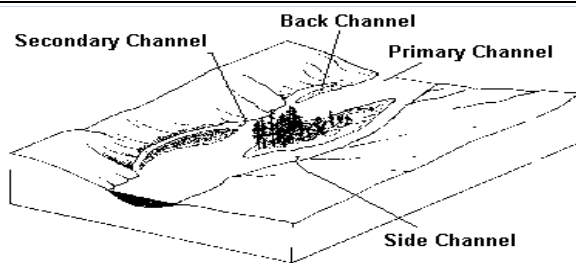


Figure 3: Channel types

Recording Procedure:

1. Assign an **AMT** code ranking for each **Cover Type** found.

Code	Definition
N	None - No cover of this type exists at the site.
T	Trace - A small amount of this cover type exists at the site.
S	Sub-dominant - This cover type accounts for a large amount of cover at the site but is not the dominant type present.
D	Dominant - This cover type is the dominant type of cover existing at the site.

2. Record the **LOC** codes that describe the channel locations of the **Cover Types** found.

Code	Definition
P	Primary Channel
S	Secondary Channel
O	Off Channel
A	All Channels (for the field form only. FDIS will allow you to check of P, S and O.)

3. Assess the amount and location independently. For example: SWD is dominant in the secondary channel, moderate in the off channel and absent in the primary channel. In terms of the whole site it is possible that SWD will be present in trace amounts. Record amount as **Trace** and Location as **Secondary & Off**.

Type	SWD	LWD	B	U	DP	OV	IV
AMT	T	S	N	N	D	T	N
LOC	S, O	P, O			P	P, O	

Crown Closure

Definition: The amount of canopy closure provided by streamside/riparian vegetation which projects over the stream channel, directly above the thalweg and is >1 m above the water surface.

Method: Visually assess.

Recording Procedure: Circle the corresponding number.

Code	Description
0	0 %
1	1-20%
2	21-40%
3	41-70%
4	71-90%
5	>90%

Instream Vegetation Type

Definition: The type of instream vegetation.

Data collection and Recording Procedure: Visually assess the type(s) of vegetation present and circle code(s).

Code	Definition
V	Vascular plants
M	Mosses
A	Algae
N	None

LWD FNC - Functional Large Woody Debris

Definition: Attached or embedded in the stream (W_b) or bank and directly influences the morphology of the stream channel by influencing sediment storage and /or local flow conditions. Includes rootwads embedded in the stream or bank, or any other large pieces of LWD that create pools or scour.

Method: Visually assess.

Recording Procedure: Circle the code.

Code	Definition
N	None
F	Few (< 1 piece per bankfull. Width).
A	Abundant (> or = 1 piece per bankfull width).
NA	Not applicable

Dist - Distribution of LWD

Definition: Evenly spaced LWD is individual pieces evenly distributed throughout the stream channel. Clumped accumulations of LWD occur when a number of LWD pieces group in the same location.

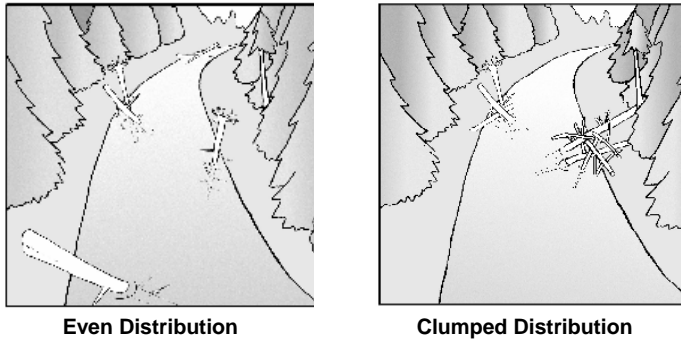


Figure 4: Large Woody Debris Distribution

Method and Recording Procedure: Visually assess the distribution of the LWD present and circle code.

Code	Definition
C	Clumped
E	Even

LB SHP & RB SHP - Left and Right Bank Shape

Definition: The shape or form of the identified channel bank described when the observer is facing downstream.

Method: Visually assess.

Recording Procedure:

Code	Definition	Description
U	Undercut banks	Protrude over the water or "wetted channel".
V	Vertical	Steep sloping/vertical (45° -90°).
S	Sloping	Gradual or shallow slope (<45°).
O	Overhanging	Banks protrude over a non-wetted portion of the stream.

Texture - Bank Texture

Definition: The predominant size class(es) of material that forms the stream bank.

Method and Recording Procedure: Visually assess bank material and circle the predominant size class(es) present (a maximum of 2 are acceptable). Record this for the left and right banks. Refer to Appendix.

Rip.Veg. - Riparian Vegetation

Definition: The vegetation on land adjacent to the normal high water line of the of the stream, extending to the portion of land that is influenced by the presence of the adjacent ponded or channeled water.

Method: Visually assess.

Recording Procedure: Circle the dominant code.

Code	Description	Code	Description
N	None	D	Deciduous forest
G	Grass	M	Mixed C & D forest
S	Shrub	W	Wetland
C	Coniferous forest		

Stage - Riparian Vegetation Stage

Definition: The level of maturity and structure of the dominant riparian vegetative cover adjacent to the sample site.

Method: Visually assess.

Recording Procedure: Circle dominant code for each bank.

Code	Description
INIT	Initial. Non-vegetated or initial stage following disturbance (less than 5% cover)
SHR	Shrub/herb stage, less than 10% tree cover
PS	Pole-sapling stage, with trees overtopping shrubs. The standard age is usually less than 15-20 years old
YF	Young forest, self thinning is evident and the forest canopy is differentiated into distinct layers, stand age is 30-80 years
MF	Mature forest with canopy gaps and a well-developed under-story
NA	When riparian vegetation is absent, grass or wetland (specify in comment section).

FEATURES

Definition: Features are structures (e.g., bridges, culverts), natural landmarks (e.g., cascades, waterfalls) or anthropogenic influences (e.g., hatcheries, fishways) found within the site which may affect fish or fish habitat.

Method and Recording Procedure:

1. Record features outside of the site (e.g., a portion of the reach) in the field book for entry into FDIS.
2. Where possible measure height (HT) and length (LG) for the feature to the nearest 1 m. Record these under the HT/LG field.
3. Record any other relevant measurements (e.g., width and gradient) in the Features Comments. Refer to Appendix for measuring method codes.
4. Take quality photographs of every feature showing any impacts on the stream.
5. Obtain and record the UTM coordinates or assign a NID # to the feature. Record the method used to obtain the UTM (refer to the Appendix for codes).
6. For features with linear distances, obtain the UTM coordinates.

dinates at the downstream point.

7. If using NIDS, assign different numbers.
8. Record judgment in the Features Comments on whether or not the feature presents an obstruction to fish passage. If determined as an obstruction indicate the type including:
 - 'Permanent' (e.g., waterfall, cascade).
 - 'Seasonal or low flow' (e.g., cascade, de-watering).
 - 'Temporary' (e.g., LWD jam, beaver dam).
9. Record codes.

Code	Description	Code	Description
BD	Beaver dam	FD	Ford
BG	Crossing, general	GE	Groundwater, field evidence
BR	Bridge	HD	Hydro dam
C	Cascade or chute	LS	Landslide or bank sloughing
CN	Canyon	X	LWD jam
CV	Culvert	ECAC	Spawning channel
D	Dam, general	ECAH	Hatchery
FLD	Dewatering	FSB	Subsurface flow
E	Enhancement, general unspecified	TS	Termination of survey
HCE	Erosion/Sedimentation	TRB	Tributary
F	Falls (> 2m)	VB	Velocity barrier
FSZ	Fisheries Sensitive Zone	XW	Wedge
EOF	Fishway		

WATER QUALITY

REQ.# - Requisition number

Definition: The water analysis requisition form.

Data collection and recording procedure:

1. Consult individual laboratories for instructions.
2. Locate the number on the requisition form and in the REQ # field. There is no required method.

EMS - Environmental Monitoring System Site Number

Definition: EMS is a provincial data base system.

Method: Obtain applicable EMS site numbers from Fisheries Inventory Specialists.

Recording Procedure: Record the EMS site number.

TEMP - Temperature

Definition: The ambient stream water temperature.

Method: Measure in flowing water at a location representative of the stream site.

Recording Procedure:

1. Record temperature to the nearest 1°C.
2. Record method in the method box (MTD).

Code	Description
T1	Hydrolab
T2	YSI
T3	Thermometer, alcohol
T4	Thermometer, mercury
T5	Recording meter
T6	Thermister
O	Other (specify type in comments)

pH

Definition: A measure of hydrogen ion concentration on a scale of 0 (highly acidic) to 14 (highly basic) with a pH of 7 as neutral.

Method: Measure and follow instructions with sampling tool. Follow the instructions provided with sampling tool.

Recording Procedure: Record the pH to the nearest 0.1 and record method code.

Code	Description
P1	pH meter, low ionic strength electrode
P2	pH meter, ordinary "drinking water" electrode
P3	pH meter, recording (over a time period)
P4	Colourimetric (paper, indicator)
O	Other (specify type in comments)

COND. - Conductivity

Definition: The ability of a solution to carry electric current.

Method: Measure conductivity following the instructions provided with sampling tool.

Recording Procedure: Record to the nearest 1 $\mu\text{S}/\text{cm}$, standardized to 25° C and record method code.

Code	Description	Code	Description
S1	Hydrolab	S3	Recording metre
S2	YSI	S4	Other metre

TURB. - Turbidity

Definition: The concentration of suspended sediments and particulate matter in the water.

Method: Visually assess.

Recording Procedure: Record comments on water colour (e.g., tannins) in Comment Section and circle the Turbidity code.

Code	Description	Code	Description
T	Turbid	L	Lightly turbid
M	Moderately turbid	C	Clear

MORPHOLOGY

Fld Sns - Flood Signs

Definition: Physical indicators of high water flow within or surrounding a channel. They include rafted debris, scarring on trees and other vegetation, and fluvial sediments newly deposited on the surface of the forest floor, tree trunks or other vegetation.

Method: Visually assess or measure from the top of the bank to the height of the flood sign.

Recording Procedure: Record any comments on the type(s) of flood sign(s) or method(s) used for measurement.

Bed Material

Definition: Refers to the size of the surficial bed material.

Method: Visually classify.

Recording Procedure: Record the code for both the dominant and sub-dominant material. Refer to Appendix for a range of size classes.

D_{95} (cm)

Definition: The diameter of the bed material particle that is larger than 95% of the materials in the stream channel.

Method:

1. Estimate the range of particle sizes. Identify the D_{95} , which is larger than 95% of all other materials.
2. Measure D_{95} with a marked rule along the b or intermediate axis of the substrate particle. The b axis is the intermediate axis of the particle.

Recording Procedure:

Record the value in centimeters to $\pm 10\%$.

Elaboration:

- If D_{95} is too fine to measure, mark 0 in the D_{95} box.
- D_{95} can be larger than D if boulders are found in the channel (D does not consider lag boulders).
- If boulders are buried or too large to measure, estimate b and note the reduced precision.
- D_{95} does not have to be moveable by water.

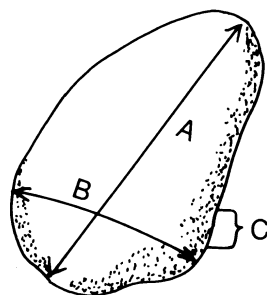


Figure 5: D_{95} and D

D

Definition: D represents the size of the largest particle on the channel bed that will be moved at channel forming flow levels. (Refer to the *Channel Assessment Procedure Field Guidebook*, Forest Practices Code (1996), p.12).

Method:

1. Identify D. Look for:
 - Particles incorporated into the streambed, surrounded by similar materials (not an isolated stone distinctly different from all others within several channel widths, either up or downstream).
 - Particles without old moss or organic stains.
 - Rounded/ sub-rounded particles rather than angular.
 - Evidence of movement by flowing water within the last ten years.
2. Measure D with a marked rule along the b or intermediate axis of the substrate particle.

Recording Procedure: Record the value in cm to $\pm 10\%$.

Elaboration:

- When boulders are difficult to measure (e.g., buried by surrounding sediments), visually estimate D note the reduced precision.
- D does not include large lag boulders deposited during periods with very different stream flow regimes or that have fallen into the channel from surrounding areas. Only infrequent, large floods usually reform small channels with step-pool morphologies. The bed may actually stay stable for several decades and support a thick cover of moss. Identifying the D in this situation becomes more difficult. You should consider your position within the watershed and what you expect D to be given your experience in other reaches.

Morphology

Definition: The general channel shape indicates the processes dominating the channel.

Method:

1. Observe the sections of channel between pools and determine if they are riffles, cascades, or steps.
2. Determine if there is any functional LWD in the channel (common in channels with $W_b < 30\text{m}$).
3. Consider the dominant bed materials. Boulders are dominant in step-pool channels, cobbles and boulders in cascade-pool channels, cobbles and/or gravels in riffle-pool channels and fines in large morphology channels.

Recording Procedure:

Record the morphology code.

Morphology	Code	Sub-code	Bed Material	LWD
Riffle-pool	RP	RP _{g-w}	gravel	functioning
Riffle-pool	RP	RP _{c-w}	cobble	functioning
Cascade-pool	CP	CP _{c-w}	cobble	present, minor function
Cascade-pool	CP	CP _b	boulder	absent
Step-pool	SP	SP _{b-w}	boulder	present, minimal function
Step-pool	SP	SP _b	boulder	absent
Step-pool	SP	SP _r	boulder-block	absent
Large channel	LC	See < http://www.env.gov.bc.ca:80/fsh/ids/invent/ >		

As a check of the visual classification, use a nomogram (refer to Appendix in this Field Guide and to the *Channel Assessment Procedure Field Guidebook*) to classify the morphology.

Elaboration:

- If there has been a lot of disturbance to the site channel determine the morphology based on the gradient.
- Record comments.

Disturbance Indicators

Definition: Descriptions of impacts from changes in sediment supply and/or discharge and are grouped into categories of sedimentological characteristics, bank impacts, morphological features, and LWD.

Method: Visually assess.

Recording Procedure: Circle the code.

Code	Disturbance Indicator	Description
Organic		
O1	Beaver dam	The channel had aggraded upstream and/or degraded downstream of a beaver dam. Do not include beaver dams that no longer influence flow or sediment transport.
Banks		
B1	Abandoned channels	Abandoned and/or isolated back or side channels that show signs of colonization by riparian vegetation and have accumulated some forest litter.
B2	Eroding banks	Recently exposed bank material or lack of undercut associated with the bank.
B3	Avulsions	Similar to B1 although mainstem channels are abandoned and/or isolated when the channel shifts laterally.
LWD		
D1	Small woody debris	Abundant small-sized woody debris pieces (commonly logs with saw-cut ends and detached root wads and branches).
D2	Large woody debris	The majority of LWD does not span the channel width as the orientation of individual LWD pieces shifts from perpendicular to parallel (relative to the channel banks).
D3	Recently formed debris jams	Typical of aggrading channels (but can occur in degrading channels) in riffle-pool and cascade-pool morphologies.
Morphology		
C1	Extensive riffles or cascades	Riffles and relatively shallow pools or glides dominate the channel. In cascade-pool or step-pool morphologies, extensive riffles are replaced with extensive cascades. Do not to confuse this with the extensive riffles or cascades that are created at high flow levels.
C2	Minimal pool area	Pools are limited in frequency and extent and are often only associated with individual pieces of LWD.
C3	Elevated mid-channel	Channel bars have aggraded with bar-tops at elevations equal to or higher than adjacent bank-tops. Typically, such bars

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	bars	have relatively steep downstream faces.
C4	Multiple channels or braids	Multiple channels develop as the channel aggrades and shifts from single thread to multiple channels.
C5	Disturbed stone-lines	Steps associated with step-pool morphologies are disturbed (stone lines are no longer intact and water flows around individual stones, rather than cascading over actual stone lines).
Sedimentation		
S1	Homogeneous bed texture	The channel bed and bars exhibit minimal sediment textural variability. (Sediment sorting is influenced by changes in LWD characteristics -- low variability means that sediment is all similarly sized, regardless of actual texture).
S2	Sediment fingers	Long linear fingers or stripes of fine textured sediment (commonly coarse sand in cobble-gravel bed streams) extend longitudinally along the channel bed.
S3	Sediment wedges	The channel develops extensive "wedges" of sediment. In extreme cases, the channel can be completely de-watered. Associated with channel bends, bedrock outcrops, LWD jams, or large pieces of LWD or root wads.
S4	Extensive bars	Areas of bar extend throughout the entire channel reach and consist primarily of bed material with minimal flowing water during low flows (the extreme is a de-watered channel that may develop in association with individual sediment wedges).
S5	Extensively scoured zones (bed)	The majority of bed and bar material is absent due to scouring flows.

Pattern - Channel pattern

Definition: The path of the channel banks in relation to a straight line (within the site).

Method: Compare the existing channel pattern to the drawings.

Recording Procedure: Circle the channel pattern code.

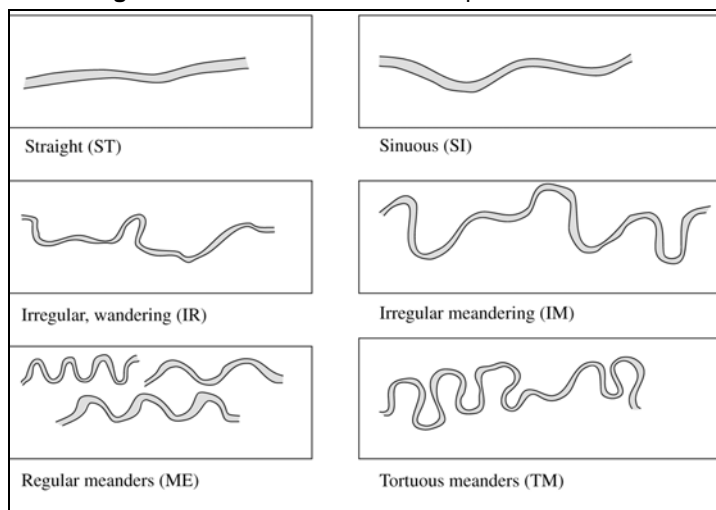


Figure 6: Channel patterns

Islands

Definition: A bar with permanent vegetation over at least half the surface area, and appear relatively stable (not likely to be eroded during the next high flow).

Method: Visually assess the type.

Recording Procedure: Circle the island type.

Code	Description
N	None - no islands in channel
O	Occasional - no overlapping islands, average spacing between ten or more W_b
I	Irregular - infrequent overlapping, with average spacing less than ten W_b
F	Frequent - not overlapping, average spacing less than 10 W_b
S	Split - islands overlap frequently or continuously; usually two or three flow branches
AN	Anastomosing – continuously overlapped islands, with multiple flow branches

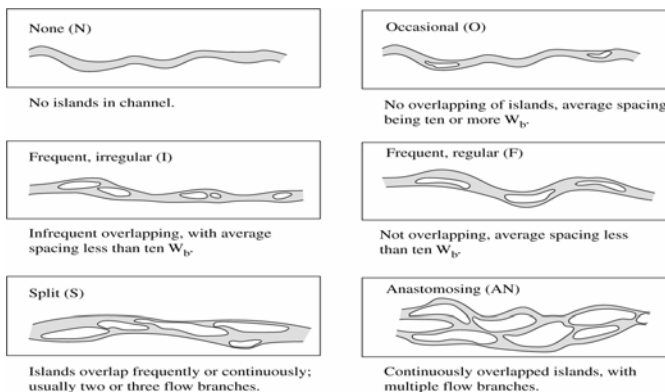


Figure 7: Islands

Bar Types

Definition: Sediment deposit in the channel that is typically more than one particle diameter high or has lengths of the same order as the channel.

Method: Visually assess the dominant type of bar present within the site. When unsure of the bar type, observe where sediment is stored (e.g., in the middle of the channel or against one of the banks).

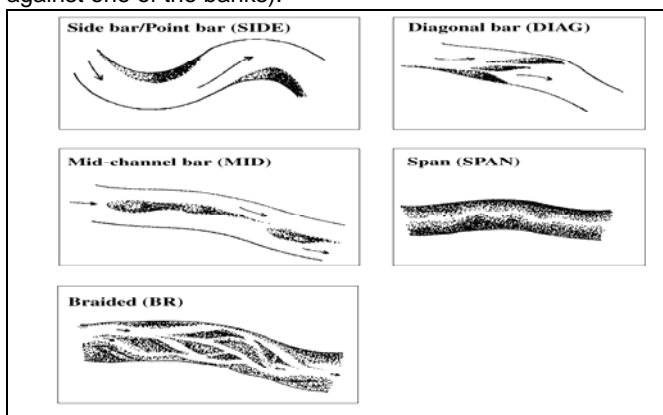


Figure 8: Types of channel bars

Recording Procedure: Circle the code.

Code	Description
N	None
Side	Sediment deposition intermittent along the sides of the stream.
Diag	Mid-stream sediment deposition diagonally aligned to stream axis.
Mid	Mid-stream deposition aligned parallel to stream axis.
Span	Sediment deposition continuous along the sides of the stream.
Br	Sediment deposition forms a number of small channels separated by bars.

Coupling

Definition: The connections among the stream channel, valley bottom, and hillslopes and the potential sediment mobilized on the hillslopes to enter a stream channel.

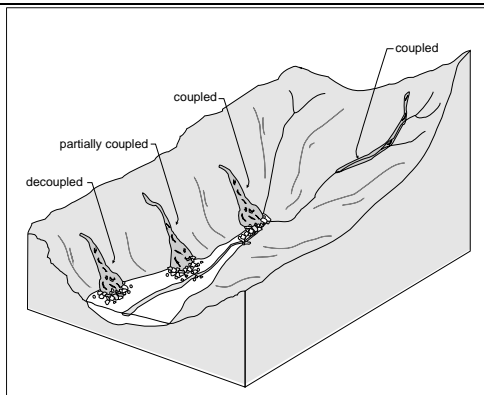


Figure 9: An illustrated example of coupling (CAP 1996)

Recording Procedure: Circle the character for the type of coupling observed. It does not matter from which bank the sediment enters.

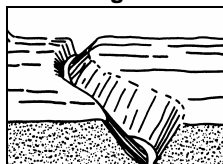
Code	Description
DC	Decoupled - Sediment mobilized on the hillslope by a landslide normally would not enter the stream channel.
PC	Partially coupled - A portion of the sediment mobilized on the hillslope by a landslide directly enters the stream channel.
CO	Coupled - Sediment mobilized on the hillslope by landslide activity directly enters the stream channel.

Confinement

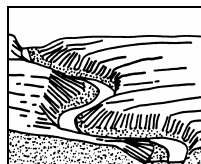
Definition: The ability of the channel to migrate laterally on a valley flat between surrounding slopes.

Method: Visually assess.

Recording Procedure: Circle the code.



Entrenched (EN)



Confined (CO)

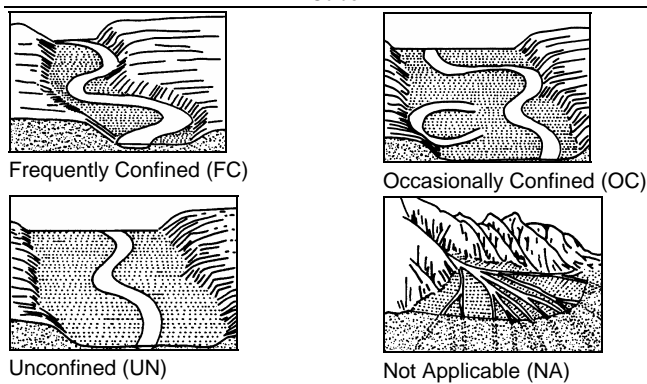


Figure 10: Examples of confinement

Code	Description
EN	Entrenched channels are confined by fluvially eroded gullies or valleys or bedrock walls.
CO	Confined channels are prevented or restricted from lateral migration by the valley walls.
FC	Frequently confined channels are restricted from lateral migration by the valley walls, but are able to store sediments on a valley flat (typically, $\leq W_b$ wide).
OC	Occasionally confined channels are able to store sediments on a valley flat (typically, 1 to 10 W_b wide) and can migrate laterally in all but a few segments of channel.
UN	Unconfined channels are not restricted from lateral migration by the valley walls.
N/A	Confinement is not always applicable to every stream reach, such as a channel flowing across a fan or cone onto a valley flat.

HABITAT QUALITY

Definition: General comments about fish habitat.

Method: Visually assess the habitat quality within the site.

Recording Procedure:

1. Record a detailed description of the habitat quality and its potential to support fish production. Use key words to describe habitat and fish species codes.
2. Comment on the habitat quality within spawning, rearing and overwintering habitats; for primary, secondary and/or off channels present; with specific reference to the requirements of species, genera or sub-family of fish known or suspected to occur within the area. Use approved fish species codes in single quotation marks (e.g., 'CH' spawning sites located) for all references to fish species.
3. Do not use comments such as "PRIMARY COVER TYPE IS LWD". PRIMARY refers to the primary channel. Choose alternative phrasing such as "DOMINANT COVER TYPE IS LWD".
4. Use key words in various tenses/forms, (e.g., spawn, spawned, spawning).
5. In the event no fish are captured, discuss reasons (low density, presence of barriers, poor water quality, etc.).

Key Words	Key Words	Key Words
OFF (channel)	REAR	BACK (channel)
PRIMARY (channel)	MIGRATING	LWD
SECONDARY (channel)	SIDE (channel)	OBSTRUCTION
SPAWN	RIFFLE	BARRIER
OVERWINTER	GRAVEL (spawning)	POOL

Code	Description	Code	Description
SP	Unidentified species	SB	Stickleback
AO	All salmon	SG	Sturgeon
BS	Bass/sunfish	SU	Sucker
BH	Catfish	TR	Trout

CBC	Chub	WF	Whitefish
DC	Dace	L	Lamprey
SA	Salmon	C	Minnnow
CC	Sculpin	P	Perch
SM	Smelt		

FSZ - Fisheries Sensitive Zone

Definition: A flooded depression, pond or swamp. It does not include a stream, wetland or lake, that either perennially or seasonally contains water and that is seasonally occupied by a species of fish listed in the definition of "fish stream" in the operational planning regulation).

Method: Identify any Fisheries Sensitive Zones located within the site.

Recording Procedure:

1. Check the FSZ box and provide relevant comments.
2. Indicate the general FSZ location on field maps.
3. If necessary to georeference the FSZ, treat it as a feature.

PHOTODOCUMENTATION

Definition: Photodocumentation verifies the physical characteristics documented on the Site Card.

Method:

1. Take a photo looking up and downstream in a representative area of the site. **Do this at every site.**
2. Include banks, general characteristics and a scale in the photo.
3. Take photos for identified features, several representative fish within a basin (not required at every site), fish found outside of their expected range, and unidentifiable, diseased or parasitized fish.
4. Take additional photos to aid in documentation of the site characteristics.

Recording Procedure:

1. Record the number of the film roll used under **ROLL #** (Film Cameras).

2. Record the number of the photo frame taken under # (Film Cameras).
3. Use the comments field to track your photos if using a digital camera.
4. Record the focal length (**FOC LG**) at which the photo was taken. Record in descriptive or numeric format using codes:

Code	Description	Focal Length
WD	wide	<35 mm
STD	standard	35 - 50 mm
TE	telephoto/zoom	>50mm

5. Record the direction (**DIR**) in which the photo was taken using codes.

Code	Definition	Code	Definition
U	Upstream	X	Across the stream
D	Downstream	BD	Towards the stream bed

6. Record any additional comments about the photo.

WILDLIFE - WILDLIFE OBSERVATIONS

Definition: Wildlife includes reptiles, amphibians, mammals, birds and aquatic invertebrates that inhabit the waterbody and the immediate vicinity.

Method: Observe signs of aquatic wildlife including tracks, droppings, territorial markers (e.g., bear claw marks on trees), nests and evidence of browsing.

Recording Procedure:

1. Identify and record the wildlife group with the given codes.

Code	Definition	Code	Definition
REP	Reptiles	BIR	Birds
AMP	Amphibians	INV	Aquatic invertebrates
MAM	Mammals		

2. Record the method of observation and the scientific or common name to the lowest possible taxonomic level.
3. If a wildlife species is extremely common in a region and its distribution is well documented, do not record observations unless there is a direct sighting (e.g., moose in Northern BC.)

COMMENTS

Definition: Supplemental data.

Method: Gather additional information for use in the assessment.

Recording Procedure:

1. Record all additional comments about observations, deviations from the average method used or from the codes available, or information in addition to Site Card codes.
2. Reference the comment with a number.

APPENDIX

UTM Coordinates

Field UTM, Feature UTM and Fish Sampling Site UTM

Code	Method Type
AP	Aerial photo interpretation
GIS	Geographical Information System
GP1	Geodetic survey grade
GP2	Survey grade GPS
GP3	Recreational grade GPS
GPU	Uncorrected GPS
MAP	Map interpretation
O	Other (specify type in comments)

MEASUREMENT METHODS

Site length, Channel Width, Wetted Width, Res. Pool Depth, Bankfull Depth, _{D95}, D, Flood Signs, Features

Code	Definition
AL	Abney type level
AE	Aerial estimate
AP	Air Photo
GIS	Geographical Information System
GE	Ground estimates
HC	Hip-chain
RFL	Laser range finder
MAP	Map interpretation
MS	Meter stick
T	Meter tape
RF	Range finder
RFV	Standard range finder
SC	Surveyor's chain
O	Other

Bank Texture and Bed Material

Class	Size (cm)	Description
Fines (F)	<0.2	Smaller than ladybug size
Gravels (G)	0.2 - 06.4	Ladybug to tennis ball size.
Cobbles (C)	0.6.4 - 25.6	Tennis ball to basketball size.
Boulders (B)	> 25.6	Larger than a basketball
Rock (R)	>400.0	Includes boulders and blocks larger than 4m, and bedrock.
Anthropo-genic (A)	Variable	Includes rip-rap, dikes etc.

Nomogram

