
Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Follow-up Sampling (Stream) Standards

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Abstract

This manual describes the standard for Reconnaissance (1:20 000) Fish and Fish Habitat Inventory (FFHI) Follow-up Sampling for streams in British Columbia. Reconnaissance (1:20 000) Fish and Fish Habitat Inventory Follow-up Sampling, is any sampling in a watershed, carried out in conjunction with a previous reconnaissance (1:20 000) Fish and Fish Habitat Inventory, where phases I-VI have been completed. The follow-up sampling can include re-sampling of previously sampled sites or sampling of new sites in previously sampled reaches or new reaches. The purpose of the follow-up sampling is to confirm watershed-wide fish distributions and habitat characteristics that were not sufficiently addressed in the original 1:20,000 inventory.

This manual is to be used in conjunction with the standards and other related information associated with the Reconnaissance (1:20 000) Fish and Fish Habitat Inventory. This manual represents additions or changes from the Reconnaissance (1:20 000) Fish and Fish Habitat Inventory standards and other related documents, that apply specifically to Reconnaissance (1:20 000) Fish and Fish Habitat Inventory Follow-up Sampling. The standards and other related information, relating to the Reconnaissance (1:20 000) Fish and Fish Habitat Inventory, must still be followed. This manual presents all phases of the inventory, from pre-field data review to data compilation, and preparation of final reports and maps.

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The Resources Information Standards Committee evolved from the Resources Inventory Committee which received funding from the Canada-British Columbia Partnership Agreement of Forest Resource Development (FRDA II), the Corporate Resource Inventory Initiative (CRII) and by Forest Renewal BC (FRBC), and addressed concerns of the 1991 Forest Resources Commission.

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

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1.1 Introduction

This manual describes the standard for Reconnaissance (1:20 000) Fish and Fish Habitat Inventory (FFHI) Follow-up Sampling for streams in British Columbia. Reconnaissance (1:20 000) Fish and Fish Habitat Inventory Follow-up Sampling, is any sampling in a watershed, carried out in conjunction with a previous reconnaissance (1:20 000) Fish and Fish Habitat Inventory, where phases I-VI have been completed. The follow-up sampling can include re-sampling of previously sampled sites or sampling of new sites in previously sampled reaches or new reaches. Follow-up sampling, as discussed in this document, only applies to stream inventory, and does not include lakes.

1.1.1 Objectives

Reconnaissance (1:20 000) Fish and Fish Habitat Inventory and Reconnaissance (1:20 000) Fish and Fish Habitat Inventory Follow-up Sampling are intended to provide information regarding fish species characteristics, distributions and relative abundance, as well as stream data for interpretation of habitat sensitivity and capability for fish production. The purpose of the follow-up sampling is to confirm watershed-wide fish distributions and habitat characteristics that were not sufficiently addressed in the original 1:20,000 inventory. Follow-up sampling is not intended to address site specific operation developments (i.e. stream crossing structures, 1:5,000 Fish Stream ID).

1.1.2 Standards

This document is to be used in conjunction with the standards and other related information associated with the Reconnaissance (1:20 000) Fish and Fish Habitat Inventory. This document represents additions or changes, from the Reconnaissance (1:20 000) Fish and Fish Habitat Inventory standards and other related documents, that apply specifically to Reconnaissance (1:20 000) Fish and Fish Habitat Inventory Follow-up Sampling. The standards and other related information, relating to the Reconnaissance (1:20 000) Fish and Fish Habitat Inventory, must otherwise be followed. This document presents all phases of the inventory, including pre-field planning, field data collection, data compilation, and final preparation of reports and maps. Quality assurance (QA) is required for every phase of the inventory, and follows the standards associated with the Reconnaissance (1:20 000) Fish and Fish Habitat Inventory.

2.1 Pre-field Planning

Follow-up sampling inventory requires the use of project deliverables from the original reconnaissance inventory. These deliverables include:

- Original report
- Original maps (plots)
- Digital mapping files (Fish and Fish Habitat Map Features Table and metadata table)
- The most current FDIS database available
- Digital copies of many original project deliverables are available from [EcoCat \(The Ecological Reports Catalogue\)](#). FDIS, however, must be obtained directly from the Ministry.

2.1.1 Pre-field Site Selection

Prepare a “Sample Site List and Rationale” (to be included in Attachment I of the Follow-up Sampling report), that lists the sites selected for the follow-up sampling, and the rationale for the selection of each site. Sample sites for follow-up sampling can be selected from the original reconnaissance inventory project and/or as newly identified discretionary sites. The sampling rationale must meet the objectives of Reconnaissance Fish and Fish Habitat Inventory and Reconnaissance Fish and Fish Habitat Inventory Follow-up Sampling. The rationale must also justify the reasons that a site is being selected for re-sampling or initial sampling. For example: Describe the factors (e.g. insufficient sampling effort, sampling required at different time of year, potential fish obstruction etc.) in specific terms (e.g.: temperatures too low for electrofishing, channel was dry in initial survey, sampling for overwintering coho habitat required, bull trout habitat above potential obstruction was insufficiently sampled etc.). Site selection should attempt to address gaps in fish distribution information, which were found in the original inventory project. Up to 20% of the number of sites, from the original project, may be selected as follow-up sampling sites in the pre-field planning stage. Ministry approval is required for selection of more than 20% of the number of sites from the original project.

The process for selecting follow-up sampling sites requires both of the following steps:

1. As a starting point, review and assess the “Follow-up sampling required for classification of non-fish bearing reaches ...” table, and/or other recommendations for follow-up sampling, in the original reconnaissance report (if there is no table or recommendations for follow-up sampling in the original report, sites can be selected using step 2 as the starting point).
2. In addition, review and assess the overall original report, and other available information, (e.g. operational surveys completed since the original Reconnaissance project), while selecting sites to meet the objectives of follow-up sampling.

3.1 Field Data Collection

The standards for collecting and recording site data are the same as stated in the standards and other related information associated with the Reconnaissance (1:20 000) Fish and Fish Habitat Inventory. This includes the complete collection of site card description data and photographs for each site.

Field crews are advised to take particular care that sufficient fish sampling effort is applied at each site to resolve fish distribution uncertainties from the original inventory. For example, at sites where fish are known or suspected to be sparsely distributed, it may be advisable to increase the site length (beyond the standard 100m or 10W_b), or increase the time of electrofishing effort in order to document fish presence. This is a matter of professional judgment to be determined by the field crews, but it will be important to ensure that fish distribution uncertainties from the original inventory are resolved, with acceptable justification, in the follow-up sampling report.

The need for reference voucher specimens and aging structures will depend on the results of the original Reconnaissance project. Consult with the Ministry Regional Fisheries Information Specialist to determine the need for reference voucher specimens and aging structures. Vouchers for any fish that cannot be identified to species accurately are required and must be collected.

3.1.1 Additional Field Sites

The field survey for follow-up sampling will use the sites identified in the Pre-Planning phase of the follow-sampling project in the Sample Site List and Rationale.

Where previously agreed with the proponent, additional field sites may be selected in the field (up to 10% of the total number of follow-up sampling sites selected in the pre-field planning) to address fish distribution questions at the discretion of the field crews (e.g. in order to address specific habitat types, or habitat above suspected fish obstructions). If additional field sites (beyond the 10%) are required, field crews must seek approval from the proponent.

3.1.2 Obstructions

Locate fish obstructions that may be impacting fish distribution in sampled reaches. Confirmation of any physical feature that may be a factor in restricting fish movements can be very important evidence for showing non-fish bearing status in a reach. For example, documentation of plunge pool depths can be useful to assess passage over potential obstructions. Recipients should use fish sampling results and their professional judgment, to decide if a downstream obstruction to fish movement may exist, and attempt to confirm its existence.

4.1 Data Compilation

The standards for compiling data, vouchers and photographs, collected during follow-up sampling, are the same as for an initial Reconnaissance 1:20 000 Fish and Fish Habitat Inventory. Enter all site and fish data collected into a new FDIS (Version 7.6 or most current version) database.

4.1.2 Reporting

Prepare the results of the follow-up sampling in a stand alone Follow-up Sampling report, using the most current Reconnaissance Fish and Fish Habitat Inventory standards, including the [“Reconnaissance \(1:20 000\) Fish and Fish Habitat Inventory of Buba Creek Watershed”](#) example report format, with the following modifications:

- a) Change the Report Title “Reconnaissance (1:20 000) Fish and Fish Habitat Inventory of ...” to “2006 Reconnaissance (1:20 000) Fish and Fish Habitat Inventory Follow-up Sampling of...”
- b) In “Project Reference Information” add ‘Original Report Title’ and “Original FDIS Project Number”
- c) Replace the “Sampling Design Summary” with a “Follow-up Sampling Design Summary” as follows:

Follow-up Sampling Design Summary

Total Sampling Sites Original Inventory	100
Total Sampling Sites Follow-up Inventory	20
Field Sampling Dates Original Inventory	Sept. 3-18, 1997
Field Sampling Dates Follow-up Inventory	Jun. 7-14, 2006

- d) The “Introduction” should describe “Project Scope/Objectives” and “Location” but descriptions of “Access”, “Resource Information”, and “Methods” should be very brief. Highlight what is important or changed with respect to the follow-up sampling, and refer the reader to the original report for more detailed information.
- e) The “Results and Discussion” should emphasize the section on “Habitat and Fish Distribution” and relate results, from the original report, to what is found in the follow-up sampling inventory so that the reader has a clear picture of the fish distributions in the project area.
- f) The “Logistics” and “Summary of Sub-basin Biophysical Information” sections of the “Results and Discussion” should refer the reader to the original report, unless there is new information specifically relevant to the follow-up sampling project.
- g) The “Fish Age, Size and Life History” and “Significant Features and Fisheries Observations” sections of the “Results and Discussion” should emphasize new and significant findings resulting from the follow-up sampling inventory, such as new size classes and new species, and discuss them in the context of the original report; otherwise refer the reader to the original report.

- h) The Fish Bearing Status section of the Results and Discussion shall include a table summarizing the results of the follow-up sampling in all reaches as shown in Figure 1. The table replaces the “Summary of data from surveyed fish bearing reaches in the Buba Creek Watershed, ..” table found in the “Fish Bearing Reaches Section”, and the “Summary of data from surveyed Non-fish Bearing reaches in the Buba Creek Watershed, ..” table found in the “Non Fish Bearing Reaches” Section; of the [“Reconnaissance \(1:20 000\) Fish and Fish Habitat Inventory of Buba Creek Watershed”](#) example report.

If no fish were captured in the reach during the inventory, but fish use of the reach is still suspected or assumed, include an explanation in the comments. Include in the comments column a short, concise written explanation, supporting the non-fish bearing status of the reach, which includes the following information where appropriate:

I)	date and time of sampling events, including original and follow-up sampling events
II)	capture method specifics (electroshocker make, model and settings
III)	sampling area covered
IV)	whether the sample site was open (no stop-nets); closed (up stream and down stream stop-nets); or partially closed (specify whether upstream or downstream stop-nets)
V)	habitat conditions during sampling (flow, stage, turbidity)
VI)	additional supporting evidence
VII)	known upstream and downstream fish species presence
VIII)	type and location of obstructions to fish migrations
IX)	seasonal habitat availability
X)	seasonal fish use of stream and off-channel habitats

- i) Include the Sample Site List and Rationale in Attachment I of the Follow-up Sampling Report

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Figure1.

Table X. Summary of fish sampling data for follow-up sampled reaches in the Buba Creek Watershed, 7 June to 14 June 2006.

Stream Name	Watershed Code/ILP	Reach	Map No.	Species	Channel		Electrofishing Specifications				Other Methods		Proposed Riparian Class	Comments
					Site Width (m)	Site Gradient (%)	Dist. (m)	Time (s)	Cond (uS)	Temp (C)	Type	Effort		
Buba Creek	400-033300	8	93K.006	RB	6.5	15	150	877	70	10	MT	5, over-night	S2	Fish use assumed in this reach due to fish presence in up/down stream reaches
Buba Creek	400-033300	9	93K.006	NFC	4.2	16	120	750	70	10	MT	5, over-night	S3	
Buba Creek	400-033300	10-14	93K.006	RB	3.9	15	110	792	70	10	MT	4, over-night	S3	
Buba Creek	400-033300	40	93K.006	NFC	1.8	12	150	910	70	10	MT	5, over-night	S6	

4.1.3 Mapping

Project Maps are not required for follow-up sampling; instead provide a combination Project/Interpretive follow-up sampling map (Interpretive Map including the site data symbols associated with Reconnaissance Inventory Project Maps). The follow-up sampling map only needs to show the new information collected, as well as relevant data from the original project noted below. If there is a preference to deliver a Project Map and an Interpretive Map, contact the Ministry for approval.

For the Follow-up sampling Project/Interpretive Map:

- Display both original and follow-up inventory site data symbols for each follow-up sampling site.
- Display both original and follow-up inventory reach summary symbols for each follow-up sampling site, only where the reach classification changed as a result of the follow-up sampling information review.
- All original inventory reach summary and site data symbols must be distinguished from the follow-up inventory reach summary and site data symbols (recommend grey for original sampling symbols and black for follow-up sampling symbols).
- Where the reach classification does not change as a result of the follow-up sampling information review, display the reach summary symbol as a follow-up inventory reach summary symbol (i.e. black)
- Add red and blue solid/dashed lines to illustrate the known and inferred limits of fish distribution in the watershed
- Defaulted fish bearing classifications and suspected (not confirmed) fish species presence will be designated in brackets on the reach summary symbol i.e. (S2), (RB).
- Indicate in the Map Legend Box that both original and follow-up sampling data are presented, and indicate how they are distinguished on the map

Digital map files are to be provided as a Fish and Fish Habitat Map Features Table and metadata table, as specified in “Standards for Fish and Fish Habitat Maps” (RISC). The Project map labels will continue to be included in the Fish and Fish Habitat Map Features Table, even when no project map is produced. All label fields in the Fish and Fish Habitat Map Features Table must be consistent with all other report products, especially the interpretive maps. Provide digital versions of hardcopy maps in PDF format.

5.1 Deliverables

The list below describes the deliverable standards for Reconnaissance Fish and Fish Habitat Follow-up Sampling. Where not specified the deliverables must follow the most current Reconnaissance (1:20 000) Fish and Fish Habitat Inventory standards, errata, clarifications, example report, and related documents.

One complete digital copy of the Phase 1-3 (Planning) and Phase 4-6 (Field work and reporting) deliverables must be submitted through the [fish data submission](#) process. One complete hardcopy and one complete digital copy of the Phase 1-3 (Planning) and Phase 4-6 (Field work and reporting) deliverables, and all quality assurance documentation (forms, correspondence, and reports) are to be sent to the appropriate Regional Ministry office.

Copies of the digital report, appendices and applicable attachments must be provided in PDF format. The Ministry must be able to reproduce the entire hardcopy report from the PDF files submitted. To ensure the PDF files are not too large, provide a separate PDF document for the report, for Appendix I, and for each map in Appendix II. Each PDF document must match the hardcopy document and have all tables, figures, FDIS printouts and integrated site photos etc. inserted and collated appropriately.

- Quality assurance (QA) documentation (forms, correspondence, and reports) to be submitted with project deliverables to Regional Ministry Office
- Complete digital (PDF format) copies and hardcopy of the Follow-up Sampling Report
- Appendix I of the Follow-up Sampling report: FDIS Summary and Photographs in digital (PDF format) copies and hardcopy
- Appendix II of the Follow-up Sampling report: Hardcopy and digital versions (PDF format) of the project/interpretive map
- Digital map files (Fish and Fish Habitat Map Features Table and Metadata table in dbase file format)
- Sample Site List and Rationale (to be included in Attachment I of the Follow-up Sampling report)
- Digital Copies of FDIS database (Version 7.6 or most current version)
- Original field notes site cards, field cards/forms; to be submitted in Attachment II of the Follow-up Sampling hardcopy report, submitted to Regional Ministry Office
- Labeled Aging structures, and photocopies of scale prints (to be included in Attachment III of the Follow-up Sampling hardcopy report, submitted to Regional Ministry Office)
- Fish Vouchers: summary table (results from expert examination for identification) in digital (PDF format) copies and hardcopy; to be included in Attachment IV of the Follow-up Sampling report, actual (fish) samples to be submitted to Regional Ministry Office with project deliverables
- Photodocumentation: Photodocumentation Form 1 and Photo Summary report in digital (PDF format) and hardcopies; CD jacket thumbnail reference, photo CD,

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negatives to be included in Attachment V of the Follow-up Sampling hardcopy report, submitted to Regional Ministry Office