

Fish Inventory Mapping System (FishMap)

For

BC Fish Inventory Data

User Manual

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Version 1.2

Developed for the British Columbia Ministry of Sustainable Resource Management

Aquatic Information Branch

By

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1.0 Introduction

1.1 Purpose

The Fish Inventory Mapping system (FishMap) is an ArcView extension designed for GIS data entry and map production for Reconnaissance (1:20000) Fish and Fish Habitat Inventory projects. FishMap includes a number of programs and utilities designed to automate the steps required to complete the phase 1-3 and 4-6 components of inventory projects. All data sets and map products created by this program have been designed to adhere to the “Standards for Fish and Fish Habitat Maps, Version 3.0, RIC 2001”. The application, as well as this manual, has been designed to follow the workflow outlined below:

Phase 1-3

1. **Project Preparation** – this step consists of all the background work to complete prior to commencing the mapping:
 - a. ArcView project initialization – creation of a project workspace to store all information related to the project and creation of an ArcView project file to load the FishMap extension into. Use of the templates included with the extension simplifies this step.
 - b. Data Acquisition – compiling all data required for the project (1:20000 TRIM, Watershed Atlas (WSA), historical fish data, Forest development plans, etc).
2. **Data Preparation** – this step consists of converting all data into a format usable by FishMap:
 - a. Merging TRIM themes (and setting map projection).
 - b. Setting map projection for WSA and other project data.
3. **Initial Data Entry** – digitizing of all reach breaks and any other known features (including historical fish / stream features).
4. **Initial QA** – to ensure data entry completed correctly.
5. **Labeling** – to place WSC/ILP’s, NID’s, Reach #’s and other labels on the map. Having the labels present will make completion of reach calculations easier.
6. **Reach Calculations** – to calculate upstream elevation, downstream elevation and reach length for each reach in the project area. This information is used by FDIS for calculation of reach gradient.
7. **Export to FDIS** – this step will create the RPLAN, LPLAN, and FPLAN tables for further data entry outside ArcView. Once complete, these tables get loaded into FDIS.
8. **GIS Deliverables** – If the GIS QA passed, the attribute and metadata tables can be created.
9. **Map Production** – creation of the Interim maps.

Phase 4-6

1. **Project Preparation** – this step has two possible starting points:
 - a. Continuing with same project file (*.apr) as Phases 1-3.
 - b. Starting with only FDIS and a new project file (*.apr).
2. **Data Preparation (1b only)** – same as step 2 above. In addition, the FDIS Table 1 Export Tool should be run to generate the GIS Table 1 (for both 1a & 1b).
3. **Data Entry** – new 4-6 features (sample sites, stream features) have to be digitized.
4. **Phase 4-6 Setup** – this step will merge output from the FDIS Table 1 file with digitized data so labeling can be completed for the Project and Interpretive maps.
5. **Labeling** – In addition to the phase 1-3 labels (WSC/ILP’s, reach #’s), labels for the project maps (site data, reach data and lake summary labels) and interpretive maps (reach summary labels) have to be created.
6. **QA / GIS Deliverables** – After a successful QA, attribute and metadata tables can be created.
7. **Map Production** – creation of Overview, Project and Interpretive maps.

1.2 Limitations

As there may be slight regional differences in standards, manual editing of the products may be required by the user. All of ArcView's standard tools are available to the user for this reason. The tool has data checks and automation built in; however, as each inventory project is unique, not every possible scenario can be anticipated.

- *Projects crossing UTM zones*

There may be situations where a fish inventory project crosses a UTM zone boundary. If this is the case, two separate projects and workspaces will have to be setup, one for each UTM zone of the project. The map production should also be completed by mapsheet; composite maps are not recommended.

1.3 About this Manual

This manual is designed to direct the user through the steps necessary to complete the GIS component of a fish inventory mapping project. It is assumed the user has previous experience using ArcView and has a solid understanding of ArcView's document types (project, views, tables, and layouts) and how these documents are used to display, query and analyze fish inventory GIS data. The manual follows the natural workflow of a typical fish inventory map project; if the user strays from this workflow, difficulties and errors may be encountered. This manual is also designed to be used in conjunction with the RIC standards manual "**Standards for Fish and Fish Habitat Maps, Version 3.0, RIC 2001**"; the user should have a thorough understanding of all mapping specifications outlined in the standards manual.

1.4 Other Useful Extensions

There are many third party software extensions developed for ArcView, the following have been found to be useful for fish inventory mapping projects:

- BC Albers Tools (melpkid.avx) – contains a number of utilities, most notably a program for projecting data to and from the BC Albers projection. Developed for BC Environment, available at: <http://srmwww.gov.bc.ca/gis/melpkid/index.html>
- 2001 Fish Inventory QA Tool Version 3.0 – contains utilities used to check fish inventory data, also other utilities for working with fish data. Developed for the Ministry of Sustainable Resource Management, available at: <http://www.bcfisheries.gov.bc.ca/fishinv/QAtoolVersion1.htm>
- Xtools Extension, Metres/Hectares (xtoolsmh.avx) – contains useful table editing and view utilities. Developed by the Oregon Department of Forestry, available at: <http://www.odf.state.or.us/StateForests/sfgis/default.htm> where there is a link to other ODF ArcView Extensions.
- ArcView ODB Extension (odb.avx) – useful for saving ArcView documents (views, layouts, etc) so they can be loaded into other ArcView project files. Available at: www.esri.com/arcscripts

One of the best sources for third party extensions is ESRI's ArcScripts site: www.esri.com/arcscripts. All ArcView scripts and extensions available here can be searched by keyword.

*NOTE: Some extensions may interfere with FishMap, minimize loading unnecessary extensions while using FishMap.

2.0 Installation Notes

2.1 System Requirements

FishMap is designed to work with ArcView 3.1 or 3.2. It will not run in earlier versions of ArcView, or in ArcView 8.1. The program was developed and tested on a Pentium 200 Mhz machine running Windows NT4.0 and has been tested on Windows 98 and Windows 2000 systems as well. Suggested hardware requirements are as follows:

- *Minimum* – Pentium processor, 200MHz, 64 MB RAM
- *Optimum* – Pentium III processor, 500 MHz 128MB RAM

In ArcView cartographic elements, such as labels, are stored in RAM memory as graphics. Larger projects, ie. more than 6 TRIM maps, should be run on an optimum level or better system. For smaller areas, i.e. up to 6 mapsheets, the minimum system will work fine.

2.2 Installation and Required Files

The FishMap extension package includes support files necessary to complete fish inventory mapping projects. These support files must be present in order for the extension to work. The FishMap extension and all these support files are distributed in a compressed zip file, **fishmapv1_2.zip**. To install, place the **fishmapv1_2.zip** file in the \$USEREXT directory on the system. Use PKUNZIP with the “-d” option to unzip the file and rebuild the directory structure. If using WinZIP, you **must** check the “**Use Folder Names**” checkbox in the lower left corner of the “Extract” window to rebuild the directory structure. The BC Environment symbols are included as Windows font files; these must also be installed (if not installed already for FishQA or MelpKid extension). Copy the font files into the “fonts” folder of the Windows installation directory.

2.3 \$USEREXT system variable

\$USEREXT is a system variable that identifies a directory on the system for storage of a user’s ArcView extensions; the most common setting for \$USEREXT on a standalone (no network) system would be c:\userext.

- *Windows NT 4.0*

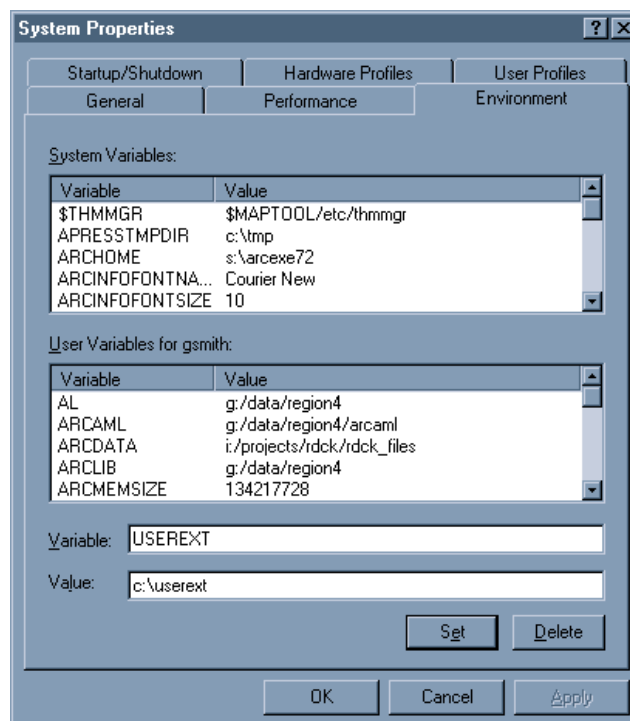


To set a system variable in Windows NT 4.0, right click on the “My Computer” icon on the desktop, select “Properties”, and then click the “Environment” tab. This opens a window (see right) for setting system variables. Under the “User Variables” set the variable USEREXT to the pathname where the FishMap files reside, (e.g. c:\userext)

- *Windows 95/98*

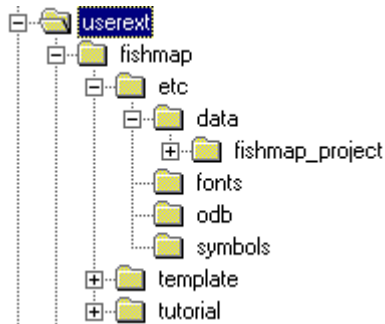
Windows95/98 users must set the USEREXT variable in the AUTOEXEC.BAT file by adding the following line (substituting the appropriate drive letter for c):

```
set USEREXT=c:\userext
```



2.4 FishMap Directory Structure

The FishMap extension directory structure is shown and described below:



\$USEREXT\FishMap subdirectories:

etc\data – 1:20,000 mapsheet grids – UTM & Albers projections.

FishMap_project – template fish project directory structure – copy to appropriate location on system. (see Workspace Setup – section 3.2)

etc/fonts – BC Environment symbol fonts. These must be installed as Windows fonts to ensure the map features draw with the correct symbols. See Windows help for installation of new fonts.

etc/odb – object database of blank FishMap views and layouts.

etc/symbols – symbol files as ArcView object databases

template – symbology lookup tables for all map features

tutorial – An HTML FishMap tutorial to provide detailed step-by-step examples of an entire Phase 1-3 and Phase 4-6 project. To start open the [index.htm](#) file.

2.5 Loading the Extension

The FishMap application is an ArcView extension that is loaded at the beginning of a fish mapping project. After a project has started, the extension will load automatically each time the ArcView project is opened. The extension will be required for the duration of the project; it should not be unloaded from the project file.

NOTE: The FishMap Extension is already loaded into the fish_template.apr file. In the normal course of using FishMap, the extension should not need to be unloaded or loaded.

The extension will add menus named “FishMap” and “MapExtents” to the ArcView View document, and only “FishMap” to the Project, and Table documents. These menus access all programs that are included in the extension. The order of the items in the menus reflects the natural workflow of a project. See the next section for descriptions of each menu item.

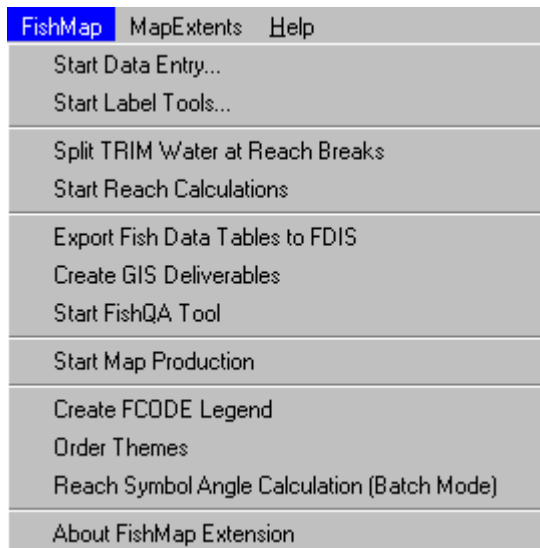
The extension will also load the following five tables:

FSHMAP.SpCd.lut
FSHMAP.bcemrk.lut
FSHMAP.bcelin.lut
FSHMAP.bceshd.lut
FSHMAP.fshmrk.lut

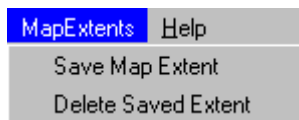
these are lookup tables used by FishMap to determine symbology for displaying map features.

2.6 FishMap Menu Descriptions

View 'FishMap' Menu

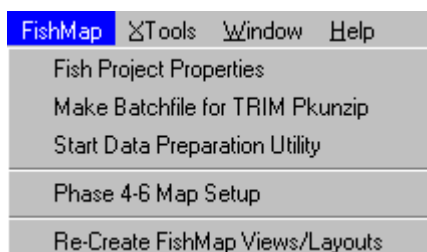


- **Start Data Entry...** - Starts data entry dialogs.
- **Start Label Tools** – Starts labeling dialog for labeling features, reaches and stream WSC/ILP.
- **Split TRIM Water...** - Preps TRIM water for reach calculations.
- **Start Reach Calculations** – Starts reach calculations dialog.
- **Export Fish Data Tables to FDIS** – Creates RPLAN and LPLAN csv files, or nidutm csv file for import to FDIS.
- **Create GIS Deliverables** – Creates attribute and metadata tables in accordance with standards.
- **Start FishQA Tool** – Loads FishQA extension into project (if needed) and starts main QA program.
- **Start Map Production** – Opens map production dialog to create base interim, project or interpretive maps.
- **Create FCODE Legend** – creates a legend for active theme using MELP symbology
- **Order Themes** – rearranges order of themes in view according to feature type
- **Reach Symbol Angle Calculation...** - calculates rotation angle for all reaches – *only used for phase 4-6.*
- **About FishMap Extension** – Displays FishMap version number, release date, etc.



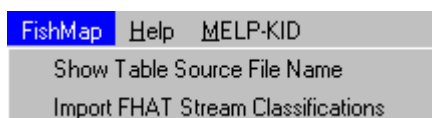
- **Save Map Extent** – Save the current display extent. Useful for creating composite maps.
- **Delete Saved Extent** – Delete a saved map extent

Project 'FishMap' Menu



- **Fish Project Properties** – Opens a dialog for input of project parameters: name, project code, etc.
- **Make Batchfile for TRIM Pkunzip** – Creates a DOS batchfile (.BAT) to run with PKUNZIP to automate the unzipping of the raw TRIM data
- **Start Data Preparation Utility** – Starts a program for merging and projecting TRIM data to UTM.
- **Phase 4-6 Map Setup** – Starts a utility to import FDIS Table 1 with phase 4-6 features. Used after phase 4-6 FDIS database is exported to Table 1 (dBase). Creates a "Fish Data" them in Project and Interpretive Views
- **Re-Create FishMap Views/Layouts** – loads predefined FishMap views and layouts from odb files. (*Only necessary if documents are accidentally deleted from the project*)

Table 'FishMap' Menu



- **Show Table Source File Name** – Shows the filename and path of source data for the active table in a dialog box.
- **Import FHAT Stream Classifications** – will replace stream classifications in GIS Table 1 with those generated by FHAT model.

3.0 Phase 1-3

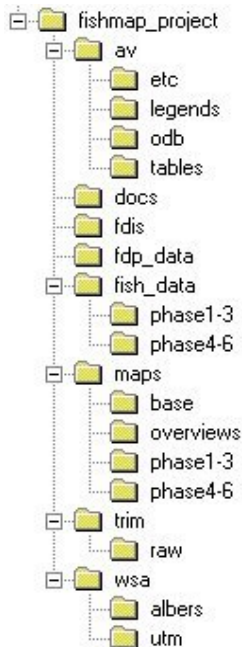
3.1 Background

Most of the data entry in a fish inventory project occurs in phases 1 to 3. Digitizing of reach breaks, calculation of reaches (elevations and lengths) and labeling streams with watershed codes and ILP's are the main focuses of this portion of the project.

3.2 Project Preparation

- *Workspace Setup*

Prior to starting an ArcView project file (.apr file), a workspace must be set up to store all the data used by FishMap. It is **critical** to adhere to the following directory structure closely as FishMap looks for and saves files based upon these naming conventions. A blank directory tree (\$USEREXT\FishMap\etc\data\FishMap_project) is provided with the FishMap extension package; it must be copied to another location on your system. Within the FishMap_project/av folder, there is a template project file called **fish_template.apr**. After the "FishMap_project" folder has been copied to a location on the system, open the **fish_template.apr** project file with ArcView to start the fish inventory project.



av – Contains ArcView *.apr project file(s)

- **etc** – stores project parameter files used by FishMap
- **legends** – ArcView *.avl legend files – for themes with no feature code
- **oddb** – for storage of object databases – views and graphics
- **tables** – for storage of any reach data, summary, and site data tables
- **docs** – any documentation related to the project
- **fdis** – FDIS Access database *.mdb file(s) and Table 1
- **fdp_data** – Forest development plan data from licensee
- **fish_data** – Fishdata point theme created during data entry
- **phase1-3** – GIS table 1 and metadata *.dbf files for phase 1-3
- **phase4-6** – GIS table 1 and metadata *.dbf files for phase 1-3
- **maps** – Plotfiles in .prt, .eps, or .rtl format
- **base** – working maps
- **overviews** – overview maps
- **phase1-3** – interim maps
- **phase4-6** – project and interpretive maps
- **trim** – TRIM data created by TRIM data prep program in *.shp format
- **raw** – files downloaded from MELP
- **wsa** – Watershed atlas themes – streams, lakes and watershed boundaries
- **albers** – as downloaded from MELP
- **utm** – after reproject using MELP-Kid - *.shp format

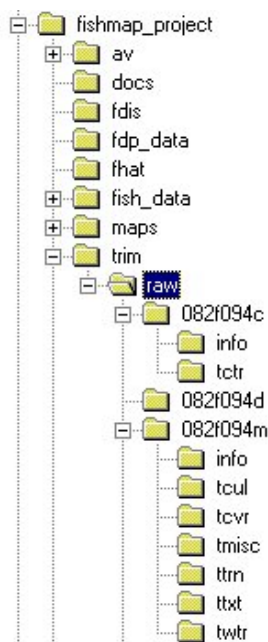
- *Data Acquisition - TRIM, WSA, NTS, other*

To acquire TRIM data, a request must be submitted through the MSRM regional GIS coordinator. For a list of GIS coordinators in the province, refer to <http://srmwww.gov.bc.ca/gis/gisCOORD.html>. Once a username and password has been provided, the data can be downloaded from the MSRM trim ftp site: <ftp://ftp.biolith@trim.env.gov.bc.ca/>. For more info on access and use of this ftp site, refer to <http://srmwww.gov.bc.ca/gis/trimcont/>. For each TRIM mapsheet in the project three zip files <map>d.zip, <map>m.zip and <map>c.zip are required. The zip files <map>m.zip and <map>c.zip **must** be downloaded in Arc/Info coverage format from the 'arc' directory on the ftp site, and unzipped into the \trim\raw directory. The <map>c.zip and the <map>m.zip will create

the mapsheet sub-folder The zip file <map>d.zip, an ARC/INFO Ascii generate file called tdem.gen (containing the TDEM elevation points) must be downloaded from the 'exp' directory on the ftp site, and unzipped into a sub-folder called <map>d. Because the <map>d.zip does not have the mapsheet folder name in the <map>d.zip file the user will need to create a new folder under \trim\raw, name it <map>d, and unzip the tdem.gen file into the new folder. Unzipping these files into the specified directories is required so that the FishMap extension can merge multiple map sheets and project if necessary.

NEW: There is a new utility that has been added that will create a DOS batchfile that will unzip all the zip files. To run the DOS version of Pkuzip must be installed, and the pkunzip.exe in the system PATH. Put all the TRIM .zip files into the TRIM/raw folder. From the FishMap Project menu select "Make Batchfile for TRIM Pkuzip", then select all the .zip files. You will be asked whether to run the batchfile.

The directory structure of the TRIM should be as follows:



Watershed atlas data (WSA, 1:50000 scale) is distributed by watershed group and is available at the following ftp site: ftp://ftp.elp.gov.bc.ca/dist/arcwhse/watershed_atlas/. Download and unzip the stream (lwss), lake (lwsl), annotation(lwsx) and watershed boundary (lwsd) layers into the \wsa\albers folder. Note: each layer will unzip as an Arc/Info export file (*.e00) which will require additional processing using the ArcView **Import71 utility** to convert the export file (*.e00) to an Arc/Info coverage (layer). This WSA data will be in the Albers map projection, so use the MELP-KID ArcView extension to project each WSA layer to the correct UTM projection. If the project area covers more than one watershed group, be sure to download data for all watershed groups in the project area. In this case, use of ArcView's GeoProcessing wizard to merge the WSA stream data is recommended. Refer to ArcView's help files for use of the GeoProcessing wizard. NTS (National Topographic System, 1:250000 scale) data is useful for the overview maps. Contact the regional MELP GIS Coordinator for information on access to NTS data.

NOTE: When accessing the LWSS coverage, be sure to use the ARC feature class and not the ROUTE.BL route feature class. Only the ARC feature class contains the watershed code.

- *Start the ArcView Session*

As mentioned above, to start using FishMap open the fish_template.apr project file in the FishMap_project\av. This project already has the necessary documents setup for the user. The project will automatically load the FishMap extension.

- *ArcView Project Setup*

When a new FishMap ArcView session is started, the user will be prompted for some the project information. This information will be saved to a parameter file (FishMap_project\av\etc\projmeta.ini) for reference during completion of the project. Project number, contract number, contractor name, contract monitor, MELP region, projection information and project phase will be saved in the parameter file. The “Project Setup Information” dialog allows input of this information. The projection information entered in this dialog is also used to initialize the TRIM data preparation dialog. If any of these properties, except for the projection, need to be changed, such as when the project moves from phases 1-3 to phases 4-6, selecting ‘Fish Project Properties’ under the project ‘FishMap’ menu will open this dialog.

NOTE: Only the UTM map projection is supported at this time. Albers is not supported, input data must be projected to UTM.

3.3 Project ArcView Documents

The following are the ArcView documents FishMap uses to complete Phases 1-3 of the inventory project. These documents are already included in the fish_project.apr template file.

Views

- *Raw Data – Albers*
Used for importing, merging and projecting base data to UTM, i.e. TRIM, WSA
- *Overview*
Stores data layers for the overview map, including the WSA and NTS layers
- *Data Entry and Maps*
This is the main view for digitizing reaches, symbology, etc.
The phase 1-3 final (Interim) maps will be setup in this view

Layouts

- *Overview*
8.5x11 layout page for the Overview map(s)
Contains an image of the province of BC for showing location of project area
- *TRIM Map*
30x36 layout for production of TRIM base maps
- *Interim Map*
30x36 layout for production of the Interim map(s)

Tables

- *GIS Attribute Table 1, Phase 1-3**
Attribute table of Fish Data theme
- *GIS Metadata Table**
Metadata table for Fish Data theme
- *Extension tables*
Symbology lookup tables – SpCd, bcelin, bcemrk, bcefsh & bceshd.lut

The above tables are loaded when the FishMap extension is loaded. *The GIS Tables are created once data entry is complete.

NOTE: FishMap looks for data using the above document names, they must be present and named as shown for the application to function properly. If any of the above names are changed, or documents deleted, program errors will result.

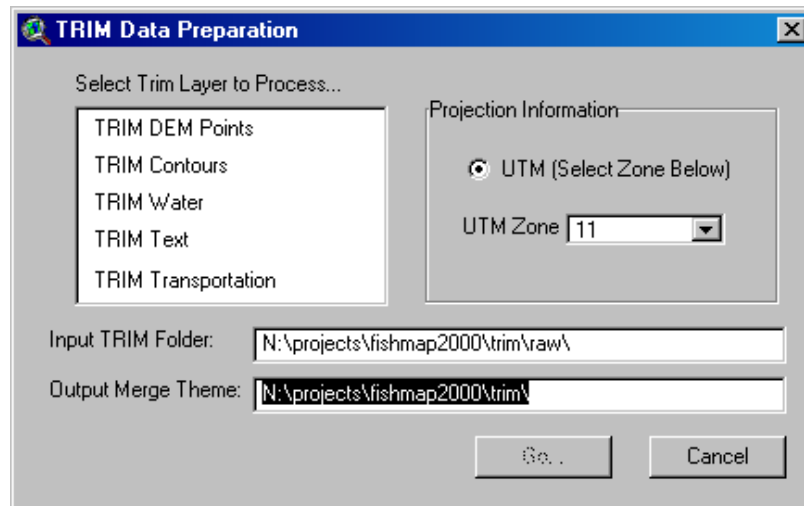
3.4 Data Preparation

Prior to commencing data entry, the base data for the project must be prepared. This consists of processing the following data layers:

- TRIM water features
- TRIM contours
- TRIM transportation features
- TRIM annotation
- TRIM DEM (Digital Elevation Model) points
- WSA stream and lake features and watershed boundaries
- NTS Layers for the Overview Map (optional)
- BCGS 1:20000 mapsheet grid
- Any other applicable (i.e. forest development data)

TRIM data should be unzipped in the trim\raw folder as per Section 3.2

TRIM data is supplied in 1:20000 tiles in BC Albers projection. The FishMap application requires the tiled data be merged into a seamless layer. A data preparation program in the application will merge and set the map projection for the TRIM data. To start the TRIM data preparation utility, select the 'Start Data Preparation Utility' item under the Project "FishMap" menu. The following dialog will start up:



To use this dialog:

- Select the layer to process in the "Select Trim Layer to Process..." list. When one of the layers in the list is selected, the output merge theme field will be updated to match the layer selected and the "Go..." button will be enabled.

When the "Go..." button is pressed, the utility will merge all the TRIM mapsheets for the selected layer and project to the selected UTM zone. Once complete, the theme will be symbolized with a feature code legend and loaded into the "Data Entry and Maps" view in the ArcView project.

The WSA data should be unzipped in the wsa\albers folder as per Section 3.2

The WSA layers lwss,lwsl,lwsx, and lwsd are supplied as 1:50,000 Arc/Info coverages in BC Albers projection and will have to be projected to UTM using the MELP-Kid extension's 'Theme projector...' utility (BC Albers Tools v1.1). The newly projected UTM layers must be saved in the wsa\utm folder. The layers will then have to be added to the "Data Entry and Maps" view by the user. The WSA stream theme (lwss) should be renamed "WSA Streams" using ArcView's Theme Properties option. For large project areas, the merge process may take a long time (15 minutes or more); it may appear the program has crashed, just be patient and allow the process to finish.

3.5 Data Entry

Before commencing data entry, optional base maps may be produced for the project area. If base maps are preferred, refer to Section 3.11 for instructions on map production.

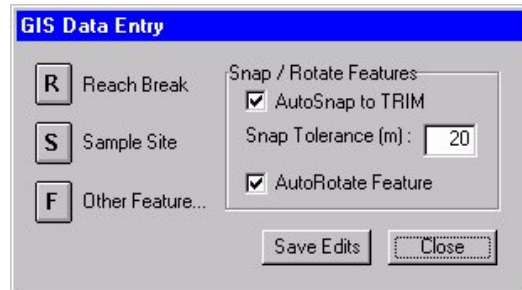
There are a number of themes required in the “Data Entry and Maps” view for data entry. The following chart outlines the theme name and theme source location:

Theme Name	Theme source location (suggested)
1:20000 Map Grid	\$USEREXT\fishmap\etc\data\20k_uNN.shp
Fish Data	<fishmap_project>\fishdata\fishdata.shp
TRIM Water	<fishmap_project>\trim\twtr_mrg.shp
TRIM Contours	<fishmap_project>\trim\tctr_mrg.shp
TRIM DEM Points	<fishmap_project>\trim\tdem_mrg.shp
WSA Streams	<fishmap_project>\wsa\utm\lwss_u.shp

***Do not change the theme names**

Data input can be started by selecting the ‘Start Data Entry’ item from the “FishMap” menu; the GIS Data Entry dialog will start up. The data entry interface links features on the map view to the GIS database. When data is being input the tool will set the attributes for the feature. Several automatic and semi-automatic features make the setting of attributes easy to follow.

The watershed code does not have to be entered by the user. The watershed atlas stream network must be a layer in the “Data Entry and Maps” view. When the user starts entering features on a WSA stream, the user selects the WSA stream feature. The watershed code will be extracted and formatted for the full code and abbreviated code and shown to the user in the entry tool. For features entered along that stream the watershed code will be written to the database. When the user is finished on that stream, another WSA stream can be selected or an ILP value can be set.

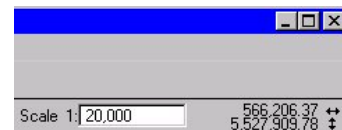


NOTE: The application is designed to work best when data entry is done on a stream-by-stream basis.

There are three main feature types to digitize in a fish inventory map project: reach breaks, sample sites, and other features (ie. falls, cascades, fish observations, etc). Each feature type has a tool on the above dialog; selecting one of the tools will open a properties dialog used to input and display attributes of the current feature. The properties dialog is unique for each feature type. The above dialog also controls the snap to trim and reach break rotation. If the current feature is an ‘off-stream’ feature, the “AutoSnap to TRIM” check box must be unselected.

NOTE: The required tool on the Data Entry dialog must be selected (pressed down) to digitize a point. If another tool is selected from ArcView’s standard toolbar (ie. pan or zoom), the required data entry tool must be selected again before digitizing the feature on the screen.

Digitizing should be completed at a “screen scale” of about 1:20000 or less. The screen scale is shown in the upper right corner of the ArcView application window. Typing a new value in the scale box shown on the right will change the view “screen scale”.



The digitizing procedure for reaches and features is described below. The sample sites procedure is described in the Phases 4-6 mapping part of this document.

Digitizing Reach Breaks

1. Select the TRIM Stream channel where reach breaks will be digitized and position the mouth of this stream in the centre of the View window.
2. Set the screen scale to 20,000.
3. Select *Start Data Entry* from the 'FishMap' pulldown menu. This will open the GIS Data Entry window.
4. Click the "Reach Break" Button in the GIS Data Entry window. This will open the Reach Break Properties dialog window.
5. Depending on whether or not the TRIM stream has a "matching" WSA stream execute one of the following steps:
 - a) If the TRIM stream has a "matching" WSA stream then the watershed code can be obtained by clicking the "Select WSA Stream" tool in the Reach Break Properties dialog. In the View window click on the downstream section of the WSA stream line. Note: the selected stream line will turn a different colour and the WS Code field in the Reach Break Properties dialog will automatically be updated with the watershed code value. The Reach # field will be set to 0 and the NID # field, if initially set to 0, will become 1 or if non-zero will be incremented by 1. Note the mouse cursor will change from an arrow to a circle with bull's eye indicating that the Reach Break digitizing mode is active.
 - b) If the TRIM stream does not have a "matching" WSA stream then a watershed code cannot be obtained and the user will need to click the "New ILP" button in the Reach Break Properties dialog to assign the TRIM stream a new Interim Locational Point (ILP) number. This will display the ILP Stream window. Enter both the correct ILP # and ILP Map sheet number and click "OK" to close this window. The ILP number and ILP Map sheet number will be stored with each reach break digitized on this TRIM stream.
6. Point the mouse cursor to the TRIM stream 'mouth' and click the left mouse button to digitize the location of the mouth, then click the "Commit" button in the Reach Properties dialog window. This will display a blue triangle at the stream mouth. This digitized point is stored as reach '0' and is used for reach gradient calculations. Note: If the user digitizes this point in the wrong location and has not clicked the "Commit" button the Reach Break Properties dialog has an "Undo" button; pressing this will remove the last feature digitized from the screen.
7. Continue digitizing reach breaks on the TRIM stream channel in an **upstream** direction. FishMap will automatically increment the Reach # and NID # for each reach break digitized. Make sure to click the "Commit" button after digitizing each reach break location to add this new feature to the theme and to ensure that the Reach # and NID # are incremented correctly and that the required fields are filled in the attribute table. Note: If the user digitizes a reach break in the wrong location and has not clicked the "Commit" button then click the "Undo" button, on the Reach Break Properties dialog, to remove the last feature digitized from the screen. Use the Pan tool as required to move upstream to digitize reach breaks. After using the Pan tool or any other ArcView tool click the "Reach Break" button to disable the tool and to resume Reach Break digitizing. If the reach is at the upstream end of a lake, select the "Lake Reach" checkbox and fill in the Waterbody ID by selecting the WSA stream that passes thru the lake. If the reach is at the study area boundary, select the appropriate "Termination of survey symbol" checkbox.
8. When all reach breaks for the TRIM stream channel are digitized, close the Reach Break Properties dialog, then close the GIS Data Entry window and click the "Yes" button to Save Edits to Fish Data?
9. Repeat Steps 1 – 8 above for each new stream where reach breaks will be digitized.

The screenshot shows the 'Reach Break Properties' dialog box. It contains the following fields and controls:

- Reach #:** An empty text input field.
- NID #:** A text input field containing the value '20019'.
- WS Code:** An empty text input field.
- ILP #:** An empty text input field with a 'New ILP' button to its right.
- ILP Map:** An empty text input field.
- Elevation:** An empty text input field.
- Rotate Angle:** An empty text input field.
- Lake Info:** A section containing a 'Lake Reach' checkbox and a 'Waterbody ID' field.
- Termination of survey symbols:** A section containing two checkboxes: 'Upstream' and 'Downstream'.
- Buttons:** 'RPLAN Data', 'Undo', 'Commit', and 'Close'.

RPLAN/LPLAN Data Entry - Optional

FishMap has the ability to capture reach and lake planning data (RPLAN/LPLAN) while completing data entry. The form on the right can be opened by pressing the “RPLAN Data” button in the Reach Break Properties dialog window. All values entered in this form will be added to the attribute table, and will be exported to FDIS when data entry is completed.

If the “Lake Reach” checkbox in the Reach Break Properties dialog window is selected then the *RPLAN Data* button changes to an *LPLAN Data* button. Clicking the *LPLAN Data* button will open the LPLAN Attributes form for input of LPLAN data. *Leave the window open while clicking the “Commit” button.*

NOTE: When entering RPLAN/LPLAN data, be sure the values entered in each field conform to the FDIS standards. The Data Entry tool does NOT check that data in these fields are to standard, and errors may occur when importing data into FDIS if non-standard values are used.

Digitizing Features

1. Select the TRIM Stream channel where features will be digitized and position the mouth of this stream in the centre of the View window.
2. Set the screen scale to 20,000.
3. Select *Start Data Entry* from the ‘FishMap pulldown’ menu. This will open the GIS Data Entry window.
4. Click the “*Other Feature*” Button in the GIS Data Entry window. This will open the Feature Properties dialog window.
5. Depending on whether or not the TRIM stream has a “matching” WSA stream execute one of the following steps:
 - a) If the TRIM stream has a “matching” WSA stream then the watershed code can be obtained by clicking the “*Select WSA Stream*” tool in the Feature Properties dialog. In the View window click on the downstream section of the WSA stream line. Note: the selected stream line will turn a different colour and the WS Code field in the Features Properties dialog will automatically be updated with the watershed code value. Note the mouse cursor will change from an arrow to a circle with bull’s eye indicating that the Feature digitizing mode is active.
 - b) If the TRIM stream does not have a “matching” WSA stream then a watershed code cannot be obtained and the user will need to click the “*New ILP*” button in the Feature Properties dialog to assign the TRIM stream a new Interim Locational Point (ILP) number. This will display the ILP Stream window. Enter both the correct ILP # and ILP

- Map sheet number and click “OK” to close this window. The ILP number and ILP Map sheet number will be stored with each reach break digitized on this TRIM stream.
6. Select the type of feature from the “Feature type” drop down list. Fill in the values for height, length, species code and reach number if necessary.
 7. Digitize the feature at its correct location on the stream and note the feature’s symbol will appear at this location. If this symbol needs to be moved off the stream to avoid a “crowded” map click the “*Digitize map location for feature*” tool then select an off stream location; click the left mouse button and note the feature symbol will appear with a leader line that points to the feature’s actual location on the stream. Note: If the user digitizes a stream feature in the wrong location and has not clicked the “Commit” button then click the “Undo” button, on the Feature Properties dialog, to remove the last feature digitized from the screen. Once the Feature properties dialog is filled in and the feature digitized correctly, click the “Commit” button. This will add the new feature to the theme and fill in the required fields in the attribute table which includes incrementing the NID# by one.
 8. Continue digitizing features along the TRIM stream channel and click the “Commit” button after each feature is digitized.
 9. When all features for the TRIM stream channel are digitized, close the Feature Properties dialog, then close the GIS Data Entry window and click the “Yes” button to Save Edits to Fish Data?
 10. Repeat Steps 1 – 9 above for each new stream where features will be digitized.

NOTE: The user can override the text in the text input fields.

FPLAN (Feature Planning) Data Entry - Optional

FDIS version 7.5 has incorporated a feature planning (FPLAN) import for collection of feature data. Version 1.0b of the FishMap application supports FPLAN data collection in a similar manner to RPLAN/LPLAN data collection. Open the form shown by pressing the “FPLAN” button on the Feature Properties dialog. *Leave the window open while clicking the “Commit” button.*

NOTE: As with the RPLAN/LPLAN data, be sure the values entered in each field conform to the FDIS standards for FPLAN attributes. The Data Entry tool does NOT check that data in these fields are to standard, and errors may occur when importing data into FDIS.

3.6 QA Tool

The **Fish Quality Assurance Tool Version 3.0** is an ArcView extension that is compatible with FishMap Version 1.2 and available at:

<http://www.bcfisheries.gov.bc.ca/fishinv/QAtoolVersion1.htm> .

The Fishqa01.zip file should be unzipped into the USEREXT directory. This will create a folder called Fishqa01 that contains the Fish QA Tool program and makes it accessible through the view “FishMap” menu. The Fishqa01.doc file is the User Manual. To ensure the data entered up to this point conforms to Fish and Fish Habitat standards, a link to the 2001 Fish Inventory QA tool has been added. Select “Start FishQA Tool” from the view “FishMap” menu. This will load the Fish QA tool (if necessary) and open the main Fish QA dialog so a QA can be completed on the “Fish Data” attribute table (fishdata.dbf).

3.7 Labelling

Once data entry is complete, the new features will have to be labelled before map production can begin. There is a “Label Tools” dialog containing all the labelling tools; to open it select ‘Start Label Tools...’ from the ‘FishMap’ pulldown menu. For the phase 1-3 Interim maps, the following labels are required:

1. Watershed Code (WSC) / Interim Locator Point (ILP) labels. This label is attached to the headwater end of the stream channel by a leader line. To attach this label to a stream first click on the “Select WSC/ILP point to label” tool; then select a feature (preferably a reach break); next point to the headwater end of the stream and while holding the left mouse button down draw out the leader line to the length and orientation desired; release the left mouse button to stop drawing; then double click to insert the label at the end of the leader line. Note: FishMap will automatically toggle between the ‘Select WSC/ILP point to label’ and the “Draw WSC/ILP Label” tools for each label.
2. Reach number labels. Pressing the “Label Reaches...” button will start the reach number label program and label all the reaches in the project area. A new theme called “Reach Numbers” will be added to the view. The reach numbers can be updated by deleting theme “Reach # Labels” and re-running this program.
3. Feature labels. Pressing the “Label Features” button will label features such as falls and cascades with the height and length of each feature, if applicable.
4. Fish Species Labels. Pressing the “Fish Species Labels” button will label observation, presence, distribution and spawning limits features with the fish species code.
5. Contour Labels. Pressing the “Label Contours” button will label the TRIM index contours (100 metre intervals).
6. NID Labels. Pressing the “NID Labels” button will label each feature with its Numeric Identifier.



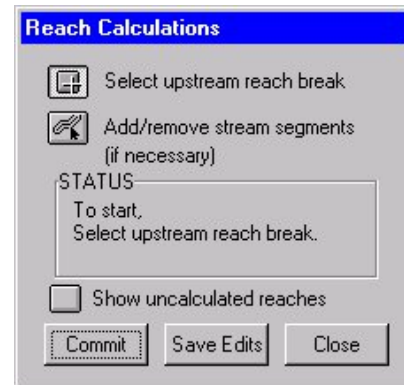
All labels created are stored as graphic elements in the ArcView project, and are “attached” to the theme that they describe; meaning when the theme is not visible, the labels are not drawn. When a theme is copied to another view, the labels are as well. All but the NID labels are also used on the phase 4-6 maps (project and interpretive); they can easily be copied over to the project and interpretive views. Intelligence is built into the graphics such that they have internal attributes that specify what type of label they are and what feature they belong to. The “Select labels by type” button allows the user to select just one subclass of label. This is useful for hiding/showing labels, selecting for edit and for copying of labels between views.

3.8 Reach Calculations

Once all reach breaks have been digitized, and the data has passed QA, the reach calculations can be started. This step will assign a length to the reach, providing the data needed to calculate gradient. The first step is preparation of the TRIM Water to enable the reach calculations; select "Split TRIM Water at Reach Breaks" from the "FishMap" menu. This will split the streams and rivers at all stream intersections and reach breaks. **NOTE: This is a very CPU intensive process; for large project areas with a large number of reaches, it may take an hour or more to finish.** Once the TRIM split completes, the reach calculations can commence; select "Start Reach Calculations" from the "FishMap" menu to open the Reach Calculations dialog.

To complete reach calculations for a stream, start at the "top" (highest reach number) of the stream and work down to the mouth. The "Status" window will report progress of the reach calculation program and will report any errors. Opening the attribute table of the fish data theme to view changes 'on the fly' is also recommended.

Use the "Select upstream reach break" tool to select a reach break; the program will then select all downstream segments up to the next reach break and highlight them. If the stream segments selected are incorrect, use the "Add/remove stream segments" tool to correct the selection. Holding the shift key and selecting a feature will add or remove it from the current selection. Pressing the "Commit" button accepts the selection and writes the upstream elevation, downstream elevation and reach length to the selected reach break record. This information will be exported to the RPLAN table once reach calculations are complete. **NEW: The reach MAPNID is written to the TRIM stream for linking attributes.**



NOTE: The reach calculation process is complex and it will not work for every reach. There may be situations (particularly in areas of low relief, areas with many small lakes, or marshes and wetlands) where the program cannot calculate a downstream elevation; in this scenario, manual elevation measurement by the user may be required.

3.9 Export to FDIS

After the QA has been run on the data and passed, the GIS table created can be written out to CSV format conforming to the RPLAN, LPLAN & FPLAN (optional) templates. The files created from this step will be used for further data entry outside of ArcView (e.g. Microsoft Excel). The user will then import the data into FDIS. The columns written to the tables are:

RPLAN.CSV: Ref#, Project WS Code, Watershed Code, ILP Map#, ILP, Reach#, Date, NID Map#, NID, Photo Line #, Photo #, Order, US, DS, Length, Pattern, Confinement, AN/BR, Basin Type, Wetland, Sample, Water, Voucher, Zone, Easting, Northing, Gear1, Gear2, Gear3, sinReach_Angle

LPLAN.CSV: Ref#, Project WS Code, Name, WS Code, WBID, ILP Map#, ILP, NID Map#, NID, Reach #, BasinType, Group, Class(p/s), Genesis, Area, Magn, BGC, Wetland, Sample, Voucher, Zone, Easting, Northing

FPLAN.CSV: Ref#, Project WS Code, Watershed Code, ILP Map, ILP#, Reach#, NID, NID_MAP, TYPE, Height, HT_Method_Code, Length, LG_Method_Code, Comment, Photodoc_Roll_Number, Photodoc_Frame_Number, Air_Photo_Number, Air_Photo_Line, UTM_Zone, UTM_Easting, UTM_Northing, UTM_Method_Code, Species_Code, Fsource

3.10 GIS Deliverables

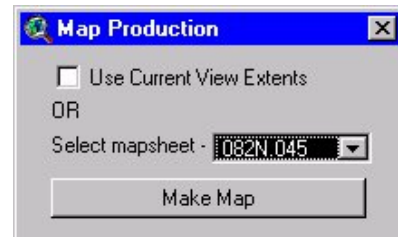
Two tables are created from the 'Create GIS Deliverables' menu choice:

- Interim GIS Attribute Table 1, Phase 1-3
- GIS Metadata Table

The user will be prompted for a file name/location for each, and the tables will get added to the ArcView project file. If the tables already exist, the user will be asked if the tables should be replaced.

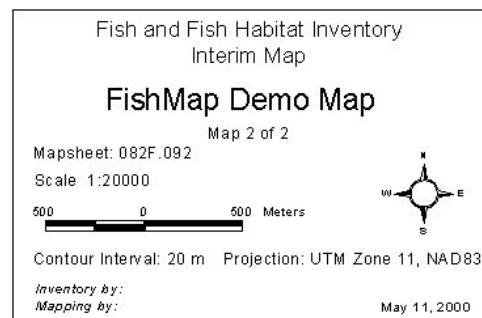
3.11 Map Production

To make a map, select 'Start Map Production' from the "FishMap" menu. The dialog shown on the right will open. Preset map templates will be used by the user to create the standard maps. The parameter file filled in at the start of the project will be accessed for metadata information such as project name, contractor name, etc. The user has the choice of making the maps by BCGS mapsheet ("Select mapsheet") or creating composite maps that straddle mapsheets ("Use Current View Extents"). The extent of the composite map may be saved under the "MapExtents" pulldown menu. For phase 1-3 mapping, the user will be given a choice of producing a "TRIM Map" base map, or an "Interim Map". Pressing the "Make Map" button will open the selected layout, the user will have to either print the map using the Windows print drivers, or export the map to *.eps (or some other graphics format) for post-processing by ArcPress or another print utility.



Notes on Map Production:

1. Before creating maps, interims in particular, be sure all necessary base data has been added to the "Overview" view. Watershed atlas data may be appropriate as overview base data for smaller project areas, however, NTS data (1:250000 scale) data might be better for larger areas. Also, be sure to add the 1:20000 map grid theme to the overview, and label it with the mapsheet numbers. Refer to "Appendix 3: Notes on Inventory Maps" in "Standards for Fish and Fish Habitat Maps, Version 3.0, RIC 2001" for information on the Overview map (The "Overview" View is used to setup the themes of the overview map layout).
2. If plotting Interim Maps, be sure the "Overview" view is centered on the project area. There is a "Study Area Boundary" viewframe in the layout, this will show the contents of the "Overview" view on the map, with a rectangle showing the extents of the main map. Depending upon the size of the project area, the scale of the "Study Area Boundary" viewframe may have to be adjusted to include the whole study area.
3. Before printing the layout, scan over the legend, title box and fish species box. FishMap will update most of this information, however, there may be information on the map (e.g. FDP data) that will have to be added to the legend, or more information may be added to the title box. All of ArcView's tools are available to make any necessary changes to the layout.
4. Graphics may be added but **do NOT delete any graphics from the layout**. Each graphic has a name associated with it so FishMap can update items such as mapsheet number, fish species, etc. **If FishMap cannot find the graphic it needs to update, program errors will result**. If the user wants to remove a text string from the layout, replacing the existing text with a blank text string or a series of spaces is recommended.



4.0 Phase 4-6

4.1 Background

The main differences between the phase 1-3 and 4-6 are:

- Sample sites need to be digitized for UTM locations, and exported to FDIS
- Limited new data to be entered, need to accommodate new reaches/features
- Focus is on cartographic presentation of FDIS attributes for reaches and sample sites
- ILP numbers may have been converted to a watershed code
- Project/Interpretive/Overview maps to be produced

There are several scenarios possible for the start of the phase 4-6 component of mapping; however, each cannot be anticipated in this manual. Therefore, the process to follow for two common situations is described here:

A. Existing *.apr file - The project is a continuation of a phase 1-3 whereby the user will start with the same ArcView project file used in phase 1-3. The basic steps are outlined below:

1. Update the project phase in the project parameters file. To do this select 'Fish Project Properties' from the project "FishMap" menu, and select the Phase 4-6 button on the Project Phase panel.
2. Digitize new features. New features can be added to the original "Fish Data" theme created in phase 1-3.
3. Export to FDIS. Nid #, Map #, & UTM coordinates for new features get written out to a csv file for import into FDIS.
4. Phase 4-6 Map Setup. This step imports the data from the FDIS table 1 output to create a new "Fish Data" theme for the Project and Interpretive map views.
5. Copy base map themes (TRIM, etc) from the "Data Entry and Maps" to the "Project" and "Interpretive" views.
6. Labeling . Use of label tools to create Site Data, Reach Data, Reach Summary and Lake Summary labels for Project and Interpretive maps.
7. Create GIS Deliverables / QA. Export of new "Fish Data" theme to dbf file, and QA check.
8. Map Production. Plotting of Project, Interpretive and Overview maps.

B. New *.apr file - The user is only starting with the FDIS database. All data acquisition and preparation will have to be completed. The steps are outlined below:

1. Project preparation. Includes setting up a workspace, acquiring data needed for the project (TRIM, WSA, etc), and setting up an ArcView project file (or using the fish_template.apr file included with the FishMap extension package). See Section 3.4 for the TRIM data preparation.
2. Define the project properties. The "Project Setup Information" dialog will open when a new FishMap project is started; be sure to fill out all parts of the form, and select "4-6" for the project phase.
3. Phase 4-6 Map Setup. This step imports the data from the FDIS table 1 output to create a new "Fish Data" theme for the Project and Interpretive map views.
4. The rest of the steps will be the same as steps 6 – 8 above.

In either situation, the user will need the Table 1 created out of FDIS, using the Table 1 export utility. This table will have all the reach data/summary information in it; this information is required for the sample site, reach data, lake summary and reach summary labels on the Project and Interpretive maps.

4.2 Project Preparation

If starting with a new project file, four basic steps have to be taken before/while a project file (*.apr) is opened:

1. Workspace Setup
2. Data Acquisition – TRIM and WSA datasets (Forest development plan data may not be required)
3. Load FishMap Extension
4. ArcView Project Setup

For details on completing the above steps, refer to **section 3.2** of the manual.

4.3 Project ArcView Documents

The following are the ArcView documents used to complete Phases 4-6 of the inventory project:

Views

- *Raw Data – Albers*
Used for importing, merging and projecting base data to UTM, i.e. TRIM, WSA
- *Overview*
Contains data layers for the overview map, including the WSA and NTS layers
- *Data Entry and Maps*
This is the main view for digitizing.
Any new features for phase 4-6 can be digitized here, and the “Fish Data” theme can be copied to the Interpretive and Project Map Views.
- *Interpretive Map View*
This view will be used to create the labels for the Interpretive maps – reach summary labels and sample site numbers.
Stream classification (dashed/solid, red/blue) will be completed in this view.
The phase 4-6 Interpretive maps will be setup in this view.
- *Project Map View*
This view will contain the labels for the Project maps – reach data labels and sample site data labels.
The phase 4-6 Project maps will be setup in this view.

Layouts

- *Overview*
8.5x11 layout page for the Overview map(s)
Contains an image of the province of BC to show location of project area
- *Interpretive Map*
30x36 layout for production of Interpretive map(s)
- *Project Map*
30x36 layout for production of the Project map(s)

Tables

- *GIS Attribute Table 1, Phase 4-6*
Attribute table of Fish Data theme
- *GIS Metadata Table*
Metadata table for Fish Data theme
- *Extension tables*

The Extension tables are loaded when the FishMap extension is loaded, and the GIS Tables are created once data entry is complete.

NOTE: as the FishMap application looks for data based on the above document names, they must be present for the application to function properly. If any of the above names are changed, program errors may result.

4.4 Data Preparation

- *TRIM and WSA Data*

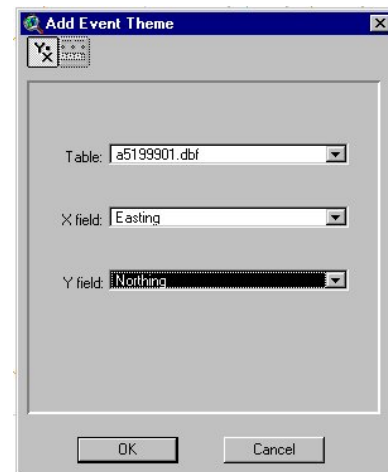
If starting with a blank project file, Refer to **section 3.4** for information on merging and projecting TRIM and WSA data for the project.

- *Import FDIS Table 1 Fish Data Theme*

To assist with data entry and to view the features from FDIS Table 1 'on-screen', ArcView's event theme capability can be used. An event theme is generated using coordinates stored in tabular form.

To add an event theme, first be sure the Table 1 is added to the project's table window, then start the event theme dialog from the "Data Entry and Maps" view by selecting "Add Event Theme..." from the "View" menu. The dialog on the right will display. Be sure to select the correct table, and specify "Easting" for the X field, and "Northing" for the Y Field, then press OK.

The theme will be added to the view; it can be symbolized using an fcode legend by selecting "Create FCODE Legend" from the "FishMap" menu.



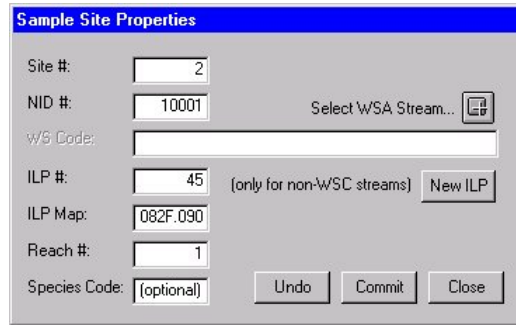
NOTE: the Table 1 event theme should only be added to the "Data Entry and Maps" view for reference during data entry.

4.5 Data Entry

Data entry will use the same tool as phase 1-3. New phase 4-6 data will be entered in the “Fish Data” theme and table. New features will include sample sites and other fish habitat data. Data entry should be completed in the “Data Entry and Maps” view. The procedure for digitizing sample sites is outlined below, for reach breaks and features, refer to section 3.5.

- **Sample Sites**

1. Select the WSA stream or enter an ILP value for the stream. Use the “Select WSA stream” tool or the “New ILP” button.
2. Fill in the reach number and the species code (if known) for the site.
3. Digitize the sample site at its correct location on the stream
4. Once complete, click the commit button. This will add the sample site to the view and write the attributes to the GIS table.



The 'Sample Site Properties' dialog box has a blue title bar. It contains the following fields and buttons:

- Site #:
- NID #:
- WSA Code:
- ILP #: (only for non-WSC streams)
- ILP Map:
- Reach #:
- Species Code:
- Buttons: 'Select WSA Stream...' (with a dropdown icon), 'New ILP', 'Undo', 'Commit', and 'Close'.

If the point is digitized in the wrong location, press the undo button to remove it from the screen.

NOTE: The user can override the text in the text input fields.

Once any additional data entry (sample sites, features) is complete, the base map themes in the “Data Entry and Maps” view can be copied to the “Project Map View” and the “Interpretive Map View”. Activate (click on theme, hold shift key for multiple selection) all the themes to be copied over and select ‘Copy themes’ from the “Edit” menu. The active themes can then be pasted into the Project and Interpretive views. **Do not copy the ‘Fish Data’ theme; it will be created in step 4.7.**

4.6 Export to FDIS

Once the phase 4-6 data entry is complete, the new points should be written out to a nidutm.csv file for import into FDIS. To do this, select “Export Fish Data Table to FDIS” from the “FishMap” menu, and specify a name/location for the nidutm.csv file. Import the nidutm.csv file into FDIS to flood the UTM values for the digitized features. This step should be followed by recreating the FDIS Table 1 dBase table. This should be the final table, ready for use in map production.

4.7 Phase 4-6 Map Setup

This step imports the data from the FDIS Table into the Project and Interpretive views. The required steps are:

1. Select “Phase 4-6 Setup” from the FishMap Project menu. The dialog show to the right opens.
2. Select Table 1 Output from FDIS. Use this button to select the location of the FDIS Table 1 dbase file.
3. Create 4-6 Theme. Once this button is pressed, specify a location for the new “Fish Data” theme. By default it places the new theme files in the “.../fish_data/phase4-6” directory.






The new theme is then added to the Project, Interpretive and Overview Map views, named “Fish Data”, and symbolized with a feature code legend.

NOTE: If there are any “non-standard” fcodes present in the new theme, the user will be advised in a message box. Pressing OK will allow the program to continue.

- *Moving features in “crowded” areas*

There may be areas where two or more on-stream features coincide; these may be moved off stream for cartographic clarity (See section 3.2 in *“Standards for Fish and Fish Habitat Maps, Version 3.0, RIC 2001”*). These features can be moved using ArcView’s standard theme editing tools:

1. Open the “Fish Data” theme in either the Project or Interpretive Map view for editing. To do this, be sure the theme is active, then select “Start Editing” from the “Theme” menu.
2. Use the select tool  to select and move features in crowded areas. When complete, select “Stop Editing” from the “Theme” menu. Select “Yes” when asked to save edits.
3. Draw a leader line using the line tool , found under the graphics toolmenu .

Leader lines should be created in both Project and Interpretive Map views. Edits to the theme only have to be completed in one view, the theme will be updated automatically in the other view.

- *Reach rotation angle*

There may be situations where some (or all) of the reaches have not yet been rotated. There is a program included to run a “batch mode” angle calculation for the reaches. To rotate reaches, select “Reach Symbol Angle Calculation (Batch Mode)” from the view “FishMap” menu. This will select all reaches from the Fish Data theme’s selected set and calculate a rotation angle for each. To speed up the process, a query could be run on the Fish Data theme to select features with an angle of 0, eg ([angle] = 0). The program will report features that couldn’t be rotated; angles for these can be entered manually.

4.8 QA Tool

To ensure the new data entered conforms to Fish and Fish Habitat standards, a link to the 2001 Fish Inventory QA tool has been added. Select “Start FishQA Tool” from the view “FishMap” menu. This will load the Fish QA tool (if necessary) and open the main Fish QA dialog so a QA can be completed on the “Fish Data” attribute table.

4.9 Import FHAT Stream Classes (Optional)

Some projects may have an FHAT (Fisheries Habitat Assessment Tool) model complete. If this is the case, the stream classes in the Fish Data theme table could be replaced with those generated by FHAT, provided in a .csv file. To do so, open the table of the Fish Data map theme from the Interpretive Map View, and select “Import FHAT Stream Classifications” from the table “FishMap” menu.

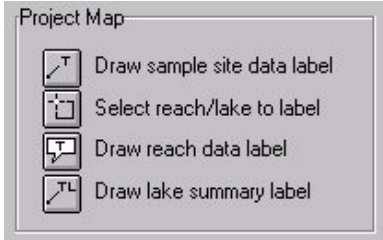
4.10 Labeling

The bulk of the work in Phase 4-6 is map presentation and labeling of reaches and sample sites. The project and interpretive maps will make use of some of the labels created in phase 1-3; see section 3.7 for descriptions:

- Watershed code / ILP labels
- Reach Number labels
- Contour labels
- Fish Species labels
- Feature Height / Length labels.

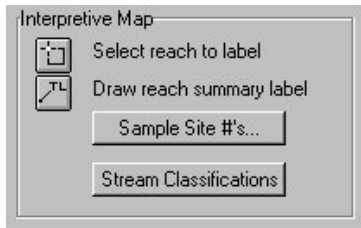
If the ArcView project file is a continuation of the same file used in phases 1-3 then these labels can be copied to the Project and Interpretive Map views. If the project file is new, then these labels will have to be created. They could be drawn in one view and copied to other views where they are needed. In addition, there are two more sets of labels needed in phase 4-6; one of the following panels will appear when the Label Tools dialog is opened:

- **Project Map labels** (*Project Map View*)



1. Sample Site Data label – labels selected sample site with fish species codes and other site attributes.
2. Reach Data Label – created using a two-step process – select the upstream reach break (“Select reach/lake to label”) then draw the label (“Draw reach data label”). If the reach selected is not a lake reach, FishMap will automatically select the reach data tool.
3. Lake Summary Label – uses same two-step process as the reach data label. If the reach selected is a lake reach, the lake summary tool (“Draw lake summary label”) will be selected to draw the label.

- **Interpretive Map labels** (*Interpretive Map View*)



1. Reach Summary label – created using a two-step process – select the upstream reach break (“Select reach to label”) then draw the label (“Draw reach summary label”). FishMap will automatically toggle between the two tools for each label.
2. Sample Site #'s – will label each sample site with the site number.

For more information on labels, refer to section 2.2 of “Standards for Fish and Fish Habitat Maps, Version 3.0, RIC 2001”.

- **Fish Bearing Status** (*Optional – Interpretive Map View only*)

Some projects may require the TRIM streams be coded to indicate fish-bearing status: confirmed fish-bearing (solid red, SR), suspected fish-bearing (dashed red, DR), confirmed non fish-bearing (solid blue, SB) and suspected non fish-bearing (dashed blue, DB). Press the “Stream Classifications” button on the “Label Tools” dialog to open the dialog shown on the right. “TRIM Water” will become the active theme, and one of the four tools on the dialog can be used to select streams. Press “Commit” to accept the selection and update the “str_class” column in the attribute table. Each stream segment will be assigned a two-character code (SB, DB, SR or DR) accordingly. A legend file, \$USEREXT/FishMap/etc/symbols/str_class.avl is included for symbolizing these streams on the interpretive map. To load the legend file, press “Load legend”.



4.11 GIS Deliverables

These two final tables are created from the 'Create GIS Deliverables' menu choice:

- GIS Attribute Table 1, Phase 4-6
- GIS Metadata Table

The user will be prompted for a file name/location for each, and the tables will get added to the ArcView project file. If the tables already exist, the user will be asked if the tables should be updated.

NOTE: this program must be run from the "Project Map View" or the "Interpretive Map View".

The FDIS Table 1 tool may also be used to create the final GIS Attribute table (after nidutm.csv file loaded).

4.12 Map Production

Map production for phase 4-6 uses the same utility as the phase 1-3 map production; refer to section **3.11** for details.

The map layout opened by the utility depends on which view is current; if the "Project Map View" is open, the "Project Map" layout will be opened, if the "Interpretive Map View" is open, the "Interpretive Map" layout will be opened.

5.0 FishMap Tutorial

A HTML FishMap tutorial has been compiled to provide detailed step-by-step examples of an entire Phase 1-3 and Phase 4-6 project. It gives specific examples, and shows what menus or buttons to use in each step. The illustrated examples provides a start-to-finish example of a small fish inventory project. The tutorial includes sample data for use by the user. The tutorial can be downloaded from the same website as the FishMap application.