
Standards for Fish and Fish Habitat Maps

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B.C. Fisheries
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for the
Resources Inventory Committee

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The Resources Inventory Committee consists of representatives from various ministries and agencies of the Canadian and the British Columbia governments as well as from First Nations peoples. RIC objectives are to develop a common set of standards and procedures for the provincial resources inventories, as recommended by the Forest Resources Commission in its report “The Future of our Forests”.

For further information about the Resources Inventory Committee and its various Task Forces, please access the Resources Inventory Committee Website at:
<http://www.for.gov.bc.ca/ric>.

This is an updated version of the May 1997 document of the same name.

This version of this document (main body) was updated by headquarters staff of the Fisheries Ministry (Tony Cheong, Sean Cheesman, Don Philip and Stu Hawthorn), with input from regional Inventory Specialists. The Figures were prepared by Richard Dabrowski. The Digital Mapping Specifications portion was written by Graham Smith and Don Philip. Contributions to the earlier version were made by Bruce Mackenzie and staff of the Information Systems Branch, MELP, who developed the symbol lookup table.

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Introduction

This document presents guidelines to standardize the map format, content and presentation of the Fish and Fish Habitat information on aquatic inventory maps. Although designed for 1:20,000 or 1:50,000 scale of map presentation (common scales of representation for aquatic information in reconnaissance and overview inventories), many of these guidelines are also applicable to maps at other scales.

These guidelines are primarily intended for the production of maps associated with the Reconnaissance (1:20,000) Fish and Fish Habitat Inventory and related derivative maps (e.g., overview, project and interpretive) for land management uses. Interpretive products are not discussed here. Information on classification and other interpretations can be found in other documents such as the Forest Practices Code “Fish-Stream Identification Guidebook” (for stream class designation).

Note that the appearance and content of reach symbols is intended to be followed for reach information collected in 1998 and beyond. Reach information collected prior to 1998 should be displayed as per contract specifications in effect at the time of collection.

Although these guidelines should be followed whenever possible, they will not substitute for common sense, scientific accuracy, or positive innovations that improve clarity. Exceptions to the guidelines must be relayed to the *Inventory and Applications Section, Information Services Branch, B.C. Fisheries*.

Although a conscious effort has been made to minimize in-house terminology throughout the manual, jargon and abbreviations are used occasionally. Feature abbreviations and aquatic biophysical inventory terminology are defined in the Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures (2001) and in the Fisheries Information Summary System: Data Compilation and Mapping Procedures (1997)

Other references include; An Introduction to the British Columbia Watershed Atlas (MELP, 1996), Physical Data Model of the British Columbia Watershed Atlas (MELP, 1996), and User’s Guide to the British Columbia Watershed/Waterbody Identifier System (2001).

1.0 Determination of Map and Presentation Scale

Fish and fish habitat inventories are conducted at three main levels of intensity: overview, reconnaissance and intensive, depending on the requirements of the project. While the level of survey determines the scale of the maps required, the same information may be used at different scales. Two kinds of maps are usually employed for inventory purposes: standard British Columbia Geographic System (BCGS) maps (e.g., TRIM) and/or National Topographic System (NTS) maps, that are used for compilation of existing data and for recording information during field work; and presentation maps, that are products of the inventory.

In this document, the term “mapping scale” represents the standard scale of BCGS (scale 1:20,000) or NTS maps (scales 1:250,000, 1:125,000, 1:100,000, 1:50,000, etc.).

“Presentation scale” signifies the scale used to best display data on presentation maps.

Presentation scale may differ from the mapping scale and is chosen to display the inventory data with maximum clarity. Attempting to place detailed surveys (large-scale mapping) on less detailed, smaller-scale maps can result in a cluttered, hard-to-read map. Therefore, a project may require several different scales for different sections of a study area. Presentation maps can be overview maps, project maps and/or interpretive maps.

The purpose of the project and, therefore, the information being displayed on the project maps determines the symbology used. Different presentation maps can use different symbol codes depending on their exact purpose. For example, three main presentation maps are used for fish and fish habitat reconnaissance inventory (see Appendix 3). Specific requirements for each of these three are listed in Appendix 3. The “**Overview map**,” shows the entire project area and locates the project spatially. The “**Project map**,” displays NEW information for the inventory project. The “**Interpretive map**” summarizes inventory information and includes some interpretations (e.g., stream class). Decisions about map purpose and future distribution should be discussed in the planning stages of the mapping process. In some cases all three presentation maps may have the same codes or a combination of codes. To avoid problems that arise during the compilation of the final product, it is strongly recommended that the choice of base map and survey intensity be discussed with a cartographer/GIS specialist during the initial planning of the project.

Maps produced in accordance with the Standards for Fish and Fish Habitat Maps given in this manual should be reproduced in colour. If the maps are produced in black and white, then additional information must be included to substitute for the loss of colour detail. This should be decided in the planning stages of map production.

2.0 Mapping Specifications for Watershed and Reach Identification

2.1 Watershed Information

2.1.1 Watershed boundaries

A watershed boundary is a divide between adjoining watersheds and follows the height of land between two drainage basins.

MELP/RIC standards for watershed boundary line types (line symbology and codes) can be found in the BC Environment Line Symbology Look-Up Tables on the web at <http://www.env.gov.bc.ca/gis/arcsymbols.html>. If the study area spans more than one map, the watershed boundaries of adjacent mapsheets must align correctly and be of the same hierarchy. Furthermore, the boundary line 'type' must be appropriate to the channel hierarchy as illustrated in Figure 1.

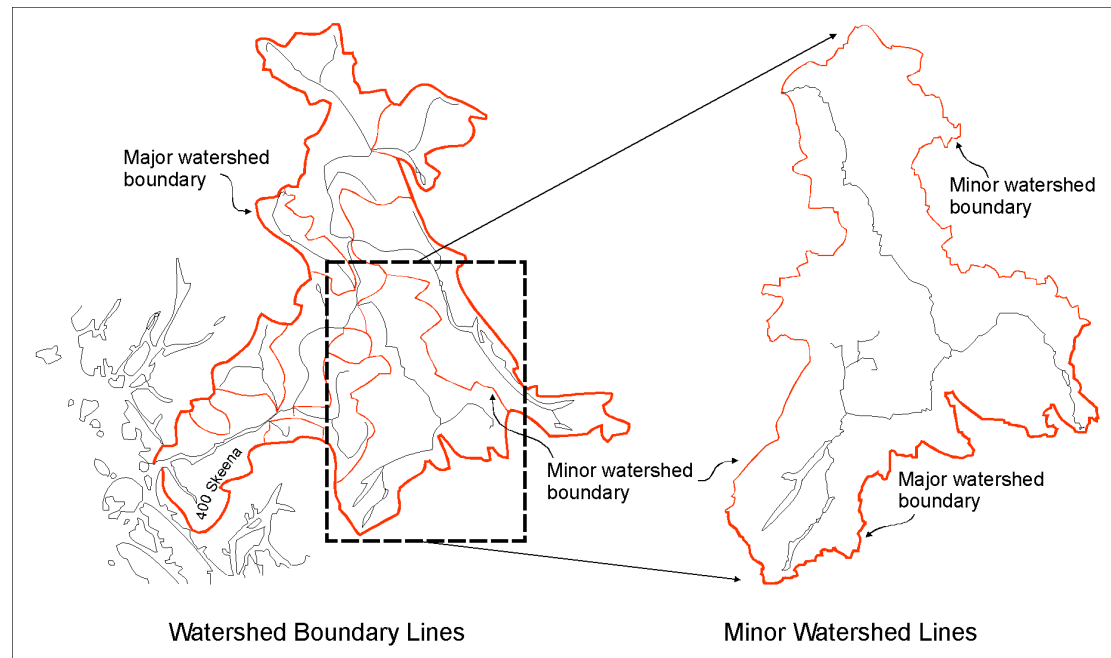


Figure 1 - Watershed code placements with boundary lines

'Major watersheds,' when shown on small-scale locational maps, may also have the watershed name (e.g., 400-Skeena Watershed) along any identified boundaries (Figure 1). The watershed code number for any unsurveyed large or important basins within the mapsheet area should also be presented, provided such optional additions do not cause excess clutter.

Sometimes it may be necessary to omit a watershed boundary of a surveyed channel due to space constraints, or it may not be possible to appropriately place the watershed code and watershed/waterbody identifier. In such cases, the code number is placed in a rectangular box and attached to the headwaters of the surveyed channel for which information is available.

Watershed boundaries that have changed because of impoundment may have the historic boundary indicated by a “pre-impoundment watershed boundary” designation. Pre-impoundment watershed boundaries are dotted lines with labeling criteria that are the same as normal watershed boundaries.

2.1.2 Watershed code and watershed/waterbody identifier

The **watershed code** and **watershed/waterbody identifier** when used must be clearly designated on the map (Figure 2). Conventionally, the watershed code displayed on the map is abbreviated by displaying only the last 2 non-000 suffix groups, a watershed code number shown in the database as **349-248100-66000-00000-0000-0000-000-000-000-000-000**, would appear on the map as **-248100-66000**. All watershed codes and stream names used must conform to the watershed code dictionary. In the absence of an existing watershed code and/or waterbody identifier, an **interim locational point (ILP)** must be used (Figure 2). Guidelines for their creation and use appear in ‘User’s Guide to British Columbia’s Watershed/Waterbody Identifier System,’ 2001, Revision 2.2. For initial display, these ILP’s should be placed in a box with an arrowed leader line similar to that used for watershed codes and waterbody identifiers (see Figure 2). Following receipt of these ILP’s, the Fisheries Ministry will create the final watershed code/waterbody identifier which must then be displayed on the final map products.

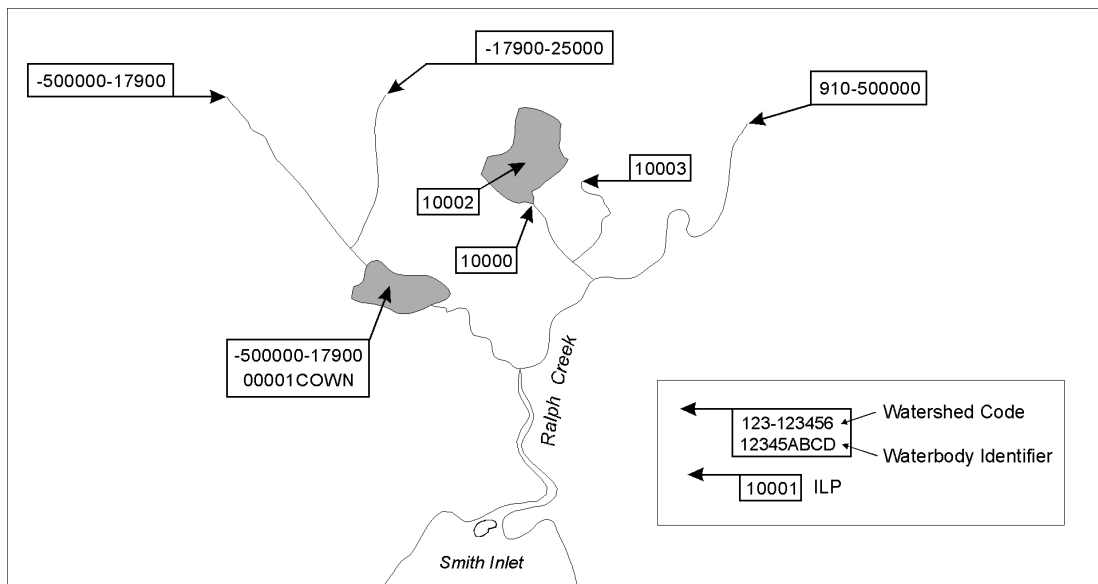


Figure 2 - Watershed code and watershed/waterbody placement

The **watershed/waterbody identifier** uniquely identifies a waterbody within a watershed in the province of British Columbia. It consists of two parts: Part 1, the watershed group/waterbody key, contains 9 alpha-numeric characters comprised of 5 digits followed by a 4-letter acronym of the parent watershed group (e.g., 00708HORS); and, Part 2, the sequential waterbody identifier which consists of five characters (e.g., 01394). For further information on the watershed/waterbody identifier, see ‘User’s Guide to British Columbia’s Watershed/Waterbody Identifier System,’ 2001, Revision 2.2.

2.2 Reach Information

2.2.1 Reach breaks and reach numbers

A **reach** is defined as a length of a channel with homogeneous hydrologic and physical characteristics. A **reach break**, therefore, marks the boundary between adjoining reaches. Each reach on a stream is assigned a unique number in an upstream-ascending order, the first being the reach closest to the mouth of the stream. This is termed the **reach number**. Reach numbers should only be placed at the upstream boundary (break) for each reach (see Figure 3). If additional reaches (e.g., due to field evidence) need to be added, a decimal system is to be used. This is illustrated in Figure 3 where an additional reach was added, any further additions would be 2.1, 2.2, etc.

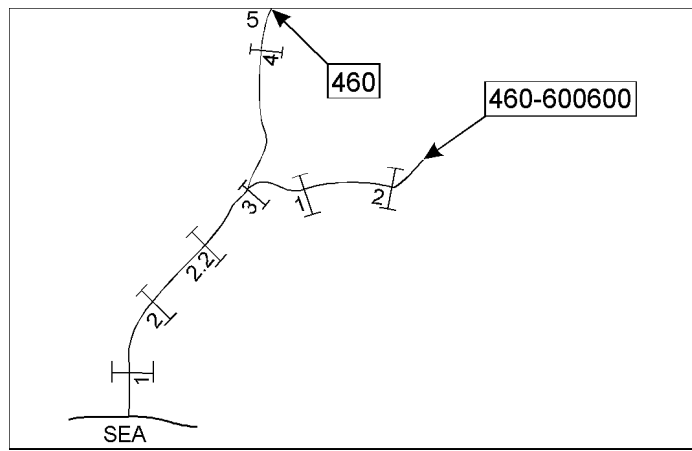


Figure 3 - Reach break and reach number placement

Reaches are identified on maps using labels and symbols. The boundary between adjacent reaches is represented by reach break symbols (see Table 1) drawn across the channel at right angles and labeled with the numbers of the reach downstream of the symbol (Figure 3). Hence a reach break symbol with the number 2 immediately downstream of that symbol would indicate the reach break is between reaches 2 and 3.

Table 1. Reach break symbols and labels

Symbol	Feature Code	Label	Description
	FF85660000	1, 2, 3,...	Reach – record only reach number.
	FF85660016	None	Termination of survey symbol – upstream
	FF85660017	None	Termination of survey symbol – downstream

As mentioned, the reach label is placed immediately adjacent to and on the same angle as the reach break symbol. In case of a confluence, the label is placed where it is easy to read and the reach symbol is clearly visible. Figure 3 illustrates correct placement of reaches labeled with reach numbers. **Note: reach numbers are placed at the upstream end of the reach.**

Where channel lines extend beyond the edge of a map, it may be unclear what reach number corresponds to the adjacent reach on the adjoining map (see Figure 4).

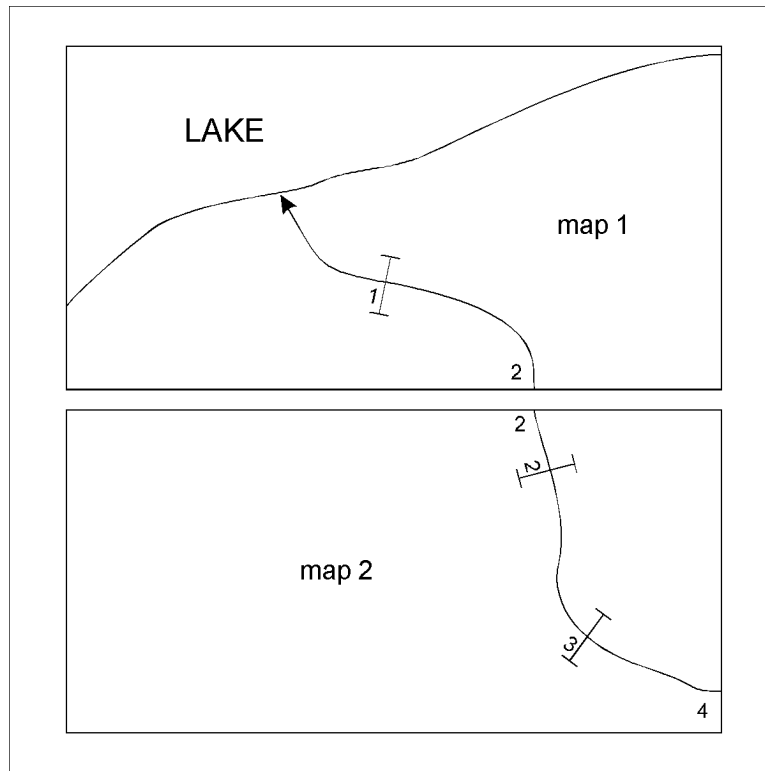


Figure 4 - Reach break label placement (map edges)

This is clarified by placing the appropriate reach number (*with no reach break*) next to the channel line at the mapsheet edge.

Lake inlet and outlets are natural stream reach breaks but mapping standards require that all reach breaks be indicated. Therefore, reach break symbols should be placed at the inlet and outlet of the lake along with the appropriate labels. The reach symbol is placed perpendicular to the stream at the inlet and outlet as shown in Figure 5.

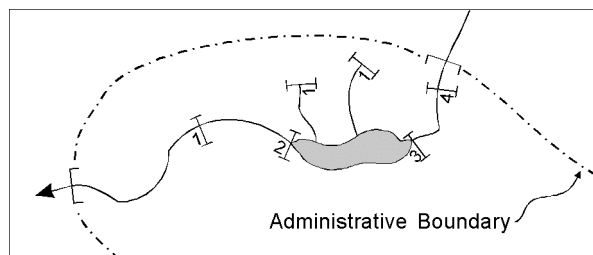


Figure 5 - Lake reach break/termination of survey symbols placement

2.2.2 Termination of survey symbol

In some instances surveys may end prior to reaching the mouth or headwaters (e.g., due to administrative or project boundary). At this point a **termination of survey upstream** symbol (see Figure 5) is used to denote the fact that the channel characteristics have changed from those in the previous reach, but no information for this next stream section is being provided. The symbol is placed just upstream of the last reach break. This symbol is *not* used if the end of the reach is the headwaters or mouth of a waterbody.

To mark the downstream extent of a survey the **termination of survey downstream** symbol is used. The symbol is placed just downstream of the last reach break (Figure 5).

In those instances where no reach breaks are indicated (e.g., stream sampled at road crossing) the symbols should be placed at the upstream and downstream extents of the sampled section.

2.2.3 Sample site symbol

A **sample site** is defined as the point at which fish inventory information has been collected. It is represented on the map as a circle with a dot at its centre. The number of the sample site is placed adjacent to the symbol except where a site data symbol is connected to the sample site at which time the number is placed at the start of the data symbol.

2.2.4 Site data symbol – project maps

When present, the site data symbol (divided into 2 sections) contains the required information regarding fish species and site characteristics. Figure 6 illustrates an example of the site data symbol.

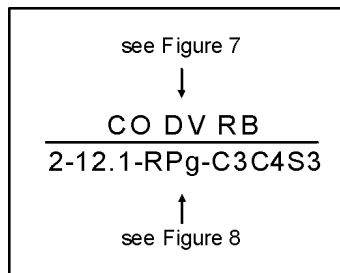


Figure 6 - Site data symbol

The upper portion of the symbol contains the **fish species present** and the lower portion the **site characteristics**.

The fish species portion of the site data symbol contains the codes of fish species identified at the site (Figure 7). Fish species codes are listed alphabetically and written in capital (uppercase) letters.

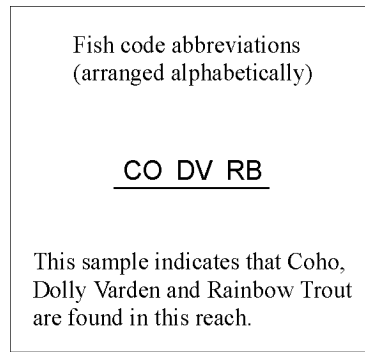


Figure 7 - Fish species

Fish species are listed with one space between each code. This spacing is unique to the fish portion of the site data symbol. Refer to Section 3.1 for a description on the use of the codes and Appendix 2 for a listing of Fish Species codes for BC.

The sample site characteristics are summarized in the lower portion of the symbol (Figure 8). This component of the symbol is comprised of 5 data items, separated by hyphens: the site gradient to the nearest whole percentage; the site average width to the nearest tenth of a metre; the channel morphology code; the dominant substrate code; and site disturbance indicators.

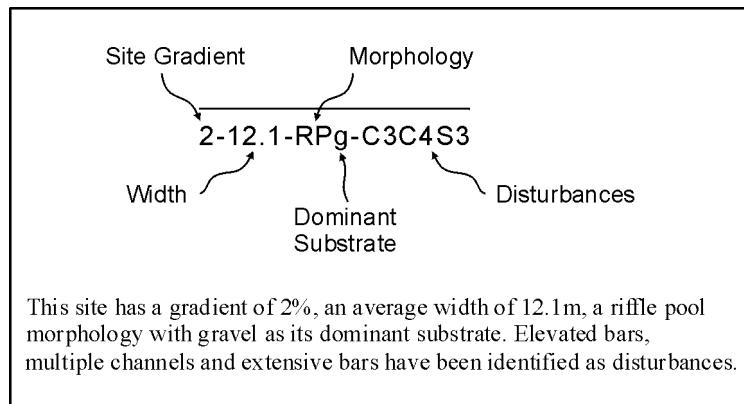


Figure 8 - Site characteristics

For elaboration on the data items contained in the symbol, and the relevant codes, refer to the Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures, 2001.

When mapping, if a sample site is present in the reach, the pointer from the site data symbol must be connected to the sample site (Figure 9). If multiple sample sites occur within a reach a site data symbol must be connected to each site. The site number should be indicated adjacent to the symbol as shown in Figure 9. The final map must be checked to ensure that there are no unattached, “floating” symbols.

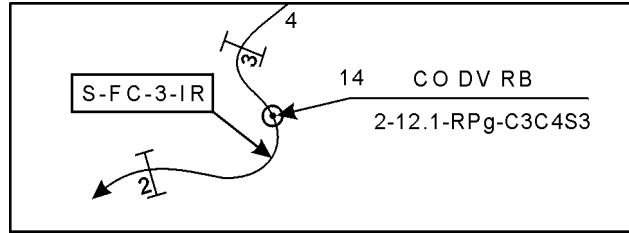


Figure 9 - Site data symbol/reach data symbol

2.2.5 Reach data symbol

The reach data symbol (Figure 10) displays required attributes of each reach. This information consists of four data items: stream or wetland designator; confinement code; gradient (to the nearest whole percentage) and channel pattern code. These data items are separated by hyphens.

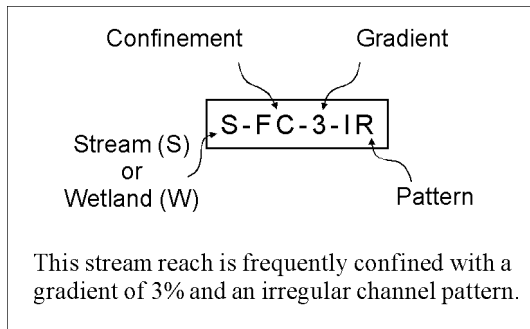


Figure 10 - Reach data symbol

When mapping, the pointer from each data symbol should connect to the approximate mid-point of the appropriate stream reach (Figure 9).

2.2.6 Reach summary symbol – interpretive maps

When present, the reach summary symbol (divided into 3 sections) contains required information regarding **fish species, channel properties, and stream classification**.

The upper portion of the symbol contains fish species, the lower left portion contains gradient and width, and the lower right portion the stream class.

The fish species portion of the reach summary symbol is as described for the site data symbol (Figure 7) with one major difference: species only **suspected** of being present in the reach (as opposed to being confirmed) are indicated in **parentheses** (Figure 11). Two channel characteristics, gradient and width, may be displayed in the lower left portion of the symbol (Figure 11), separated by hyphens. These should be displayed when a sample site is present. If displayed where no sample site exists, it is assumed that the information is inferred.

The lower right portion of the reach summary symbol (Figure 11) contains the stream class designation. The Forest Practices Code “Fish-Stream Identification Guidebook” should be consulted for stream classification.

When mapping, the pointer from the reach summary symbol must be connected to the approximate mid-point of the reach or, where clutter poses a problem, at a cartographically appropriate location. The final map must be checked to ensure that there are no unattached, “floating” symbols.

Figure 11 illustrates an example of the reach summary symbol.

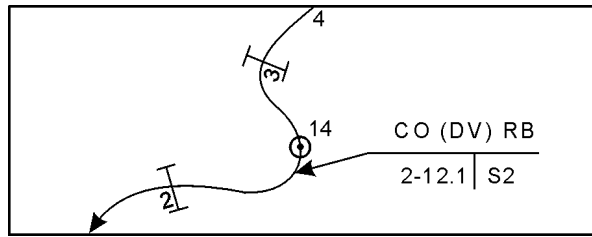


Figure 11 - Reach summary symbol and placement

2.2.7 Lake summary symbol – project maps

When present, the lake summary symbol (Figure 12) has 3 sections: general physical information (upper left); detailed physical information, if a primary survey was completed (upper right); and fish species sampling information (lower).

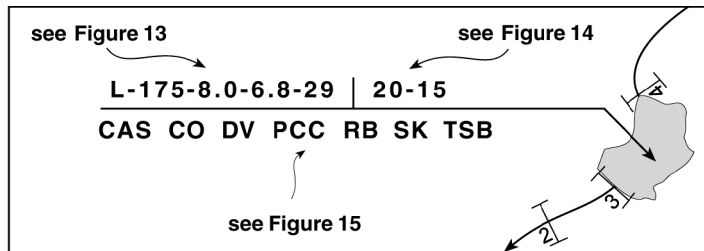


Figure 12 - Lake summary symbol

The upper left portion of the symbol (Figure 13) summarizes physical information for a surveyed lake and contains four pieces of data separated by hyphens: the lake or wetland designator; the surface area in hectares; the maximum depth in metres; the pH; and the conductivity in $\mu\text{S}/\text{cm}$.

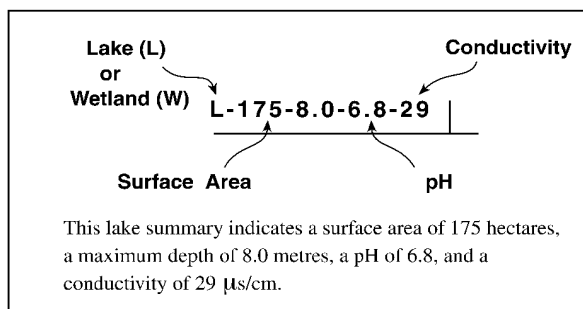


Figure 13 - Physical information for a surveyed lake

The physical information for a surveyed primary lake appears in the upper right portion (Figure 14) and contains the hyphen-separated data for Total Dissolved Solids and percentage littoral area.

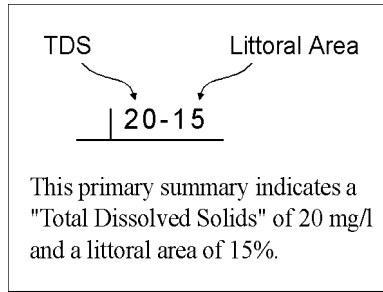


Figure 14 - Physical information for a surveyed primary lake (detailed)

Fish species sampled are displayed in the lower portion of the symbol (Figure 15).

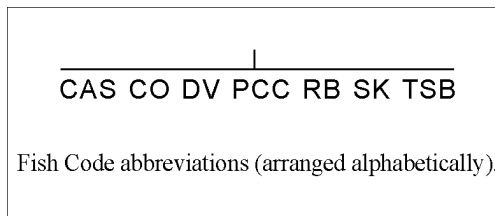


Figure 15 - Fish species codes

3.0 Mapping Specifications for Fish and Fish Habitat Information

3.1 Fish-related Symbols and Species Codes

The **fish-related symbols** and **species codes** encompass all types of fish information recorded and are used to identify the **fish classes** (sport, salmon, regionally significant or other). They designate where fish are present and/or observed and indicate spawning and distribution zones. These colour-coded symbols are designed to show point positions or ranges along with fish classes.

Fish symbols are placed on the stream to mark the original site of observation or presence in the waterbody and represent the fish class (sport, salmon, other or regionally significant species), as illustrated in Figure 16.

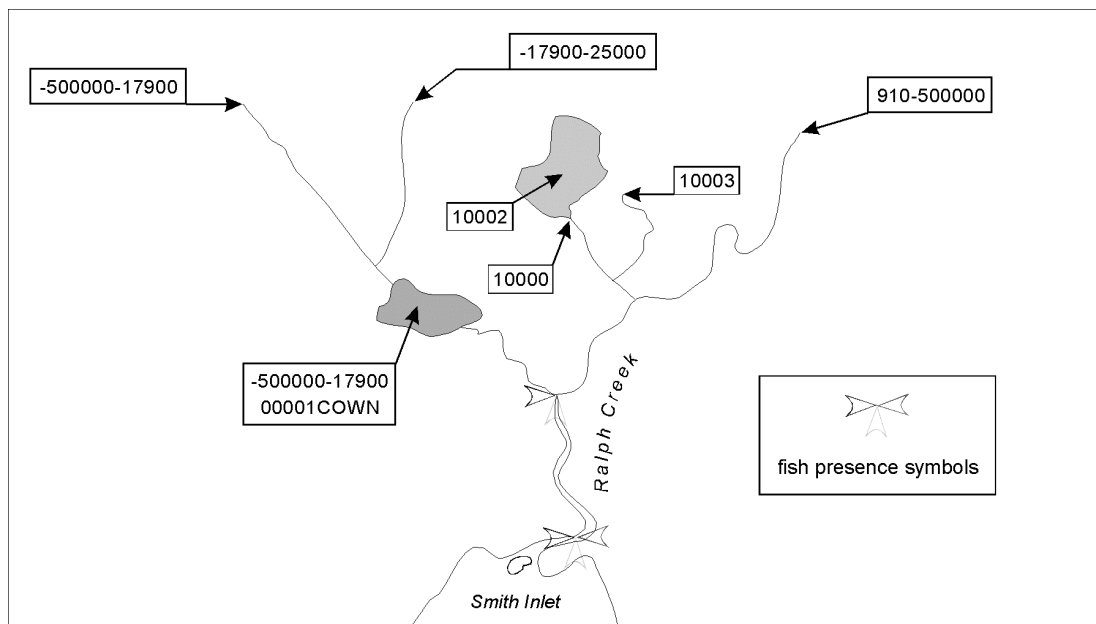




























Figure 16 - Fish presence symbols and placement

Individual fish species codes may or may not be placed next to the symbols, depending on the map usage or how the map is ultimately printed i.e., black and white or colour. Project maps *do not* contain fish symbols but use the fish species codes only, but interpretive maps use both the fish symbols and fish species codes. Fish related symbols and respective feature codes are given in Table 2 and Appendix 1 while the fish species codes are listed in Appendix 2.

Table 2. Fish symbols, feature codes and descriptions

Symbol	Feature Code	Description
Fish Limits		
	FF85510110	Salmon, upstream limit
	FF85520110	Salmon, downstream limit
	FF85510120	Sport, upstream limit
	FF85520120	Sport, downstream limit
	FF85510130	Regionally significant species, upstream limit
	FF85520130	Regionally significant species, downstream limit
	FF85510999	Other, upstream limit
	FF85520999	Other, downstream limit
	FF85510115	Salmon and Sport, upstream limit
	FF85610110	Salmon, spawning zone, upstream limit
	FF85620110	Salmon, spawning zone, downstream limit
	FF85610120	Sport fish, spawning zone, upstream limit
	FF85620120	Sport fish, spawning zone, downstream limit
	FF85610130	Regionally significant species, spawning zone, upstream limit
	FF85620130	Regionally significant species, spawning zone, downstream limit
	FF85610999	Other, spawning zone, upstream limit
	FF85620999	Other, spawning zone, downstream limit
Fish Presence		
	FF85550110	Salmon, presence
	FF85550120	Sport fish, presence
	FF85550130	Regionally significant species, presence
	FF85550999	Other, presence
	FF85550115	Salmon and Sport, presence

Symbol	Feature Code	Description
Fish Observation		
	FE85650110	Salmon, observation
	FE85650120	Sport fish, observation
	FE85650130	Regionally significant species, observation
	FE85650999	Other, observation

The following symbol colours are used to represent fish classes in Table 2: red for Salmon symbols, dark blue for Sport fish, purple for Regionally significant, green for Other and light blue or cyan for Salmon and Sport combined.

As discussed, fish species codes may or may not be placed next to the fish symbols on interpretive maps. When used, fish species codes are placed as close to the fish symbol as possible and where cartographically appropriate. Fish species codes are also placed in the site data symbol, the lake summary symbol and may appear in the reach summary symbol (see sections 2.2.4, 2.2.5 and 2.2.6). By convention, fish species are listed alphabetically.

All symbols for fish classes used on a map must be shown in the fish species box (4.1.4). Table 2 lists various fish symbols, feature codes and a brief description for the symbols.

3.1.1 Fish presence or observation

Point records for fish presence or observation are represented by hollow or solid-fill triangles. The **hollow triangle** signifies the non location-specific presence of a fish class and is used only at the mouth of the stream with the triangle apex at the stream mouth. The **solid-fill triangle**, recording a location-specific observation of a fish class, is placed at the point of observation along the stream. The apex of the triangle is placed directly on the stream line to mark the site of observation. The colour signifies the particular fish class present or observed (Figure 17).

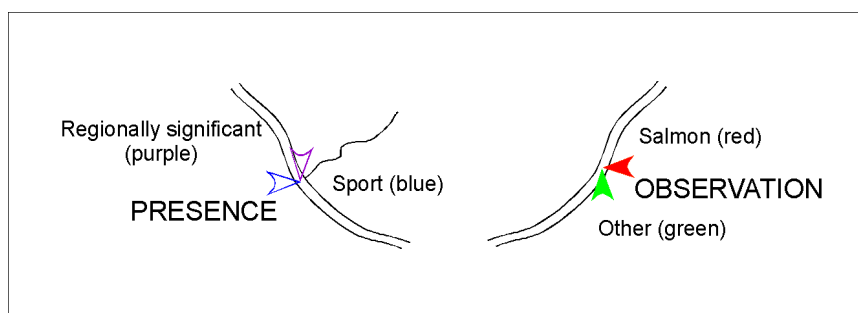


Figure 17 - Fish presence or observation symbols and placement (detailed)

3.1.2 Fish distribution

Upper and lower fish distribution limits within the stream are identified using limit symbols as listed in Table 2. Limit symbols (colour denotes fish class) are triangles placed perpendicularly on a solid line. The triangular portion of the symbol is always located on the inside of the limit line. Figure 18 illustrates the correct placement of the limit symbols.

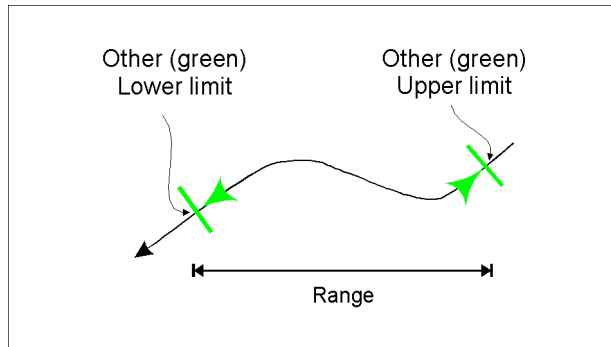


Figure 18 - Fish distribution symbol and placement

3.1.3 Spawning zones

Spawning zones have their lower and upper limits defined by a limit symbol (as described in section 3.1.2) along with an asterisk. For lower limits the asterisk is on the left side of the triangle when facing downstream. The upper limit symbol is an inversion of the lower limit symbol. Figure 19 illustrates the spawning zone symbols and their correct placement.

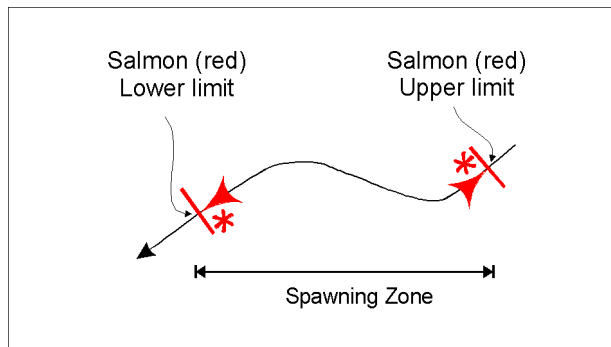


Figure 19 - Spawning zone symbol and placement

In many cases the distribution of fish classes, the spawning zones and the location of upper and lower limits overlap. When more than one symbol is needed at one point, the symbols are placed side-by-side and perpendicular to the stream. The entire group of symbols is then centered with respect to the stream line. Figure 20 illustrates the placement of fish symbols when multiple symbols occur at one limit line.

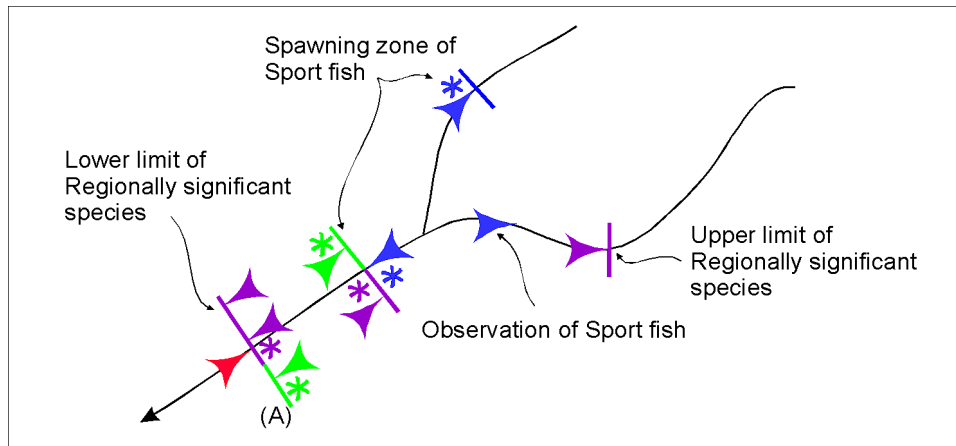


Figure 20 - Multiple symbol placements at shared limit lines

Figure 20 also illustrates a variety of symbols that can be found on a stream. For example, the lower set of symbols marked (A) represent (i) the upper limit of “salmon,” (ii) the lower limit of a “regionally significant species” and (iii) the lower spawning limit of both “regionally significant species” and “other” fish species. Detailed descriptions of these species are provided in the site data or lake summary symbols (see sections 2.2.4 and 2.2.6). For clarity, colour symbols are the preferred standard to present fish information on maps.

3.2 Channel Features and Obstructions
























Channel feature and obstruction symbols are used to accurately illustrate the precise map location of the features along the surveyed channel.

Site specific channel features, “zonal” channel features and “off-channel” features are represented by the symbols listed in Table 3.

Symbols (e.g., spring symbol) “owned” by groups other than Fisheries Inventory, when portrayed on a Fisheries Inventory map, have been assessed visually in the field by fisheries biologists and technicians. In most cases, these do not meet the standard criteria for mapping identified by the symbol “owners” and should be treated accordingly when assessing information on the map.

Site-specific channel characteristics are channel features with no appreciable mapped length (i.e., are less than 20 m long when mapping at a scale of 1:20,000). Zonal channel features apply to channel sections of appreciable mapped length (i.e., are greater than 20 m long for a 1:20,000 map).

Table 3. Physical characteristics symbols

Symbol	Code	Description
	PI11501000	Side channel
	PI30002000	Beaver Dam
	PI30003000	Cascades
	PI30004000	Falls
	PI30005000	Culvert
	PI30006000	Persistent Debris Accumulation
	PI30007000	Dam
	HB3323500	Wedge
	GA24850190	Dewatered
	GA11215000	Obstruction – undefined
	HB27900330	Landslide, generic, debris
	HB27900330	Landslide, large, generic, debris
	GF12835000	Groundwater, general direction of flow
	GF28750000	Spring
	GC90100000	Marsh
	GC90200000	Swamp
	HB10495110	Fan, alluvial
	HB10495120	Fan, colluvial
	HB10495130	Fan, talus
	HB25400000	Rock outcrop
	HB28265000	Slump
	HB27900000	Slumping bank
	HB10125000	Eroded bank

The height of the channel feature, where applicable, is placed in numeric form (in metres) to the left of the symbol. The length of the feature, where applicable, is shown in metres to the right of the symbol (Figure 21). For height, decimal values, where applicable, must have an integer preceding the decimal point (i.e., “0.7” not “.7”)

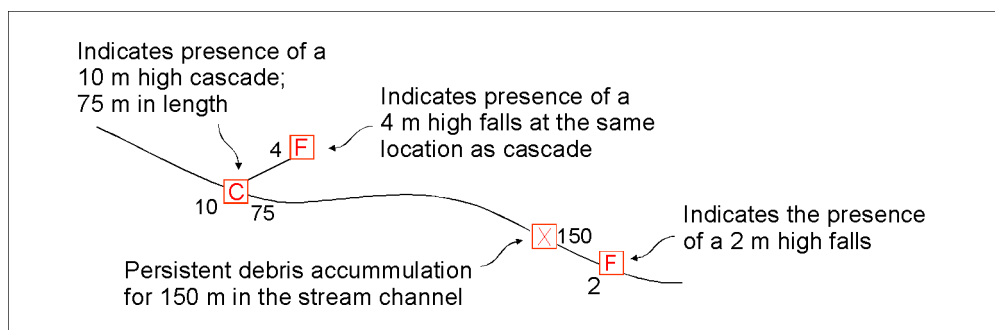


Figure 21 - Zonal features symbol with height and length placement

The symbol for the obstruction or feature is placed on the stream line at the point of occurrence or at the downstream start of the zone in the case of features with a length of occurrence. In the case of double-line rivers, the symbol is placed at or as near to the middle of the stream as is possible. If it is not possible to place the symbol at the mid-point, it should be made obvious which feature the symbol applies to. Where channel features coincide, or would be cartographically crowded, a feature may be moved off the stream line and “linked” to the correct location by means of a leader line.

Non-channel features that have a significant relevance to aquatic habitat (e.g., springs) should be mapped in the correct geographic location.

Symbols for features, other than those noted in Table 3, may be available (see Appendix 1). In addition, MELP has created an ARC/INFO lookup table which contains a more extensive set of feature symbols (<http://www.env.gov.bc.ca/gis/arcsymbols.html>).

3.3 Fisheries Enhancement/Management Activities

Enhancement and management activity symbols are used to identify sites that may have been modified for fisheries purposes, such as a hatchery, or are important for management purposes, such as a fisheries sensitive zone. Table 4 lists symbols, codes and descriptions for enhancement and management activities.

Table 4. Enhancement and management symbols

Symbol	Code	Description
	AF11150000	Hatchery
	PI11500000	Spawning channel
	PI30001000	Fishway
	PI40001000	Incubation box
	PI40002000	Counting fence
	GA33350000	Weir
	PI84510000	Fisheries Sensitive Zone

All symbols should be mapped as per channel features (see section 3.2). The exception to this is the Fisheries Sensitive Zone symbol (see Table 4), where the base of the “flag pole” is placed in the middle of the zone on the stream line. Figure 22 illustrates the placement of zonal and site specific enhancement and management symbols.

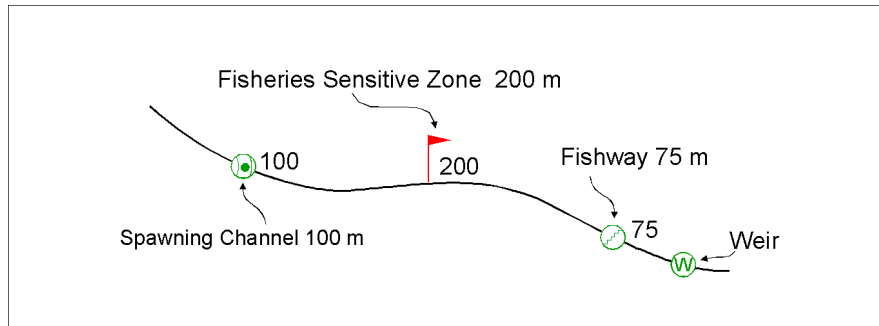


Figure 22 - Enhancement and management symbol placement

3.4 Other Related Information

3.4.1 Water quantity and quality sites

Water quantity sites are mapped only for hydrometric stations catalogued by the Water Survey of Canada and MELP (see Table 5). Ground water sites and well locations are only mapped where locations have been approved by the appropriate Water Management authorities.

Table 5. Water quality and quantity symbols

Symbol	Code	Description
◇	EP10000110	EMS/SEAM site
●	WA12800110	Hydrometric station, flow active
⊙	WA12800120	Hydrometric station, flow inactive
▲	WA12800130	Hydrometric station, both active
▲	WA12800140	Hydrometric station, both inactive
○	WA12800150	Hydrometric station, level active
⊙	WA12800160	Hydrometric station, level inactive
●	WA12100190	Well

The hydrometric station or EMS site number is placed in the box with a pointer to the symbol (see Figure 23)

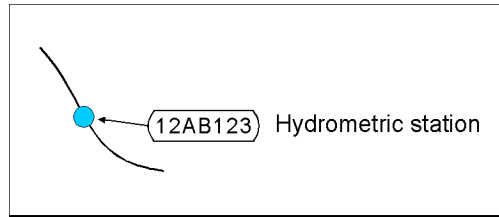


Figure 23 - Hydrometric station symbol placement

4.0 Hard Copy Mapping and Data Recording Standards

4.1 Hardcopy Map Specifics

In order to ensure **consistency** in mapping and interpretation of products, standards have been set for the map layout and information contained in the legend area.

4.1.1 Map layout

The map should contain the map area, a title box, legend box, fish species box and a source information box as illustrated in Figure 24. The title, legend, fish species and marginal information boxes are all placed on the right side of the map as shown.

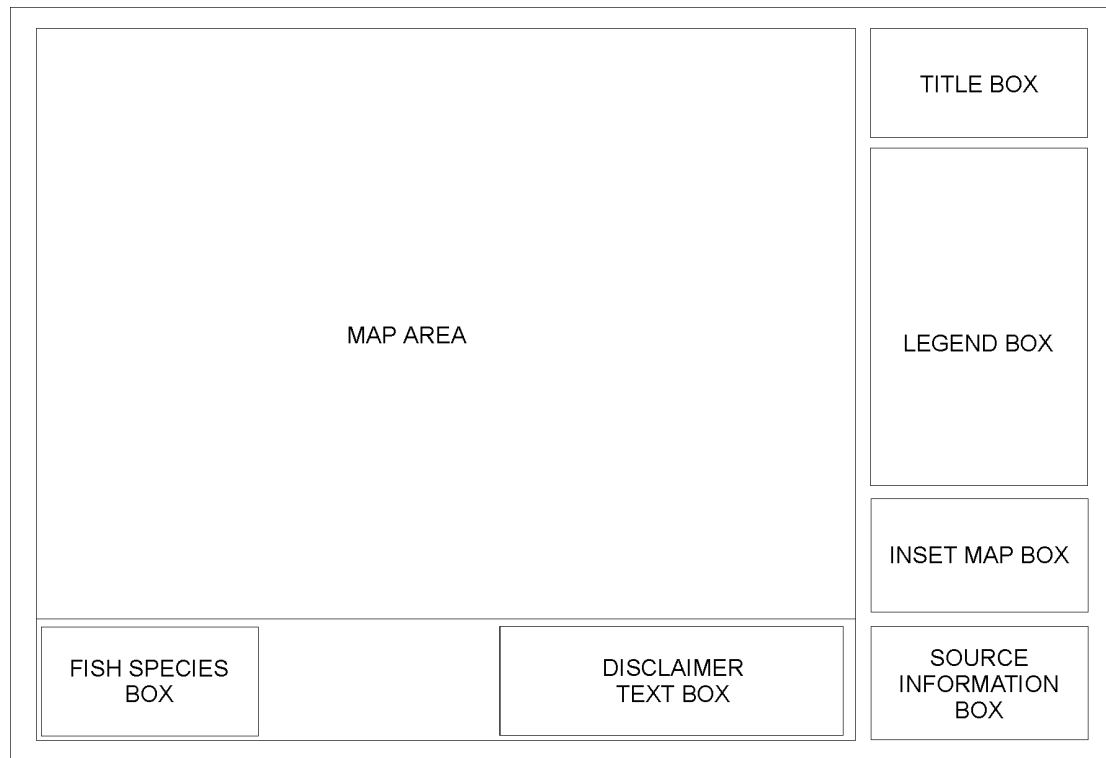


Figure 24 - Recommended hardcopy map layout

4.1.2 Title box

The title box should contain the title of the map, centered at the top of the box, which should reflect the name of the project. Below the title should appear the number of maps in the series (e.g., Project map 3 of 17). The representative fraction and the scale bar are placed beneath the map numbers. The north arrow should be placed to the right of the scales. The contour interval and projection should be provided beneath the scales, and beneath this, the date showing the month and year of production. The name of the mapping company/individual is last line of the title box (see Figure 25).

TITLE OF MAP

Map ____ of ____

SCALE: 1:20 000 0 metres 1 000

Contour Interval _____ m Projection _____

DATE _____ (yyyy/mm/dd)

COMPANY _____

Figure 25 - Map title box

4.1.3 Legend

Legend elements are shown in Figures 26, 27 and 28. The main sections to the legend are:

1. Fish Species Information;
2. Data/Summary Symbols;
3. Physical Characteristics;
4. Enhancement/Management Activities;
5. Water Survey of Canada (WSC) Information.

The legend should be legible and self-explanatory. All symbols appearing on the map sheet must be included in the legend.

Figures 26 and 28 illustrate the basic fish and fish habitat elements that could potentially be found on the maps. The legend has been split simply for clarity to provide as much detail as possible – the user would select the various legend elements based on which map is being produced. Refer to Appendix 3 (Notes on Inventory Maps) to determine the content of each map.

Species codes are required for maps being produced in black and white (see Figure 27), or where it is impractical to use symbols for fish presence in the watershed. This legend is used only as discussed in Section 1.0.

Appendix 1 lists the symbol feature codes from BC Environment. If no symbol is currently designated for a feature, the GIS Applications Unit of the Fisheries Inventory Section, B.C. Ministry of Fisheries must be contacted and will determine the correct symbol to use. See also section 3.2 for a discussion of additional symbology.

Note that on the B.C. Environment ftp site there will be 2 separate symbol sets, 1 for PC ARC/INFO and the other for UNIX ARC/INFO. Ensure that the correct set is utilized.

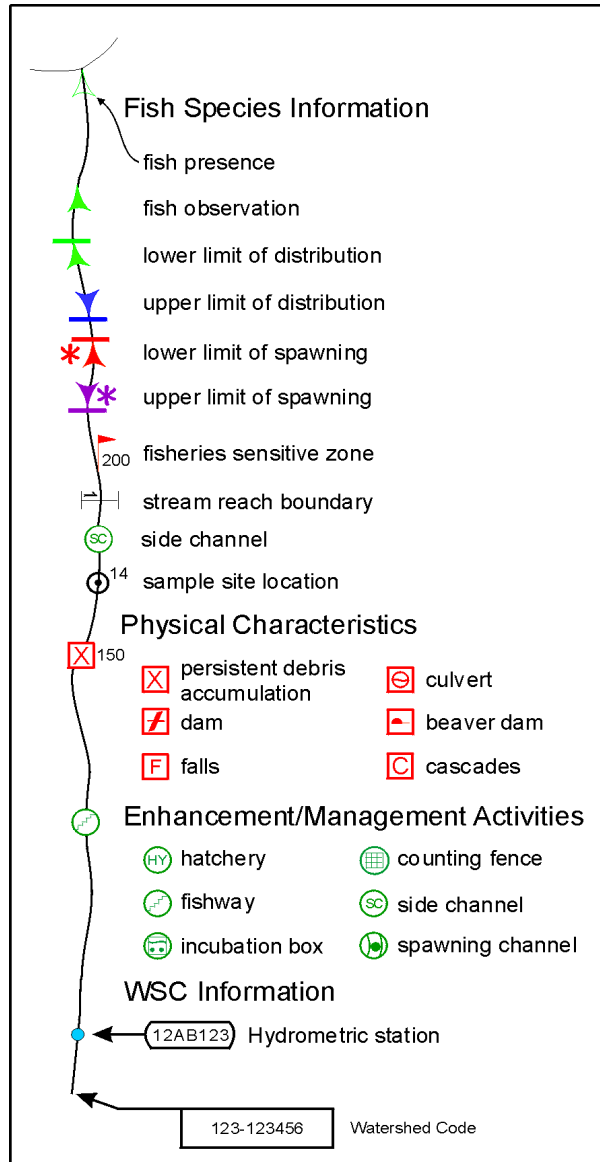


Figure 26 - Standard legend box

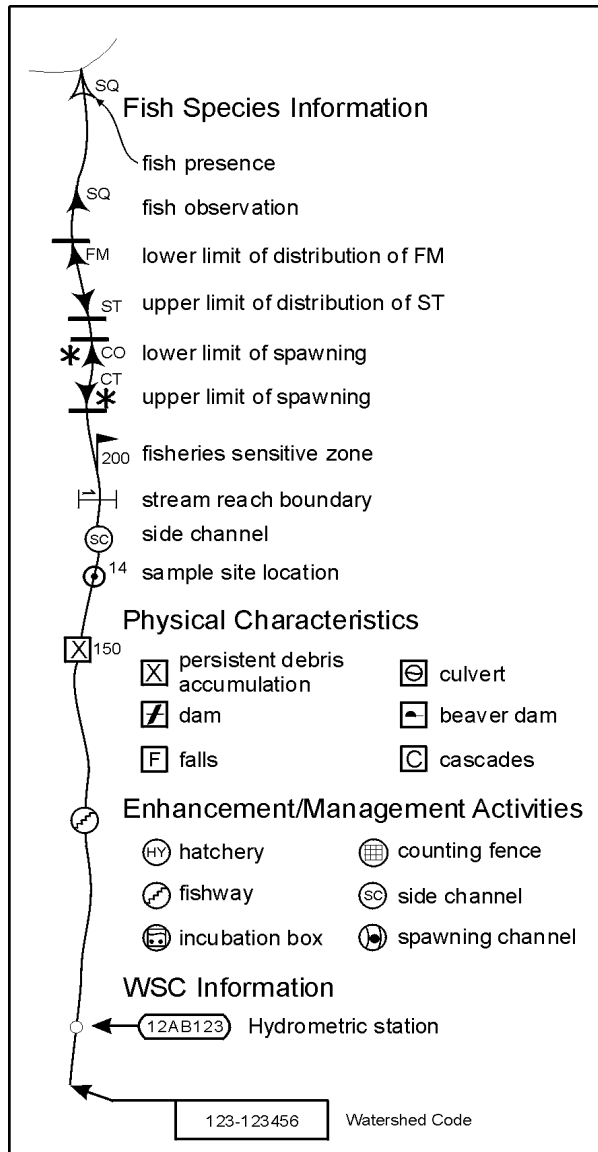


Figure 27 - Standard legend box with species summary

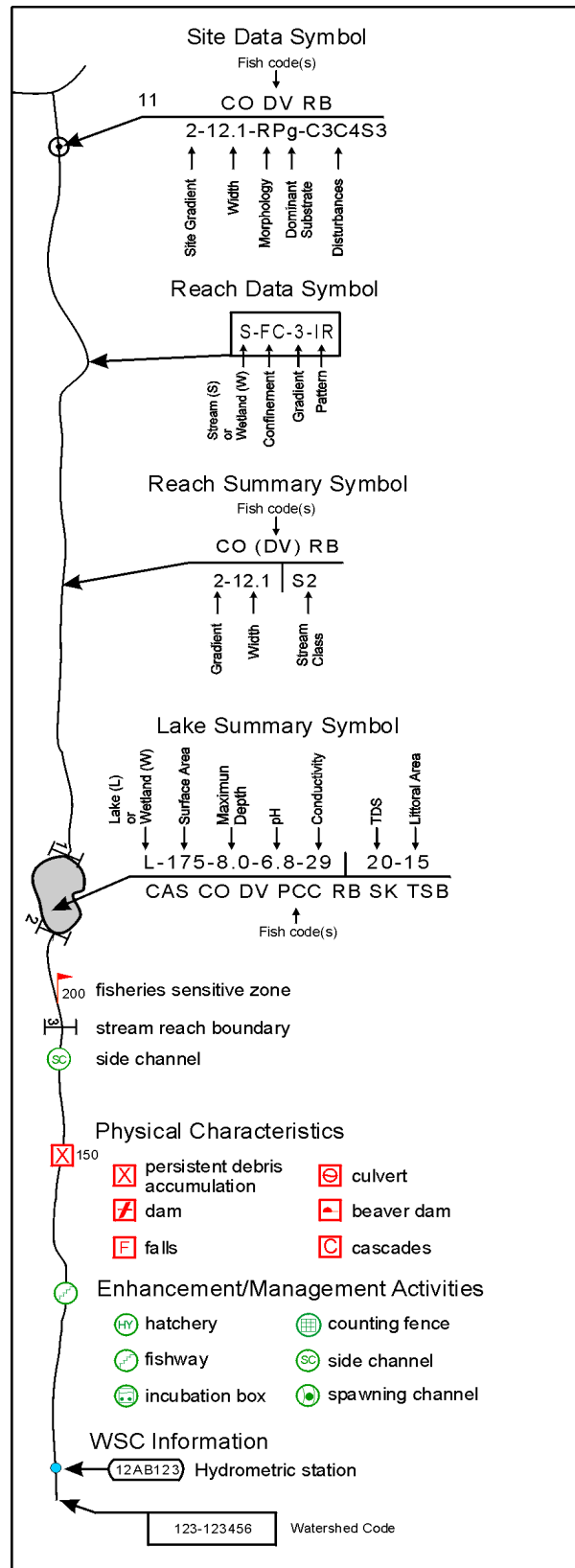


Figure 28 - Standard legend box with summary symbols

4.1.4 Inset map

The inset map is located below the map legend and should indicate the spatial relationship between the particular map and its location within the overall project area or MELP region. Due to the wide variation in size between projects, it is left to the discretion of the mapper to determine the most appropriate inset.

4.1.5 Source information box

The bottom portion of the right side of the map is reserved for the source information box. This box, illustrated in Figure 29, is important as it allows proper interpretation of the mapped information. The information includes:

1. date of inventory information
2. group or people who conducted new inventory
3. location information, and level of inventory
4. origin(s) of habitat and fish information

BASE: _____ STR SYM: _____
LOC: _____ LK SYM: _____
HAB: _____
FISH: _____
DATE INV: _____ INV MGNT: _____

Figure 29 - Map source information box

The source information box contains all the necessary information for the reader to assess the method of information gathering used to create the map via the **Source Information Codes** (Table 6). In addition to the items mentioned above, the source information box contains the base map source (BASE), the origin of the stream symbol data (STR SYM), the lake symbol data (LK SYM), the method used to locate this data for the base map (LOC), and where the habitat and fish species data (HAB and FISH) was gathered.

Table 6. Source information codes

Label	Information	Codes Standard
BASE	Base map	TR – 1:20,000 TRIM maps NTS – 1:50,000 NTS maps OTH – Other map source
STR SYM	Stream symbol	INV – field inventory SS – summary N/A – not applicable OTH – other
LK SYM	Lake symbol	INV – field inventory SS – summary N/A – not applicable OTH – other
LOC	Location information	FDE – field estimate FDG – field, GPS APE – airphoto estimate APP – airphoto, planimetric VDN – video, approximate VDC – video, corrected OTH – other
HAB	Habitat information	INV – field inventory SS – summary N/A – not applicable OTH – other AP – aerial photography VID – video
FISH	Fish information	INVD – detailed field inventory INVG – general field inventory SS – summary N/A – not applicable OTH – other
DATE INV	Date of inventory information	YYYY/MM/DD
INV MGNT	Group or persons responsible for conducting inventory	MELP – Ministry of Environment, Lands and Parks MoF – Ministry of Forests GSC – Geological Survey of Canada OTH – Other

4.1.6 Fish species box

Immediately below the legend is the fish species box. This box contains the species code and common name of the fish, listing only those species found on the map (Figure 30). The source of this information should be given in the fish species box (for example: species data from MELP). Appendix 2 provides a complete listing of fish species with abbreviations, common names and proper names.

Code	Common Name	Code	Common Name
CO	Coho	LT	Lake Trout
CT	Cutthroat Trout	ST	Steelhead
DV	Dolly Varden	TSB	Threespine Stickleback
ESC	Emerald Shiner	GSG	Green Sturgeon

Source: _____

Figure 30 - Fish species box

References

- Anon. 1996. Channel Assessment Procedures Guidebook, Forest Practices Code Guidebook, B.C. Ministry of Forests.
- Belford, D. and T.W. Chamberlin (ed.). 1980 Data Entry Procedures for Reach, Point and Fish Aquatic Data Cards. APD Technical Paper 3. Aquatic Studies Branch, B.C. Ministry of Environment. 17 pp. + Appendices.
- Chamberlin, T.W. 1980a. Aquatic System Inventory (Biophysical Stream Surveys). APD Technical Paper 1. Aquatic Studies Branch, B.C. Ministry of Environment. 33 pp.
- Chamberlin, T.W. (ed.). 1980b. Aquatic Survey Terminology. APD Technical Paper 2. Aquatic Studies Branch, B.C. Ministry of Environment. 30 pp.
- Resources Inventory Committee. 2001. User's Guide to the British Columbia's Watershed/Waterbody Identifier System. Version 2.2.

Appendix 1. Arc/Info Symbol Lookup Table

An up to date set of the symbols used on the standard Fish and Fish Habitat maps is available for viewing on the BC Environment web site at:

http://www.elp.gov.bc.ca/gis/marker_code.html

A complete description of each symbol is available through the Geographic Feature Catalogue Query Form on the BC Environment web site at:

http://www.env.gov.bc.ca:8000/pls/feature_code/fcode.formquery

The digital files of these symbols used for the production of the standard Fish and Fish Habitat maps are available for downloading at:

<http://www.env.gov.bc.ca/gis/arcsymbols.html>

Appendix 2. Fish Species Codes for B.C.

CODE	COMMON NAMES	LATIN NAMES
Salmonids (Salmon, Trout, Char)		
AGB	Anadromous Brown Trout, Anadromous German Brown Trout	<i>Salmo trutta</i>
ACT	Anadromous Cutthroat Trout	<i>Oncorhynchus clarki</i> (formerly <i>Salmo clarki</i>)
ADV	Anadromous Dolly Varden, Anadromous Dolly Varden Char	<i>Salvelinus malma</i>
AEB	Anadromous Eastern Brook Trout	<i>Salvelinus fontinalis</i>
AC	Arctic Char	<i>Salvelinus alpinus</i>
AS	Atlantic Salmon	<i>Salmo salar</i>
EB	Brook Trout, Eastern Brook Trout	<i>Salvelinus fontinalis</i>
GB	Brown Trout, German Brown Trout	<i>Salmo trutta</i>
BT	Bull Trout	<i>Salvelinus confluentus</i>
CH	Chinook Salmon, Spring Salmon, King Salmon, Tyee	<i>Oncorhynchus tshawytscha</i>
CM	Chum Salmon, Dog Salmon	<i>Oncorhynchus keta</i>
CCT	Coastal Cutthroat Trout	<i>Oncorhynchus clarki clarki</i> (formerly <i>Salmo clarki clarki</i>)
CO	Coho Salmon	<i>Oncorhynchus kisutch</i>
CT	Cutthroat Trout (General)	<i>Oncorhynchus clarki</i> (formerly <i>Salmo clarki</i>)
DV	Dolly Varden, Dolly Varden Char	<i>Salvelinus malma</i>
KO	Kokanee	<i>Oncorhynchus nerka</i>
LT	Lake Trout, Lake Char	<i>Salvelinus namaycush</i>
PK	Pink Salmon, Humpback Salmon	<i>Oncorhynchus gorbuscha</i>
RB	Rainbow Trout, Kamloops Trout	<i>Oncorhynchus mykiss</i> (formerly <i>Salmo gairdneri</i>)
SK	Sockeye Salmon	<i>Oncorhynchus nerka</i>
SPK	Splake	<i>Salvelinus fontinalis</i> x <i>S. namaycush</i>
ST	Steelhead	<i>Oncorhynchus mykiss</i> (formerly <i>Salmo gairdneri</i>)
SST	Steelhead (Summer-run)	<i>Oncorhynchus mykiss</i> (formerly <i>Salmo gairdneri</i>)
WST	Steelhead (Winter-run)	<i>Oncorhynchus mykiss</i> (formerly <i>Salmo gairdneri</i>)
WCT	Westslope Cutthroat Trout (preferred) Yellowstone Cutthroat Trout	<i>Oncorhynchus clarki lewisi</i> (formerly <i>Salmo clarki lewisi</i>)
Sturgeon		
GSG	Green Sturgeon	<i>Acipenser medirostris</i>
WSG	White Sturgeon	<i>Acipenser transmontanus</i>
WSG	White Sturgeon (Kootney River Pop)	<i>Acipenser transmontanus</i> Pop 1

CODE	COMMON NAMES	LATIN NAMES
Cod		
BB	Burbot, Freshwater Ling Cod, Ling, Loche, Lawyer	<i>Lota lota</i>
Whitefish		
BW	Broad Whitefish, Round-nosed Whitefish, Sheep-nose Whitefish	<i>Coregonus nasus</i>
DLW	Dragon Lake Whitefish	<i>Coregonus</i> Sp 1
GPW	Giant Pygmy Whitefish	<i>Prosopium</i> sp., poss. subspecies of <i>Prosopium coulteri</i>
HW	Humpbacked Whitefish	<i>Coregonus pidschian</i>
LW	Lake Whitefish, Common Whitefish, Humpback Whitefish	<i>Coregonus clupeaformis</i>
MW	Mountain Whitefish, Rocky Mountain Whitefish	<i>Prosopium williamsoni</i>
PW	Pygmy Whitefish, Coulter's Whitefish	<i>Prosopium coulteri</i>
RW	Round Whitefish	<i>Prosopium cylindraceum</i>
SQ	Squanga	<i>Coregonus</i> sp.
CA	Arctic Cisco	<i>Coregonus autumnalis</i>
CB	Bering Cisco	
CL	Lake Cisco	<i>Coregonus artedii</i>
CS	Least Cisco	<i>Coregonus sardinella</i>
IN	Inconnu, Sheefish, "Conny"	<i>Stenodus leucichthys</i>
Lampreys		
AL	Arctic Lamprey	<i>Lampetra?</i>
PL	Pacific Lamprey, Sea Lamprey	<i>Lampetra tridentata</i>
BL	Western Brook Lamprey	<i>Lampetra richardsoni</i>
RL	River Lamprey, Western Lamprey	<i>Lampetra ayresi</i>
MCL	Morrison Creek Lamprey	<i>Lampetra richardsoni marifaga</i>
LL	Lake Lamprey, Cowichan Lamprey	<i>Lampetra macrostoma</i>
Grayling		
GR	Arctic Grayling	<i>Thymallus arcticus</i>
Goldeyes		
GE	Goldeye	<i>Hiodon alosoides</i>
Herrings		
SH	American Shad	<i>Alosa sapidissima</i>

CODE	COMMON NAMES	LATIN NAMES
Minnows		
CP	Carp	<i>Cyprinus carpio</i>
GC	Goldfish	<i>Carassius auratus</i>
TC	Tench	<i>Tinca tinca</i>
ESC	Emerald Shiner	<i>Notropis atherinoides</i>
RSC	Redside Shiner	<i>Richardsonius balteatus</i>
STC	Spottail Shiner	<i>Notropis hudsonius</i>
FHC	Flathead Chub	<i>Platygobio gracilis</i>
LKC	Lake Chub	<i>Couesius plumbeus</i>
PCC	Peamouth Chub, Peamouth	<i>Mylocheilus caurinus</i>
NSC	Northern Pikeminnow	<i>Ptycheilus oregonensis</i>
CMC	Chiselmouth	<i>Acrocheilus alutaceus</i>
BMC	Brassy Minnow	<i>Hybognathus hankinsoni</i>
FM	Fathead Minnow	<i>Pimephales promelas</i>
FDC	Finescale Dace	<i>Phoxinus neogaeus</i> (formerly <i>Pfrille neogaea</i> and <i>Chrosomus neogaeus</i>)
LDC	Leopard Dace	<i>Rhinichthys falcatus</i>
LNC	Longnose Dace	<i>Rhinichthys cataractae</i>
NDC	Nooksack Dace, Nooky Dace	<i>Rhinichthys</i> sp.
RDC	Northern Redbelly Dace	<i>Phoxinus eos</i> (formerly <i>Chrosomus eos</i>)
XDC	Northern Redbelly Dace X Finescale Dace	<i>Phoxinus eos</i> (Cope) X <i>Phoxinus neogaeus</i>
PDC	Pearl Dace, Northern Pearl Dace	<i>Margariscus margarita</i> (formerly <i>Semotilus margarita</i>)
SDC	Speckled Dace	<i>Rhinichthys osculus</i>
UDC	Umatilla Dace	<i>Rhinichthys umatilla</i>
Suckers		
BSU	Bridgelip Sucker, Columbia Small-scaled Sucker	<i>Catostomus columbianus</i>
CSU	Largescale Sucker, Coarsescale Sucker	<i>Catostomus macrocheilus</i>
LSU	Longnose Sucker, Fine-scaled Sucker, Northern Sucker	<i>Catostomus catostomus</i>
MSU	Mountain Sucker, Northern/Plains Mountain Sucker	<i>Catostomus platyrhincus</i> (formerly <i>Pantosteus jordani</i>)
SSU	Salish Sucker	<i>Catostomus</i> sp.
WSU	White Sucker	<i>Catostomus commersoni</i>
Catfish		
BKH	Black Bullhead, Black Catfish	<i>Ameiurus melas</i> (formerly <i>Ictalurus melas</i>)
BNH	Brown Bullhead, Brown Catfish	<i>Ameiurus nebulosus</i> (formerly <i>Ictalurus nebulosus</i>)

CODE	COMMON NAMES	LATIN NAMES
Pike		
NP	Northern Pike, Jackfish, Jack	<i>Esox lucius</i>
Smelts		
ASM	Arctic Smelt	
EU	Eulachon, Candlefish	<i>Thaleichthys pacificus</i>
LSM	Longfin Smelt	<i>Spirinchus thaleichthys</i>
PLS	Pygmy Longfin Smelt	<i>Spirinchus</i> spp.
RSM	Rainbow Smelt	<i>Osmerus dentex</i>
SSM	Surf Smelt	<i>Hypomesus pretiosus</i>
Sticklebacks		
SB1	Balkwill Lake Benthic Stickleback	<i>Gasterosteus</i> . sp.
SB2	Balkwill Lake Limnetic Stickleback	<i>Gasterosteus</i> . sp.
BSB	Brook Stickleback	<i>Culea inconstans</i>
SB3	Charlotte Unarmoured Stickleback, Unarmoured Stickleback	<i>Gasterosteus</i> . sp.
SB4	Emily Lake Benthic Stickleback	<i>Gasterosteus</i> . sp.
SB5	Emily Lake Limnetic Stickleback	<i>Gasterosteus</i> . sp.
SB6	Enos Lake Benthic Stickleback	<i>Gasterosteus</i> . sp.
SB7	Enos Lake Limnetic Stickleback	<i>Gasterosteus</i> . sp.
SB8	Giant Stickleback, Giant Black	<i>Gasterosteus</i> . sp.
SB9	Hadley Lake Benthic Stickleback	<i>Gasterosteus</i> . sp.
SB10	Hadley Lake Limnetic Stickleback	<i>Gasterosteus</i> . sp.
SB11	Lake Stickleback	<i>Gasterosteus</i> . sp.
NSB	Ninespine Stickleback	<i>Pungitius pungitius</i>
SB12	Paxton Lake Benthic Stickleback	<i>Gasterosteus</i> . sp.
SB13	Paxton Lake Limnetic Stickleback	<i>Gasterosteus</i> . sp.
SBB	Priest Lake Benthic Stickleback	<i>Gasterosteus</i> . sp.
SBP	Priest Lake Limnetic Stickleback	<i>Gasterosteus</i> . sp.
TSB	Threespine Stickleback	<i>Gasterosteus aculeatus</i>
Sculpins		
CAL	Coastrange Sculpin, Aleutian Sculpin	<i>Cottus aleuticus</i>
CCL	Cultus Lake Sculpin	<i>Cottus</i> sp.
CMT	Deepwater Sculpin	<i>Myoxocephalus thompsoni (quadricornis ?)</i>
CBA	Mottled Sculpin	<i>Cottus bairdi</i>
CLA	Pacific Staghorn Sculpin, Staghorn Sculpin	<i>Leptocottus armatus</i>
CAS	Prickly Sculpin	<i>Cottus asper</i>

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CODE	COMMON NAMES	LATIN NAMES
CCA	Sharpnose Sculpin	<i>Clinocottus acuticeps</i>
CCN	Shorthead Sculpin	<i>Cottus confusus</i>
CCG	Slimy Sculpin	<i>Cottus cognatus</i>
CRI	Spoonhead Sculpin, Spoonhead Muddler	<i>Cottus ricei</i>
COM	Tidepool Sculpin	<i>Oligocottus maculosus</i>
CRH	Torrent Sculpin	<i>Cottus rhotheus</i>
Sunfish/Bass		
PMB	Pumpkinseed, Sunfish, Pumpkinseed Sunfish	<i>Lepomis gibbosus</i>
BCB	Black Crappie, Calico Bass	<i>Pomoxis nigromaculatus</i>
LMB	Largemouth Bass, Largemouth Black Bass	<i>Micropterus salmoides</i>
SMB	Smallmouth Bass, Smallmouth Black Bass	<i>Micropterus dolomieu</i>
Perches		
WP	Walleye, Pike-perch, Pickerel, Dore, many others	<i>Stizostedion vitreum</i>
YP	Yellow Perch, American Yellow Perch, many others	<i>Perca flavescens</i>
Flounders		
SFL	Starry Flounder	<i>Platichthys stellatus</i>
Troutperch		
TP	Troutperch	<i>Percopsis omiscomaycus</i>
Mosquitofish		
GAM	Mosquitofish, Gambusia	<i>Gambusia</i> sp.

Appendix 3. Notes on Inventory Maps

Standard Maps to be Produced

1. Project Overview Map

- this map will show the entire project area (with boundary lines)
- TRIM/Forest Cover (FIC) aquatic features as background
- location of all sample sites
- BCGS 1:20,000 grid displayed
- 8.5" × 11" size, or 11" × 17" for larger project areas, for very large areas use larger plots rather than several small maps
- inset map showing project location in relation to Region or Province
- optional (discuss with Ministry representative) – roads, towns

2. Project Map

- this map is intended to summarize all NEW information collected under this contract
- must be displayed at a scale of 1:20,000 but several maps may be joined together by eliminating those portions of maps outside the project area.
- indicate map sheet numbers in corners of each sheet
- “E” – size plots
- **mandatory:**
 - completed title box, legend box, source information box, inset map, fish species box
 - TRIM/FIC aquatic features (i.e., the linework) – relatively thick, blue lines (within project area) or black lines (outside project area)
 - contour lines – thinned (e.g., every 100m), brown
 - annotation on lakes and streams
 - watershed codes (last 2 sets of non-zero groups) or ILP’s (if watershed codes unavailable) for:
 - ~ all sampled streams in project area
 - ~ all third order and greater streams in project area
 - ~ for remaining streams, code every other one (i.e., alternating) to minimize clutter
 - waterbody identifiers on lakes
 - sample site locations/numbers
 - site data symbol attached to each sample site
 - each reach with a gradient <30% will require a reach data symbol but where no sample site exists the symbol will have limited information
 - lake summary symbols
 - features, obstructions and symbols
 - reach breaks/numbers on all streams in the project area

Note: The intent is to provide information (gradient at a minimum) on the map for all reaches or provide the means to “link” the mapped reach to the attribute information for that reach in the database. For example, streams without data symbols should have the watershed code (or ILP) displayed. This has to be tempered with the practicality of producing a “readable” product, thus the attempt to reduce clutter by not requiring the display of every watershed code and data symbol. Some discretion will have to be employed in certain situations.

- **optional (discuss with Ministry representative):**
 - ~ additional codes/identifiers/ILP's to alleviate potential problems with identification
 - ~ additional locators – roads, cultural features, towns, etc.
 - ~ historical data (*kept on a separate layer*)

3. Interpretive Map

- this map is intended to illustrate the results of classifications or interpretations, i.e., is not generated directly from the attributes stored in a database but from conclusions based on a synthesis of various data
- it may not be requested in all cases and accordingly the information listed below should be utilized as suggestions as to what should be present/used if the requirement exists to produce an interpretive map
- many of the suggestions utilize exactly the same features/data as appear on the Project map
- “E” – size and at a scale of 1:20,000 but as with the Project map, several sheets can be combined
- as per the Project map, it should include:
 - ~ completed map boxes
 - ~ TRIM/FIC features
 - ~ contour lines
 - ~ annotation
 - ~ watershed codes/waterbody identifiers
 - ~ all sample sites/numbers
 - ~ all reach breaks/numbers
 - ~ fish sensitive zones

Note: As with the Project map, the intent is to provide as much information as possible without making the map unreadable.

- for fish, upstream limit symbols (triangles with bars) labelled with “I” to indicate that it is NOT A KNOWN upstream limit but is INFERRED, may be used
- in addition, may include (**refer to Ministry representative**):
 - ~ site specific features (e.g., obstructions)
 - ~ roads, communities
 - ~ red/blue, solid/dashed lines to illustrate stream classes

Note: For all 3 maps, the above list is a minimum set of requirements and the Ministry contact in region should be consulted for additional input prior to finalizing the maps.

Appendix 4. Digital Mapping Specifications

1.0 Digital Fish and Fish Habitat Mapping Specifications

The mapping specifications outlined in Appendix 4 apply to mapping fish and fish habitat features on Terrain Resource Inventory Mapping (TRIM) and Forest Inventory Cover (FIC) digital base maps and to the hardcopy maps produced from them. These specifications describe the methods and format for the digital capture of both the spatial and attribute data associated with mapping the standard fish and fish habitat features. These specifications will be revised when the new TRIM WATERSHED ATLAS digital map base is available.

1.1 Overview of data model

The data model for the digital component of fish and fish habitat mapping is a dBase file (*.dbf) that contains the spatial and attribute data required to depict fish and fish habitat features as point symbols on reconnaissance inventory maps. Each mapped feature is represented by a point symbol and is identified by a record in the database that contains the unique feature identifier called MAPNID, the UTM coordinates, the feature point class, the label text, symbol rotation angle and specific information describing the feature. These records contain data extracted from the Field Data Information System database (FDIS). The database file is subjected to quality assurance checks prior to use by the B.C. Fisheries PC ArcView mapping application called **FishMap** used to generate the three standard inventory maps described in Appendix 3.

1.2 General requirements

The specifications for fish and fish habitat deliverables in this document **only apply to point features**. The general digitizing requirements outlined here must be followed regardless of what digitizing software is used to capture the digital coordinates for the fish and fish habitat feature point locations.

1.2.1 Standard Map Datum

The mapped fish and fish habitat features must be registered to NAD83 Datum. If existing data is in NAD27, the datum shift must be done using the Canadian National Transformation (CNT) matrix for the NAD27 to NAD83 conversion.

1.2.2 Tolerances

1. The digital location of mapped features must be maintained as single precision (7 significant digits).
2. All digitized mapping is to be registered to within .004 metres root mean square of the corners of TRIM 1:20,000 mapsheets. Data coordinates will be in metres, single precision, and in UTM NAD83 coordinates.
3. All digital fish and fish habitat feature points must be within 0.5 millimetres of source linework (i.e., 10 m on 1:20,000 scale maps; 25 m on 1:50,000 scale maps; 100 m on 1:250,000 scale maps, etc.)

1.2.3 Delivery and media specifications

1. The Fish and Fish Habitat Map features table for the project area must be in dBase file format (*.dbf) and conform to the specifications for Table 1 outlined in Section 4. This file format is required to create the three standard map products outlined in Appendix 3.
2. The Metadata table containing information about the digital mapping for the project area must be in dBase file format (*.dbf) and conform to the record structure described in Section 2.
3. Digital files must be provided for each set of standard hardcopy maps produced for a project area. These files are the digital versions of the overview, project and interpretive hardcopy maps and must be provided in the form of encapsulated postscript files (*.eps) or as adobe acrobat files (*.pdf). If a project area spans more than one UTM zone then a separate set of digital files of the hardcopy maps will be required for each UTM zone. Refer to Section 5 for digital file naming conventions.
4. Delivery media: CDROM, network ftp, or other format approved in advance by appropriate Ministry staff.

2.0 Specific Requirements

All the spatial and attribute data required for the digital mapping of the fish and fish habitat point features for a fisheries reconnaissance inventory project will be delivered in a dBase file format (*.dbf). Refer to Section 4 for a full description of the database file and record structure.

Each fish or fish habitat feature added to a TRIM mapsheet is represented by a point and is labelled with a numerical identifier called the **NID**, which is unique to the mapsheet. Where multiple features occur at the **same point location**, a separate NID value is assigned to each feature and each feature will have an identical set of digitized UTM Coordinates. The TRIM mapsheet number in combination with the NID value forms a new identifier for each fish or fish habitat feature called the **MAPNID**, which is unique to the project area. For details on using NIDs for mapping features refer to Section 3. For a complete description of the NID and MAPNID fields refer to Section 4.

2.1 Metadata

The Metadata table contains basic information about the digital mapping of the fisheries reconnaissance inventory project. The metadata is stored in a dBase file (*.dbf), which is described in section 2.1.1. This metadata file can be created using the B.C. Fisheries mapping application called **FishMap** and **must accompany the fish and fish habitat map features database as a digital deliverable**.

2.1.1 dBase Metadata Naming Convention

The metadata file will be called **M <ryyyyynn>.dbf** where **M** represents "Metadata", **r** represents the MELP region number; **yyyy** represents the year of the project, and **nn** represents the Ministry assigned two digit project number that distinguishes this project area from ninety-eight other inventory projects in the region. Note: valid Region numbers are 1, 2, 3, 4, 5, 6, 7, 8. For example, the name of the file for a Fish and Fish Habitat project with an inventory code of 3, conducted in Region 4 in 2001 would be **M4200103.dbf**.

2.1.2 Metadata record structure

This structure contains two fields and includes the following information:

Key	Value
Project Code	(Ministry project code)
Contractor name	{name of company that compiled the data}
Contract monitor	{Ministry contact for the project}
Contract number	{Ministry contract number}
Datum	{GRS80/NAD83}
GPS Data	{YES or NO}
GPS Accuracy	(See section 2.1.3 item b)
GPS – Average DOP Values	(See section 2.1.3 item c)

The fields are defined as follows:

KEY (format: type = Character; width = 16)

VALUE (format: type = Alphanumeric; width = 100)

2.1.3 GPS point data

If the point data was collected using GPS, then

- a) The datum must be GRS80/NAD83.
- b) The metadata file must indicate if the GPS locations are collected under Selective Availability, or whether they have been corrected using a base station.
- c) The file must include average Dilution of Precision (DOP) values.

3.0 Preparing Hardcopy Source Maps for Digitizing

Section 3 describes the preparation of hardcopy 1:20,000 TRIM mapsheets for digitizing where **point markers only** are used to depict the locations of fish and fish habitat features.

Each fish or fish habitat feature located on a TRIM mapsheet must be identified by a unique numerical identifier called the **NID**. The NID is an integer value between 1 and 99999. A feature's NID will be clearly marked as a label beside the feature's point location on the map.

If points are grouped so close together on the map that labelling them with NIDs would be difficult or unclear, then a short line connecting each point to its NID label should be added.

The following types of fish and fish habitat features will be spatially identified by point markers with NID labels as follows:

A **point feature** will be represented by a single point marked on the map and clearly labelled with a NID.

Examples of point features could include a fish observation site, a falls or a hatchery.

A **linear feature** will be represented by two points marked on the map with one point to identify the upstream limit and a second point to identify the downstream limit of the zone with each point clearly labelled with a NID. The exception to this is where the downstream limit of a zone is located at the stream mouth; then a second point identifying the downstream limit **is not required** and **will not be marked** at the stream mouth.

Examples of linear features include Fish Distribution zones and Fish Spawning zones.

Fish and fish habitat information pertaining to an entire stream will be represented by a single point marked on the map at the **mouth** of the stream and clearly labelled with a NID.

An example of information pertaining to an entire stream is where a species of fish is caught by an angler in stream X and is identified by a fisheries officer but the exact location of capture is not reported.

To map fish and fish habitat features located within **waterbodies that have an areal extent** such as double line rivers, double line sloughs and double line canals; place the points along an imaginary centre line of the channel as if the fish or fish habitat feature was located on a single line river. Label each point with a NID.

To map fish and fish habitat features located **near/beside waterbodies** place points on the map where the features actually occur and label each point with a NID.

4.0 The Fish and Fish Habitat Map Features Table

The **Fish and Fish Habitat Map Features Table (Table 1)** is the **standard digital mapping deliverable** required for a reconnaissance fish and fish habitat inventory project. Table 1 contains specific spatial and attribute data extracted from the FDIS project database that is required to generate **the three standard hardcopy maps described in Appendix 3**.

4.1 Fish and Fish Habitat Map Features Table generation

To generate the Fish and Fish Habitat Map Features Table an export utility is provided with the **Field Data Information System Data Entry Tool (FDIS)**. This export utility will create a **Mapping Symbol File**, which is the Fish and Fish Habitat Map Features Table (Table 1) in the form of a dBase file. The generated table is populated with data extracted directly from the FDIS project database.

The dBase file format and record structure for this table is described in section 4.2 and the generated table is available for immediate use by quality assurance programs and the BC Fisheries mapping application called **FishMap**. **Note:** This table will be subjected to quality assurance checks to ensure compliance with the mapping standards and is a **required deliverable**.

Additional information on the **FDIS Data Entry Tool** can be obtained at:

<http://www.bcfisheries.gov.bc.ca/fishinv/fdis.html>

The BC Fisheries mapping application called FishMap can be downloaded at:

<http://www.bcfisheries.gov.bc.ca/fishinv/fishmap.htm>

4.2 Data entry requirements

Table 1 shows the attributes associated with each feature. For each type of feature this table should be used as a guide for determining which fields receive a data entry value for that particular feature.

Each row in Table 1 corresponds to a record, and each column (with the exception of "Description of Fish or Fish Habitat Feature") corresponds to a field in the digital version of Table 1.

The field **FCODE** in Table 1 lists current feature codes that have been assigned to mapped fish and fish habitat features. The letter 'X' throughout the body of the table identifies those fields where a data entry value is **mandatory** for each feature mapped. The following fields must have data values assigned to them for **every map feature**: FCODE, NID, MAP, MAPNID, WS_CODE (or ILP_ID if the WS_CODE is not available), ZONE, EASTING, NORTHING, PROJCODE, AWSCODE and PTCLASS. The letter X with round brackets - '(X)' throughout the body of the table identifies those fields **that require a value to be entered when the value is known**. The letter X with square brackets - '[X]' relates specifically to the text label fields - LABEL1, LABEL2, LABEL3, LABEL4 and the symbol rotation angle field - ANGLE. The four text label fields require values to build the Site Data Symbol, Reach Data Symbol, Reach Summary Symbol and Lake Summary Symbol. The angle of rotation field requires a value to correctly rotate map symbols.

A **blank** field indicates that for a particular feature: the data value for this field is not relevant or is not required in all circumstances for mapping the feature.

Table 1. The Fish and Fish Habitat Map Features Table

Description of Fish or Fish Habitat Feature	FCODE	NID	MAP	MAPNID	DESC	WS_CODE	ILP	ILPMAP	ILP_ID	ZONE	EASTING	NORTHING	REACH_NO	SITE_NO	FEATR_HGT	FEATR_LGH	COMMENTS	PROJCODE	LABEL 1	LABEL 2	LABEL 3	LABEL 4	AWSCODE	PTCLASS	FIELDZONE	FIELDEAST	FIELDNORTH	ANGLE
Hatchery	AF11150000	X	X	X		X				X	X	X	X					X					X	X				[X]
Campground-Campsite	AL03900000	X	X	X		X				X	X	X	X					X					X	X				[X]
Campground-Campsite	AL93900000	X	X	X		X				X	X	X	X					X					X	X				[X]
Waste Regulated Site-Aquaculture	AP87020120	X	X	X		X				X	X	X	X					X					X	X				[X]
Waste Regulated Site - Hatchery	AP87020140	X	X	X		X				X	X	X	X					X					X	X				[X]
Seaplane Anchorage	AQ00800110	X	X	X		X				X	X	X	X					X					X	X				[X]
Wharf	CQ33450002	X	X	X		X				X	X	X	X					X					X	X				[X]
Wharf	CQ90000110	X	X	X		X				X	X	X	X					X					X	X				[X]
Pier	CQ90000120	X	X	X		X				X	X	X	X					X					X	X				[X]
River/Stream Crossing (indefinite)	DD85670000	X	X	X		X				X	X	X	X					X					X	X				[X]
Bridge	DD93250000	X	X	X		X				X	X	X	X					X					X	X				[X]
SEAM Site	EP10000110	X	X	X		X				X	X	X	X					X					X	X				[X]
SEAM water monitoring site	EP10020300	X	X	X		X				X	X	X	X					X					X	X				[X]
Sample Site - Fish or Fish Habitat	FE25755200	X	X	X		X				X	X	X	X	X				X	[X]	[X]			X	X				[X]
Fish Observation -Salmon	FE85650110	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Observation - Sport	FE85650120	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Observation - Regionally Significant	FE85650130	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Observation - Other	FE85650999	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Distribution Upstream Limit - Salmon	FF85510110	X	X	X		X				X	X	X	X					X					X	X				[X]

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Description of Fish or Fish Habitat Feature	FCODE	NID	MAP	MAPNID	DESC	WS_CODE	ILP	ILPMAP	ILP_ID	ZONE	EASTING	NORTHING	REACH_NO	SITE_NO	FEATR_HGT	FEATR_LGH	COMMENTS	PROJCODE	LABEL_1	LABEL_2	LABEL_3	LABEL_4	AWSCODE	PTCLASS	FIELDZONE	FIELDEAST	FIELDNORTH	ANGLE
Fish Distribution Upstream Limit - Sport	FF85510120	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Distribution Upstream Limit - Regionally Significant	FF85510130	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Distribution Upstream Limit - Other	FF85510999	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Distribution Downstream Limit - Salmon	FF85520110	X	X	X		X				X	X	X	X			(X)		X					X	X				[X]
Fish Distribution Downstream Limit - Sport	FF85520120	X	X	X		X				X	X	X	X			(X)		X					X	X				[X]
Fish Distribution Downstream Limit - Regionally Significant	FF85520130	X	X	X		X				X	X	X	X			(X)		X					X	X				[X]
Fish Distribution Downstream Limit - Other	FF85520999	X	X	X		X				X	X	X	X			(X)		X					X	X				[X]
Fish Presence - Salmon	FF85550110	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Presence - Salmon Sport	FF85550115	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Presence - Sport	FF85550120	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Presence - Regionally Significant	FF85550130	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Presence - Other	FF85550999	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Spawning Upstream Limit - Salmon	FF85610110	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Spawning Upstream Limit - Sport	FF85610120	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Spawning Upstream Limit - Regionally Significant	FF85610130	X	X	X		X				X	X	X	X					X					X	X				[X]
Fish Spawning Upstream Limit - Other	FF85610999	X	X	X		X				X	X	X	X					X					X	X				[X]

Description of Fish or Fish Habitat Feature	FCODE	NID	MAP	MAPNID	DESC	WS_CODE	ILP	ILPMAP	ILP_ID	ZONE	EASTING	NORTHING	REACH_NO	SITE_NO	FEATR_HGT	FEATR_LGH	COMMENTS	PROJ_CODE	LABEL_1	LABEL_2	LABEL_3	LABEL_4	AWSCODE	PTCLASS	FIELDZONE	FIELDEAST	FIELDNORTH	ANGLE	
Fish Spawning Downstream Limit - Salmon	FF85620110	X	X	X		X				X	X	X	X			(X)		X					X	X					[X]
Fish Spawning Downstream Limit - Sport	FF85620120	X	X	X		X				X	X	X	X			(X)		X					X	X					[X]
Fish Spawning Downstream Limit - Regionally Significant	FF85620130	X	X	X		X				X	X	X	X			(X)		X					X	X					[X]
Fish Spawning Downstream Limit - Other	FF85620999	X	X	X		X				X	X	X	X			(X)		X					X	X					[X]
Reach Break	FF85660000	X	X	X		X				X	X	X	X					X	[X]	[X]	[X]	[X]	X	X					[X]
Reach Break -Sub - Reach	FF85660013	X	X	X		X				X	X	X	X					X					X	X					[X]
Reach Break - Termination of Survey - Upstream	FF85660016	X	X	X		X				X	X	X	X					X					X	X					[X]
Reach Break - Termination of Survey - Downstream	FF85660017	X	X	X		X				X	X	X	X					X					X	X					[X]
Tributary	GA05200130	X	X	X		X				X	X	X	X					X					X	X					[X]
Ford Crossing	GA11600000	X	X	X		X				X	X	X	X					X					X	X					[X]
Rapids	GA23500110	X	X	X		X				X	X	X	X			(X)		X					X	X					[X]
Braided Channel	GA24850110	X	X	X		X				X	X	X	X					X					X	X					[X]
Dewatered	GA24850190	X	X	X		X				X	X	X	X					X					X	X					[X]
Weir	GA33350000	X	X	X		X				X	X	X	X					X					X	X					[X]
Reservoir	GB24300003	X	X	X		X				X	X	X	X					X					X	X					[X]
Flooded Land	GB90000000	X	X	X		X				X	X	X	X					X					X	X					[X]
Marsh in Water	GC17100110	X	X	X		X				X	X	X	X					X					X	X					[X]
Marsh	GC90100000	X	X	X		X				X	X	X	X					X					X	X					[X]
Swamp	GC90200000	X	X	X		X				X	X	X	X					X					X	X					[X]

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Description of Fish or Fish Habitat Feature	FCODE	NID	MAP	MAPNID	DESC	WS_CODE	ILP	ILPMAP	ILP_ID	ZONE	EASTING	NORTHING	REACH_NO	SITE_NO	FEATR_HGT	FEATR_LGH	COMMENTS	PROJODE	LABEL 1	LABEL 2	LABEL 3	LABEL 4	AWSCODE	PTCLASS	FIELDZONE	FIELDEAST1	FIELDNORTH	ANGLE
Rock In Water	GE25350000	X	X	X		X				X	X	X	X					X					X	X				[X]
Bedrock Confined	GE25350120	X	X	X		X				X	X	X	X					X					X	X				[X]
Sand/Gravel Bar	GE90100000	X	X	X		X				X	X	X	X					X					X	X				[X]
Flow Arrow	GE90200000	X	X	X		X				X	X	X	X					X					X	X				[X]
Flow Arrowhead	GE90200110	X	X	X		X				X	X	X	X					X					X	X				[X]
Groundwater - General Direction of Flow	GF12835000	X	X	X		X				X	X	X	X					X					X	X				[X]
Spring	GF28750000	X	X	X		X				X	X	X	X					X					X	X				[X]
Eroded Bank	HB10125000	X	X	X		X				X	X	X	X					X					X	X				[X]
Fan - Alluvial	HB10495110	X	X	X		X				X	X	X	X					X					X	X				[X]
Fan - Colluvial	HB10495120	X	X	X		X				X	X	X	X					X					X	X				[X]
Fan - Talus Cone	HB10495130	X	X	X		X				X	X	X	X					X					X	X				[X]
Rock Outcrop	HB25400000	X	X	X		X				X	X	X	X					X					X	X				[X]
Slumping Bank	HB27900000	X	X	X		X				X	X	X	X					X					X	X				[X]
Slide - Debris	HB27900330	X	X	X		X				X	X	X	X					X					X	X				[X]
Slump	HB28265000	X	X	X		X				X	X	X	X					X					X	X				[X]
Slide	HB90000000	X	X	X		X				X	X	X	X					X					X	X				[X]
Spawning Channel	PI11500000	X	X	X		X				X	X	X	X			(X)		X					X	X				[X]
Side Channel	PI11501000	X	X	X		X				X	X	X	X					X					X	X				[X]
Stream Reference Number	PI12100110	X	X	X		X				X	X	X	X					X					X	X				[X]
Fishway	PI30001000	X	X	X		X				X	X	X	X			(X)		X					X	X				[X]

Description of Fish or Fish Habitat Feature	FCODE	NID	MAP	MAPNID	DESC	WS_CODE	ILP	ILPMAP	ILP_ID	ZONE	EASTING	NORTHING	REACH_NO	SITE_NO	FEATR_HGT	FEATR_LGH	COMMENTS	PROJ_CODE	LABEL_1	LABEL_2	LABEL_3	LABEL_4	AWSCOPE	PTCLASS	FIELDZONE	FIELDEAST	FIELDNORTH	ANGLE
Beaver Dam	PI30002000	X	X	X		X				X	X	X	X		(X)			X					X	X				[X]
Cascades	PI30003000	X	X	X		X				X	X	X	X		(X)	(X)		X					X	X				[X]
Falls	PI30004000	X	X	X		X				X	X	X	X		(X)	(X)		X					X	X				[X]
Culvert	PI30005000	X	X	X		X				X	X	X	X		(X)	(X)		X					X	X				[X]
Persistent Debris Accumulation	PI30006000	X	X	X		X				X	X	X	X		(X)	(X)		X					X	X				[X]
Dam	PI30007000	X	X	X		X				X	X	X	X		(X)			X					X	X				[X]
Incubation Box	PI40001000	X	X	X		X				X	X	X	X					X					X	X				[X]
Counting Fence	PI40002000	X	X	X		X				X	X	X	X					X					X	X				[X]
Fisheries sensitive zone	PI84510000	X	X	X		X				X	X	X	X			(X)		X					X	X				[X]
Well	WA12100190	X	X	X		X				X	X	X	X					X					X	X				[X]
Hydrometric Stations, flow active	WA12800110	X	X	X		X				X	X	X	X					X					X	X				[X]
Hydrometric Stations, flow inactive	WA12800120	X	X	X		X				X	X	X	X					X					X	X				[X]
Hydrometric Stations, flow and level active	WA12800130	X	X	X		X				X	X	X	X					X					X	X				[X]
Hydrometric Stations, flow and level inactive	WA12800140	X	X	X		X				X	X	X	X					X					X	X				[X]
Hydrometric Stations, level active	WA12800150	X	X	X		X				X	X	X	X					X					X	X				[X]
Hydrometric Stations, level inactive	WA12800160	X	X	X		X				X	X	X	X					X					X	X				[X]

The record structure and field definitions for the Fish and Fish Habitat map features table are fully described in Section 4.3.

4.3 Record structure and field definitions

The **digital version of Table 1 is a dBase format file (*.dbf)**. This section specifies the record structure and field definitions for this digital file.

The **data types are as specified below; either character or numeric.**

Fish and Fish Habitat Map Features Table Record Structure:

Field					
No.	Name	Type	Width	Decimal	Description
1	FCODE	Character	10		MELP feature code
2	NID	Numeric	11		Unique TRIM Map ID for feature
3	MAP	Character	8		TRIM Mapsheet # for feature
4	MAPNID	Character	13		Unique PROJECT ID for feature
5	DESC	Character	254		Description of feature location
6	WS_CODE	Character	56		Watershed code (includes dashes)
7	ILP	Numeric	11		Interim Locational Point number
8	ILPMAP	Character	8		TRIM map for Interim Locational Pt.
9	ILP_ID	Character	13		Interim Locational Point Identifier
10	ZONE	Numeric	6		UTM Zone of feature location
11	EASTING	Numeric	11		UTM Easting of feature location
12	NORTHING	Numeric	11		UTM Northing of feature location
13	REACH_NO	Numeric	19	5	No. of reach containing feature
14	SITE_NO	Numeric	11		No. of site containing feature
15	FEATR_HGT	Numeric	19	5	Height of fish habitat feature
16	FEATR_LGH	Numeric	19	5	Length of fish habitat feature
17	COMMENTS	Character	254		Comments about the feature
18	PROJCODE	Character	22		MELP defined project code
19	LABEL1	Character	50		For Sample Site - the fish species list For Reach Break - the fish species list For Lake Summary - the fish species list
20	LABEL2	Character	50		For Sample Site - the site characteristics For Reach Break - the

Field					
No.	Name	Type	Width	Decimal	Description
					reach data label For Lake Summary - the physical information
21	LABEL3	Character	50		For Reach Break - the channel properties For Lake Summary - the physical information for primary lakes
22	LABEL4	Character	50		For Sample Site - the site type For Reach Break - stream classification For Lake Summary - the waterbody key
23	AWSCODE	Character	14		Abbreviated Watershed Code
24	PTCLASS	Character	2		Point Class Code
25	FIELDZONE	Numeric	6		Field UTM Zone of feature location
26	FIELDEASTI	Numeric	11		Field UTM Easting of feature location
27	FIELDNORTH	Numeric	11		Field UTM northing of feature location
28	ANGLE	Numeric	19	5	Rotation angle of map feature symbol

Field Definitions

FCODE (data type = Character; width = 10)

The B.C. Ministry of Environment code that identifies the type of fish or fish habitat feature. Refer to APPENDIX 1 and the Glossary at the end of this document for a complete list of the feature codes (fcodes). This value is referenced in the Ministry standard lookup table to display the correct map symbol. Note that **all mapped fish and fish habitat features must have a feature code assigned to them**. For a **zonal feature** such as a fish distribution or spawning zone enter the feature code that identifies **the upstream limit of the zone**.

NID (data type = Numeric; width = 11)

An integer value between 1 and 99999 that uniquely identifies a **fish or fish habitat feature** on a 1:20,000 TRIM mapsheet.

Note that **all mapped fish and fish habitat features** must have a value entered in this field.

Examples of valid NID values are: 1, 234, 9998, 4, 17342

MAP (data type = Character, width = 8)

The number of the 1:20,000 TRIM mapsheet that contains the fish or fish habitat feature identified by NID. A mandatory 8 characters must be entered. Left pad with a zero for mapsheet numbers beginning with 8 or 9 and also pad with zeros to the right of the mapsheet **letter** as required for numbers less than 100. Note that for the correct format of the TRIM mapsheet number a **“period”** must be added to separate the letter block from the map number.

Note that **all mapped fish and fish habitat features** must have a value entered in this field.

Examples of valid MAP values are: 082F.054, 094J.002, 103H.019.

MAPNID (data type = Character; width = 13).

A point identifier that uniquely identifies **a fish or fish habitat feature** on a TRIM mapsheet and across adjacent mapsheets **within the project area**. This point identifier can also represent fish and fish habitat information for **a whole stream**.

Note that **all mapped fish and fish habitat features** must have a value entered in this field.

The value for MAPNID is formatted as follows:

The MAPNID value is created by combining the number of the TRIM mapsheet that contains the point's location with a modified NID where:

MAPNID = TRIM Mapsheet number (a string of 8 characters) + the NID converted to a five character string.

To generate **the first part** of the MAPNID identifier, left pad the TRIM mapsheet number with a zero only if the TRIM mapsheet number begins with 8 or 9; this will ensure a valid TRIM mapsheet number consisting of eight characters with no blank spaces. Note that for the correct format of the TRIM mapsheet number a **“period”** must be added to separate the letter block from the map number.

Examples of valid TRIM mapsheet numbers are: 082F.053, 093J.001, 103H.019

To generate **the second part** of the MAPNID identifier convert the NID integer value to a character value and left pad with zero(s) as required to generate a **five character string**.

Examples of NIDs converted to valid five character strings are:

NID value of 1 is converted to “00001”; NID value of 245 is converted to “00245”; NID value of 54782 is converted to “54782.”

Combining the two formatted parts creates the identifier MAPNID that uniquely identifies, **within the project area, the fish or fish habitat feature**.

Examples of valid MAPNIDs are:

082F.05900004, 093J.00100368, 103F.08893654.

The following examples summarize how the MAPNID value is derived for a fish or fish habitat feature:

1. A fish or fish habitat feature with NID = 4 is located on TRIM map 82F.059. The correct MAPNID = 082F.05900004
2. A fish or fish habitat feature with NID = 368 is located on TRIM map 93J.001. The correct MAPNID = 093J.00100368

DESC (data type = Character; width = 254)

A description to clarify the location of a fish or fish habitat feature, identified as MAPNID, with respect to the **nearest waterbody**

One example of a description would be “This hatchery is located 100m from the east bank of the Blue River.

WS_CODE (data type = Character; width = 56; 12 set array)

The Watershed Code. Refer to the “User’s Guide to the British Columbia Watershed/Waterbody Identifier System” for the complete definition of the watershed code. Example: 160-635400-46400-46400-0000-0000-000-000-000-000-000.

Note that **all mapped fish and fish habitat features** must have **the complete watershed code** (all 56 characters including the dashes) entered in this field with the exception of those features located on streams that do not have Watershed Codes.

ILP (data type = Numeric; width = 11)

The Interim Locational Point number is an integer value between 1 and 99999 that uniquely identifies the point at the mouth of a stream on a 1:20,000 TRIM mapsheet **for a stream that does not have a watershed code**. For a more detailed explanation of the Interim Locational Point refer to the document “User’s Guide to the British Columbia Watershed/Waterbody Identifier System.”

Examples of valid ILP values are: 1, 234, 93695, 4, 1734

Assign a value to this field only when the fish or fish habitat feature to be mapped is located on a stream that does not have a Watershed Code.

ILPMAP (data type = Character; width = 8).

The number of the TRIM mapsheet containing the Interim Locational Point. Note the TRIM mapsheet is left padded with a zero if the TRIM mapsheet number begins with an 8 or a 9. Specific formatting information for ILPMAP is exactly the same as previously described for the fields MAP .

Examples of valid ILPMAP values are: 082F.054, 092J.002, 103H.019

Assign a value to this field only when the fish or fish habitat feature to be mapped is located on a stream that does not have a Watershed Code.

A point identifier that uniquely identifies an Interim Locational Point on a TRIM mapsheet and across adjacent mapsheets **within the project area**. The ILP_ID value is a combination of the TRIM map sheet number ILPMAP and the ILP where the value for ILP_ID is created by combining ILPMAP with a modified ILP value. Specific formatting information for ILP_ID is exactly the same as previously described for the field MAPNID. Refer to the MAPNID field definition for instructions on generating the ILP_ID value.

Examples of valid ILP_ID values are: 082F.05400004, 094J.00200234 and 103H.01901734.

Assign a value to this field only when the fish or fish habitat feature to be mapped is located on a stream that does not have a Watershed Code.

ILP_ID (data type = Character; width = 13)

A point identifier that uniquely identifies an Interim Locational Point on a TRIM mapsheet and across adjacent mapsheets **within the project area**. The ILP_ID value is a combination of the TRIM map sheet number ILPMAP and the ILP where the value for ILP_ID is created by combining ILPMAP with a modified ILP value. Specific formatting information for ILP_ID is exactly the same as previously described in for the field MAPNID. Refer to the definition of MAPNID for instructions on generating the ILP_ID value.

Examples of valid ILP_ID values are: 082F.05400004, 094J.00200234 and 103H.01901734.

Assign a value to this field only when the fish or fish habitat feature to be mapped is located on a stream that does not have a Watershed Code.

ZONE (data type = Numeric; width = 6)

The map-corrected UTM Zone in which the fish or fish habitat feature point is found. Valid UTM zones for British Columbia are 7, 8, 9, 10 and 11.

EASTING (data type = Numeric; width = 11)

The map-corrected UTM NAD83 easting coordinate value for the fish or fish habitat feature point location captured through digitizing (i.e., 1 metre accuracy).

NORTHING (data type = Numeric; width = 11)

The map-corrected UTM NAD83 northing coordinate value for the fish or fish habitat feature point location captured through digitizing (i.e., 1 metre accuracy)

REACH_NO (data type = Numeric; width = 19; decimal = 5)

The number of the reach where the fish or fish habitat feature is located. The decimal place allows nine additional reach numbers to be assigned to reaches that fall within the bounds of an existing reach. The format is: **9999.9**. Example of additional reaches added to an existing reach 1 would be 1.1, 1.2, 1.3 etc

SITE_NO (data type = Numeric; width = 11)

The number of the Fish and Fish Habitat Inventory Sample site where the fish or fish habitat feature is located.

FEATR_HGT (data type = Numeric; width = 19; decimal = 5)

The height of feature in metres. The format is: **99.9**

FEATR_LGH (data type = Numeric; width = 19; decimal = 5)

The length of the feature in metres. The format is: **9999.9**

COMMENTS (data type = Character; width = 254)

Comments relevant to the digital mapping of the feature.

PROJCODE (data type = Character; width = 22)

The Project Code is the identifier for a 1:20,000 Fish and Fish Habitat Reconnaissance Inventory Project Area. The Project Code is in the format:

The project code is in the format: **R#-WSGR-CCCCCCCC-YYYY** where R# represents the region number (eg. 01, 04, 7A, etc.); WSGR represents the dominant B.C. Watershed Atlas Group (eg. ELKR); CCCCCCCC represents a ministry defined inventory code (eg. 33333333); and YYYY represents the year of the project.

Example: 04-ELKR-33333333-1997

LABEL1 (data type = Character; width = 50)

The fish species list for the Sample Site.

The fish species list for the Reach Summary symbol (interpretive maps).

The fish species list for the Lake Summary symbol.

LABEL2 (data type = Character; width = 50)

The site characteristics for the Sample Site.
The reach data label for the Reach Break.
The physical information for the Lake Summary symbol.

LABEL3 (data type = Character; width = 50)

The channel properties for the Reach Summary symbol (interpretive maps).
The physical information for Primary Lakes for the Lake Summary symbol.

LABEL4 (data type = Character; width = 50)

The site "type" for a sample site. This will either be 'NVC' if No Visual Channel was indicated in FDIS or 'TRB' if a Tributary was indicated; otherwise, it will be blank.
The stream classification for the Reach Summary symbol (interpretive maps).
The Waterbody Key (WB_KEY) for the lake or wetland.

AWSCODE (data type = Character; width = 14)

The abbreviated Watershed Code or ILP for the waterbody containing the feature. Watershed Code is used in preference to ILP when both are present in the record; if neither is present, the field is blank.

PTCLASS (data type = Character; width = 2)

The Point Class code.

Valid PTCLASS codes are:

- SS** = Sample Site
- RB** = Reach Break
- FO** = Features/Obstructions
- LS** = Lake Summary

FIELDZONE (data type = Numeric, width = 6)

The field UTM Zone in which the fish or fish habitat feature point is found. Valid UTM zones for British Columbia are 7, 8, 9, 10 and 11.

FIELDEASTI (data type = Numeric, width = 11)

The field UTM NAD83 easting coordinate for the fish or fish habitat feature point location.

FIELDNORTH (data type = Numeric, width = 11)

The field UTM NAD83 northing coordinate for the fish or fish habitat feature point location.

ANGLE (data type = Numeric, width = 19, decimal = 5)

The angle of rotation of the fish or fish habitat map symbol. Values range from 0 to 360 degrees

4.4 Summary and examples of the Fish and Fish Habitat Map Features table

Table 1 shows the attributes associated with each type of fish or fish habitat feature. Use this table as a guide for determining what fields in the attribute table receive an entry for that feature.

Table 2 shows three features correctly entered into the Fish and Fish Habitat Map features database file.

Table 2. Example of three features correctly captured in the map feature database file

FCODE	NID	MAP	MAPNID	TYPE	DESC	WS_CODE	ILP	ILPMAP
FE25755200	51160	92K.011	092K.01151160	P		920-725300-35800-18100-0000-0000-000-000-000-000-000-000	0	
FF85660000	770	92K.012	092K.01200770	P		920-725300-35800-00000-0000-0000-000-000-000-000-000-000	0	
FE85660000	1955	92K.011	092K.01101955	P		920-725300-35800-18100-2010-0960-000-000-000-000-000-000	0	

Continuation of Table 2

ILP_ID	ZONE	EASTING	NORTHING	REACH_NO	SITE_NO	FEATR_HGT	FEATR_LGH	COMMENTS
	10	296071	5561477	3	17	0.0	0.0	Sample Site – Fish or Fish Habitat
	10	300310	5562646	3		0.0	0.0	Reach Break
	10	297863	5564135	3		0.0	0.0	Reach Break (Lake Summary)

Continuation of Table 2

PROJCODE	LABEL1	LABEL2	LABEL3	LABEL4	AWSCODE	PTCLASS
01-SALM-200000001-2001	DV RB	4-19-CPb-B2D2			-35800-18100	SS
01-SALM-200000001-2001	CAL CO DV	S-OC-2-IR	2-34	S1	-725300-35800	RB
01-SALM-200000001-2001	NS	L-1.2-*.**	*.*	00243SALM	-2010-0960	LS

Continuation of Table 2

FIELDZONE	FIELDEASTI	FIELDNORTH	ANGLE
10	296070	5561476	0
10	300309	5562645	333
10	297862	5564134	112

4.5 Delivery format for the Fish and Fish Habitat Map Features Table

The Fish and Fish Habitat Map Features Table will be delivered as a dBASE format file (*.dbf). The table will be given the following name: **A<ryyyynn>.dbf** where “A” represents “Attribute Data” and the remaining letter codes are fully described for the name of the metadata table in subsection 2.1.1. For example, the map features table from a project with an inventory number of 3 undertaken in Region 4 in 2001 would be A4200103.dbf. The file extension.”**dbf**” must be given.

5.0 Deliverable Checklist

The following are a number of important checks that the contractor should perform prior to submitting data to the Ministry. This is not an exhaustive list, further quality assurance measures are recommended.

1. Has each feature record in the Fish and Fish Habitat Map Features database file been assigned a unique MAPNID?
2. In the Fish and Fish Habitat Map features database file, Have **the mandatory spatial and attribute field values** been entered for each feature record? (Refer to Table 1). Make sure each feature has a BC Environment standard feature code (FCODE) assigned to it. The contractor should not create new feature codes. If there is uncertainty around what feature code to assign to a fish or fish habitat feature, contact the contract monitor
3. Are the UTM values in the Fish and Fish Habitat Map features database file in **datum NAD83?**
4. The digital map deliverables for a Fish and Fish Habitat Reconnaissance Inventory project are:

Data Source: dBase format database files

1. Fish and Fish Habitat Map Features database file **A<ryyyynn>.dbf**
2. Metadata database file: **M<ryyyynn>.dbf**

One digital file for each of the standard reconnaissance inventory hardcopy maps produced for a project area. Note the digital file naming convention is as follows:

Standard Maps: Digital Files

1. Project Overview map **O<ryyyynnmm>.eps** or **O<ryyyynnmm>.pdf**

where **O** = Overview map; **ryyyynn** (See Metadata file naming convention - section 2.1.1); **mm** = the number out of 99 potential Project Overview maps produced for the project area.

Examples: O420010301.eps or O420010301.pdf

2. Project map **P<ryyyynnmm>.eps** or **P<ryyyynnmm>.pdf**

where **P** = Project map; **ryyyynn** (See Metadata file naming convention - section 2.1.1); **mm** = the number out of 99 potential Fisheries Project maps produced for the project area.

Examples: P420010301.eps or P420010301.pdf and P420010302 or P420010302.pdf

3. Interpretive map **I<ryyyynnmm>.eps** or **I<ryyyynnmm>.pdf**

where **I** = Interpretive map; **ryyyynn** (See Metadata file naming convention - section 2.1.1); **mm** = the number out of 99 potential Interpretive maps produced for the project area.

Examples: I420010301.eps or I420010301.pdf and I420010302 or I420010302.pdf

6.0 Digital Map Display

The three standard fish and fish habitat inventory map products described in Appendix 3 can be produced using the BC Fisheries PC ArcView mapping application called **FishMap**. FishMap can be downloaded at:

<http://www.bcfisheries.gov.bc.ca/fishinv/fishmap.htm>

This application uses **the Fish and Fish Habitat Map Features Table** (described in Section 4) as the source of the spatial and attribute data required to generate the standard hardcopy inventory maps.

Use only the BC Ministry of Environment Marker Symbols. These symbols can be obtained at:

<http://www.env.gov.bc.ca/gis/arcsymbols.html>

Examples of the standard reconnaissance inventory maps are available for viewing and downloading at:

<http://www.bcfisheries.gov.bc.ca/fishinv/exampleproducts.html>

Stream Information Summary Symbol and the Lake Summary Symbol. These scripts are available to the contractor through the MELP contract monitor or from the Fisheries internet site. All maps produced must closely resemble the maps shown in the diagrams and figures of the main body of this “Standards for Fish and Fish Habitat Mapping” document. Reach labels, species code labels, obstruction height and length labels and sample site labels can all be mapped using the attributes captured in the fish and fish habitat map features table described in this Appendix.

For mapping the standard fish and fish habitat feature symbols the MELP marker set bcenv.mrk must be used.

Glossary

- fcode = FE85650110
label = Fish Observation – Salmon
def'n = Locationally point specific observation of the recorded salmon species (Atlantic salmon species, Pacific salmon: Chinook, Chum, Coho, Kokanee, Pink, and Sockeye).
- fcode = FE85650120
label = Fish Observation – Sport
def'n = Locationally point specific observation of the recorded Sport fish species.
- fcode = FE85650130
label = Fish Observation – Regionally Significant
def'n = Locationally point specific observation of the recorded Regionally designated 'significant' species.
- fcode = FE85650999
label = Fish Observation – Other
def'n = Locationally point specific observation of the recorded 'Other' fish species.
- fcode = FE85660000
label = Reach Break
def'n = A **reach** is a stream segment with relatively repetitious and homogenous sequence of physical processes and habitat types (e.g., homogenous slope, discharge, habitat, channel type and riparian features.). Thus **reach break** is the upper and lower limits of a reach that delineates it from adjoining reaches. The reach break symbol is placed at the upstream limit of a reach.
- Fcode = FE58660013
label = Sub-reach Break
def'n = Upper or lower limit of a stream sub-reach. A sub-reach is a section of a river channel defined by more intensive survey methods than a macro-reach or a reach. A sub-reach break divides adjoining sub-reaches.
- fcode = FE85660011
label = Macro Reach Break
def'n = A **macro-reach** is a section of a channel, defined at a scale of 1:50,000, that is homogeneous in its hydrology, pattern, confinement and gradient. Thus **macro-reach break** is the upper and lower limits of a reach that delineates it from adjoining macro-reaches. A macro-reach symbol is placed at the upstream limit of a macro-reach.

fcode = FE85660012
label = Aquatic Biophysical Reach Break (Historical)
def'n = **Aquatic biophysical** reaches are reaches identified on the aquatic biophysical maps; these reaches were mainly based on fish habitat considerations and are no longer used.

fcode = FF85510110
label = Fish Distribution Upstream Limit – Salmon
def'n = Locationally point specific observation of the uppermost range of the recorded salmon species for a waterbody (Atlantic salmon species, Pacific salmon: Chinook, Chum, Coho, Kokanee, Pink, and Sockeye).

fcode = FF85510120
label = Fish Distribution Upstream Limit – Sport
def'n = Locationally point specific observation of the uppermost range of the recorded sport fish species for a waterbody.

fcode = FF85510130
label = Fish Distribution Upstream Limit – Regionally Significant
def'n = Locationally point specific observation of the uppermost range of the recorded regionally designated 'significant' species for a waterbody.

fcode = FF85510999
label = Fish Distribution Upstream Limit – Other
def'n = Locationally point specific observation of the uppermost range of the recorded 'other' fish species for a waterbody.

Fcode = FF85520110
label = Fish Distribution Downstream Limit – Salmon
def'n = Locationally point specific observation of the lowermost range of the recorded salmon species (Atlantic salmon species, Pacific salmon: Chinook, Chum, Coho, Kokanee, Pink, and Sockeye) for a waterbody.

fcode = FF85520120
label = Fish Distribution Downstream Limit – Sport
def'n = Locationally point specific observation of the lowermost range of the recorded sport fish species.

fcode = FF85520130
label = Fish Distribution Downstream Limit – Regionally Significant
def'n = Locationally point specific observation of the lowermost range of the recorded regionally designated 'significant' species for a waterbody.

fcode = FF85520999
label = Fish Distribution Downstream Limit – Other
def'n = Locationally point specific observation of the lowermost range of the recorded 'other' fish species for a waterbody.

fcode	=	FF85550110
label	=	Fish Presence – Salmon
def'n	=	Locationally non-specific observation or presence recorded for Salmon species in a waterbody (Atlantic salmon species, Pacific salmon: Chinook, Chum, Coho, Kokanee, Pink, and Sockeye). The symbol is placed at waterbody mouth.
fcode	=	FF85550120
label	=	Fish Presence – Sport
def'n	=	Locationally non-specific observation or presence recorded for species in a waterbody. <i>The symbol is placed at waterbody mouth.</i>
fcode	=	FF85550130
label	=	Fish Presence – Regionally Significant
def'n	=	<i>Locationally</i> non-specific observation or presence recorded for regionally designated 'significant' species in a waterbody. The symbol is placed at waterbody mouth.
fcode	=	FF85550999
label	=	Fish Presence – Other
def'n	=	Locationally non-specific observation or presence recorded for 'other' fish species in a waterbody. The symbol is placed at waterbody mouth.
fcode	=	FF85610110
label	=	Fish Spawning Upstream Limit – Salmon
def'n	=	Locationally point specific observation of the upper range of spawning for the recorded salmon species (Atlantic salmon species, Pacific salmon: Chinook, Chum, Coho, Kokanee, Pink, and Sockeye) in a particular spawning zone.
fcode	=	FF85610120
label	=	Fish Spawning Upstream Limit – Sport
def'n	=	Locationally point specific observation of the upper range of spawning for the recorded sport fish species in a particular spawning zone.
fcode	=	FF85610130
label	=	Fish Spawning Upstream Limit – Regionally Significant
def'n	=	Locationally point specific observation of the upper range of spawning for the recorded regionally designated 'significant' species in a particular spawning zone.
fcode	=	FF85610999
label	=	Fish Spawning Upstream Limit – Other
def'n	=	Locationally point specific observation of the upper range of spawning for the recorded 'other' fish species in a particular spawning zone.
fcode	=	FF85620110
label	=	Fish Spawning Downstream Limit – Salmon
def'n	=	Locationally point specific observation of the lower range of spawning for the recorded salmon species (Atlantic salmon species, Pacific salmon: Chinook, Chum, Coho, Kokanee, Pink, and Sockeye) in a particular spawning zone.

- fcode = FF85620120
label = Fish Spawning Downstream Limit – Sport
def'n = Locationally point specific observation of the lower range of spawning for the recorded sport fish species in a particular spawning zone.
- fcode = FF85620130
label = Fish Spawning Downstream Limit – Regionally Significant
def'n = Locationally point specific observation of the lower range of spawning for the recorded regionally designated 'significant' species in a particular spawning zone.
- fcode = FF85620999
label = Fish Spawning Downstream Limit – Other
def'n = Locationally point specific observation of the lower range of spawning for the recorded 'other' fish species in a particular spawning zone.
- fcode = PI1500000
label = Spawning Channel
= A water course in which fish spawn or a water course where conditions are conducive to spawning.
- fcode = PI1501000
label = Side Channel
def'n = A water course connected to, but separated from the main water channel, by both its upstream and downstream end.
- fcode = PI12000110
label = Point Sample, Salmon
def'n = Locationally point specific observation of the recorded salmon species (Atlantic salmon species, Pacific salmon: Chinook, Chum, Coho, Kokanee, Pink, and Sockeye) along the length of the waterbody.
- fcode = PI12000120
label = Point Sample, Sport
def'n = Locationally point specific observation of the recorded sport species along the length of the waterbody.
- fcode = PI12000130
label = Point Sample, Other
def'n = Locationally point specific observation of the recorded 'other' species along the length of the waterbody.
- fcode = PI12000140
label = Point Sample, Regionally Significant
def'n = Locationally point specific observation of the recorded regionally significant species along the length of the waterbody.

fcode	=	PI12200110
label	=	Reach Break
def'n	=	A reach is a stream segment with relatively repetitious and homogenous sequence of physical processes and habitat types (e.g., homogenous slope, discharge, habitat, channel type and riparian features.). The reach break defines the two limits of a reach. The reach break symbol is placed at the upstream limit of a reach.
fcode	=	PI30001000
label	=	Fishway
def'n	=	A Fisheries habitat improvement, such as a fish ladder
fcode	=	PI30002000
label	=	Beaver Dam
def'n	=	An obstruction built by Beaver or a member of the Beaver family for the purpose of trapping, restricting or backing up a water flow for the purpose of increasing their water habitat, whether active or abandoned.
fcode	=	PI30003000
label	=	Cascades
def'n	=	Water in a water course which follows a descent gradient slightly steeper than the gradient for the parent waterbody or follows a series of such descents, in relatively quick succession (smaller than a falls).
fcode	=	PI30004000
label	=	Falls
def'n	=	1. A precipitous descent of water in a watercourse. 2. The water in a watercourse that follows a perpendicular or very steep descent
fcode	=	PI30005000
label	=	Culvert
def'n	=	A pipe, concrete, or log structure covered with soil and lying below an embankment surface, used to carry water from one side of the road to the other.
fcode	=	PI30006000
label	=	Persistent Debris Accumulation
def'n	=	1. A collection of debris which, by nature of location or morphology of the watercourse, is not flushed from the area of accumulation, with such regularity that debris tends to build up over time. 2. A build up of immobile organic material over time in the watercourse
fcode	=	PI30007000
label	=	Dam
def'n	=	A barrier across a watercourse or waterbody to control the water flow.
fcode	=	PI40001000
label	=	Incubation Box
def'n	=	An apparatus which allows for protected egg rearing or development.

fcode = PI40002000
label = Counting Fence
def'n = An apparatus which allows the enumeration of fish by a constricting of the passable water course area.

fcode = PI84510000
label = Fisheries sensitive zone
def'n = An area of assigned or recognized importance and/or sensitivity for Fisheries purposes.

Beaver Dam: A beaver-constructed barrier or partial barrier across a watercourse to control water flow by impoundment.

Cascades: Water in a water course which follows a descent gradient slightly steeper than the gradient for the parent waterbody or follows a series of such descents, in relatively quick succession (smaller than a falls).

Counting Fence: An artificial structure spanning a stream channel used for the enumeration (and sometimes, collection) of migrating fish.

Culvert: An artificial watercourse used to divert or continue the flow of water through, under, around, etc. an obstacle or barrier or to redirect the flow of water from its natural direction.

Dam: An artificial barrier across a watercourse or waterbody to control the water flow.

Falls: Suggested Definition: The water in a watercourse that follows a perpendicular or very steep descent.

Fish Distribution Downstream Limit: Locationally point specific observation of the lowermost range of the recorded fish species (salmon species sport fish species, regionally designated 'significant' species or 'other' non-game fish, non-popular sport species fish species).

Fish Distribution Upstream Limit: Locationally point specific observation of the uppermost range of the recorded fish species for a waterbody (salmon species sport fish species, regionally designated 'significant' species or 'other' non-game fish, non-popular sport species fish species).

Fish Observation: Location, point specific observation of the recorded fish species (salmon species sport fish species, regionally designated 'significant' species or 'other' non-game fish, non-popular sport species fish species).

Fish Presence: Locationally non-specific observation or presence recorded for fish species in a waterbody (salmon species sport fish species, regionally designated 'significant' species or 'other' non-game fish, non-popular sport species fish species). The symbol for fish presence is always placed at mouth of the waterbody.

Fish Spawning Downstream Limit: Locationally point specific observation of lower range of spawning for the recorded fish species in a particular spawning zone, (salmon species sport fish species, regionally designated 'significant' species or 'other' non-game fish, non-popular sport species fish species).

- Fish Spawning Upstream Limit:** Locationally point specific observation of the upper range of spawning for the recorded fish species in a particular spawning zone (salmon species sport fish species, regionally designated 'significant' species or 'other' non-game fish, non-popular sport species fish species).
- Fisheries sensitive zone:** Area of assigned or recognized importance and/or sensitivity from a Fisheries perspective. These areas include relict channels, ephemeral channels, swamps, sloughs, ponds, and other features at least temporarily connected to the main stream.
- Fishway:** An artificial channel constructed for the purpose of allowing migrating fish to bypass a barrier or partial barrier in a section of stream channel.
- Macro Reach Break:** A macro-reach is placed at the upstream point of a macro-reach. A macro-reach is a section of stream which, from an inspection of a map, appears to meet the criteria for a reach.
- Marsh:** A wetland that is periodically inundated with water to a depth of up to 2 m and that supports an extensive cover of emergent non-woody vegetation(e.g., flooded plain or grassland).
- Persistent Debris Accumulation:** A collection of debris which, by nature of location or morphology of the watercourse, is not flushed from the area of accumulation, with such regularity that debris tends to build up over time.
- Primary Lake:** Lakes that play a dominant role (and generally have the largest surface area, and/or are central) in a cluster or chain of lakes and/or lakes that represent the physical characteristics of most lakes in the group.
- Reach Break:** A reach break is placed at the upstream point where one reach turns into another. A reach is a section of stream which appears to offer roughly homogenous slope, discharge, habitat, channel type and riparian features.
- Reach number:** The unique number given to a **reach** in upstream-ascending order. Reaches are normally numbered as sequential integers, but may receive decimal subdivisions following some kinds of more detailed inventory. Consult with Aquatic Inventory Unit.
- Reach:** The basic biophysical mapping unit for the Aquatic System Inventory. Reaches are characterized by relatively homogenous properties which will vary according to the scale of the survey. These properties should reflect a repetitious and homogenous sequence of physical processes and habitat types, and are roughly equivalent to the land system level in Ecological Land Classification terminology (Environment Canada, 1976). Reaches are normally delineated from aerial photographs on the basis of changes in geomorphic indicators such as **pattern**, confinement, **surface expression**, and the presence of **bars** and **hydrology**. Individual elements (habitat types) of a reach (e.g., **pools**, **riffles**, **undercut banks**) may be mapped at larger scales, but should not be called reaches.
- Side Channel:** A water course, most frequently a relict stream channel, connected to the main stream channel at some time during the year.
- Spawning Channel:** An artificially constructed channel most frequently a side channel with controlled or ground water flow built to provide spawners with supplemental spawning habitat.
- Spring:** An underground source of water emerging naturally at the ground surface; may be **intermittent** or **perennial** flow.

Stream Reference Number:

Swamp: A flat, wet area usually or periodically covered by standing water and supporting a growth of trees, shrubs and grasses; in contrast to a bog, the organic soil is thin and readily permeated by roots and nutrients.

Total Dissolved Solids (TDS): A measure of **inorganic** and **organic** materials remaining in water that has passed through a 0.45 μ filter; often referred to as **Filterable Residue** (F.R.) and expressed as mg/L F.R. Sometimes considered similar to conductivity as an indicator of potential production in habitat quality indices. Compare *to*: **Total Suspended Solids**.

Waterbody: A natural or man-made container or portion thereof which permanently or semi-permanently holds standing or running water. A waterbody is determined by the evidence of permanent/semi-permanent presence of water.

Watershed: A catchment area for water that is bounded by the height of land and drains to a point on a **stream** or body of water. A watershed can be wholly contained within another watershed. A watershed is used to define boundaries used for environmental management, but is not the boundary itself (i.e., a watershed “divide” is a physical boundary