Methodology for Flow and Salinity Estimates in the Sacramento-San Joaquin Delta and Suisun Marsh

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Chapter 8:
DSM2-HYDRO Binary Output File Reader

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8 DSM2-HYDRO Binary Output File Reader

8.1 Introduction

The binary output file generated by DSM2-HYDRO contains flow and stage information for every channel and reservoir in the grid. Traditionally this file links HYDRO to DSM2-QUAL and DSM2-PTM. In the past, this file has been accessed to provide additional information on flow and stage data after a HYDRO simulation has been completed. However, early efforts to extract information from binary output files were not standardized and were difficult to perform on a regular basis.

Recognizing the value of having a standard tool to extract data from the HYDRO binary output files, staff began developing a graphical user interface (GUI) that would facilitate access to the flow and stage information at any location in the DSM2 grid. Though work on the output file reader is still underway, the current GUI can extract data, allow visual examination of the output, and write data in DSS format for further use.

The DSM2 Binary File Reader was written mostly in Java, with a small portion being written in FORTRAN and C. Java provides an easy and robust way to develop portable user interfaces, FORTRAN is used to most efficiently read the binary file, and C provides the interface between Java and FORTRAN.

8.2 Main Interface

The main interface (Figure 8.1) allows users to open and edit project files or create new ones. These project files use XML to store information on output preferences, including binary file names and requested output locations. Users can edit the project files, but will only be asked to save their changes when closing the binary file reader GUI.

Once a file is loaded, the binary data is exported to columns of text using the *Make Table* button, or to DSS format using the *Export to DSS* button. In addition, extracted data can be graphed by pressing the *Make Graph* button.

Instead of saving or viewing the entire binary data file, a starting and ending time can be set using the Timewindow feature. If used, both a start and an end time must be specified using the following convention:

DDMMMYYYY HHMM

For example, to look at hourly data only from 1976, the following value would be entered as the start time: `01JAN1976 0000`, and the end time would be entered as: `31DEC1976 2300`.
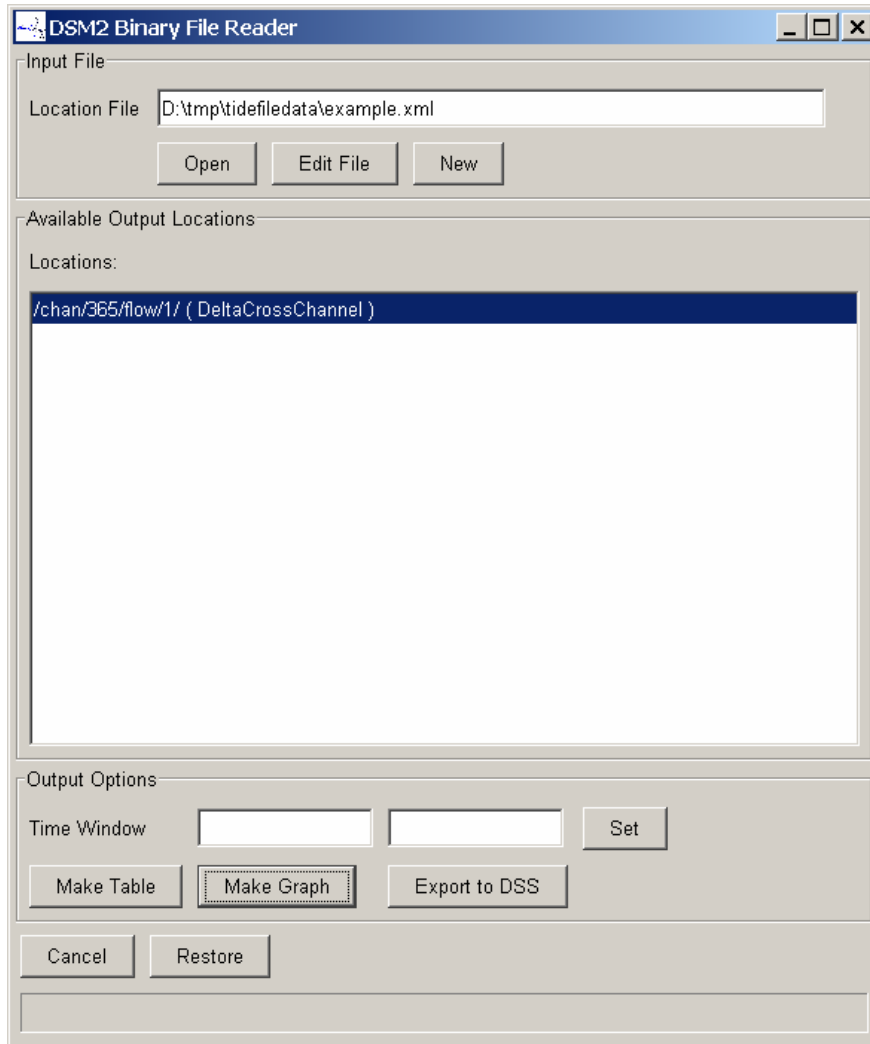
Figure 8.1: DSM2 Binary File Reader Application Interface.

8.3 File Editor Interface

Pressing the *Edit File* or *New* button will open the file editor interface (Figure 8.2). The file editor shows all binary files listed in the current project file and the output locations associated with each binary file. The editor displays this information in tree format and provides a number of ways for users to customize their output.
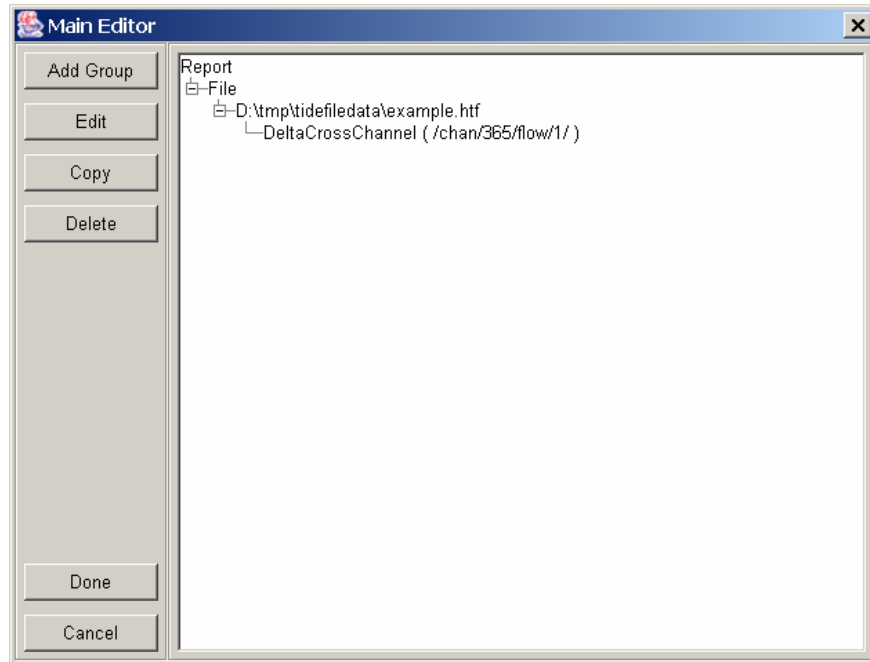
Figure 8.2: DSM2 Binary File Reader File Editing Interface.

8.4 Location Editor Interface

Pressing the *Add Group* or *Edit* button while in the main editor panel will open the location editor interface (Figure 8.3). The *Location Name* is the name of the output location and must be unique throughout the project file. The *Tidefile Location* is the path and filename the binary file will read.
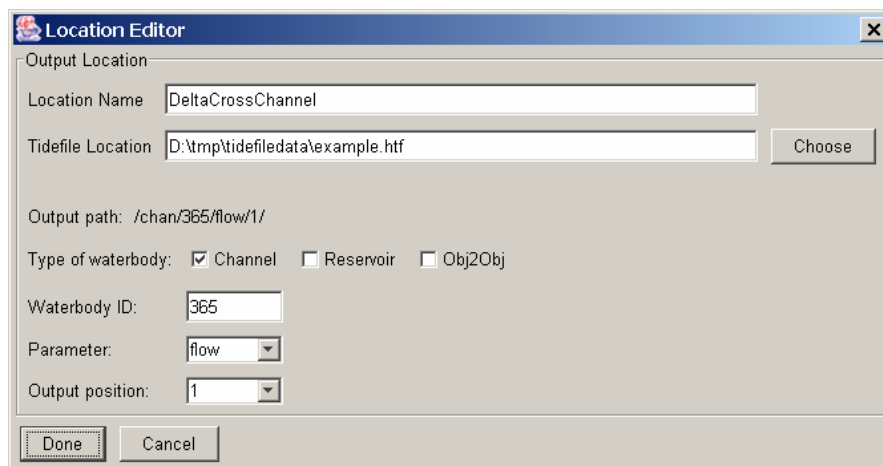

Figure 8.3: DSM2 Binary File Reader Location Editing Interface.

The remaining fields define a single location. The *Type of waterbody* defines one of three types currently available to DSM2 output: channel, reservoir, or object-to-object. The object-to-object waterbody type is used in DSM2 to simulate a transfer of water to and from either of the first two

waterbody types. The *Waterbody ID* defines the specific channel, reservoir, or object2object and must correspond with a waterbody simulated in DSM2. Channel numbers are defined in the DSM2 input files. Although reservoir and object2object are defined by names in the DSM2 input files, in the binary files they are assigned numbers based on the order they are listed in these input files.

Since every waterbody in the binary file has multiple parameters, the *Parameter* option defines which parameter to output. If both flow and stage values are to be examined, then separate output paths must be created for each parameter.

The *Output position* defines what part of the waterbody to output. On channels, "1" is for the upstream end and "2" is for the downstream end. On reservoirs this position is the gate number. Gate numbers are defined by order they are listed in the DSM2 input files.

8.5 Graphing Binary Data

After the binary data is loaded into the main interface (Figure 8.1) and a project file is selected, the user has the option to graph the data by pushing the *Make Graph* button. A sample graph is shown in Figure 8.4. The graphing ability was an add-on package Scientific Graphics Toolkit (SGT) developed by National Oceanic and Atmospheric Administration (NOAA). The graph window provides utilities to navigate, change, and print the data.
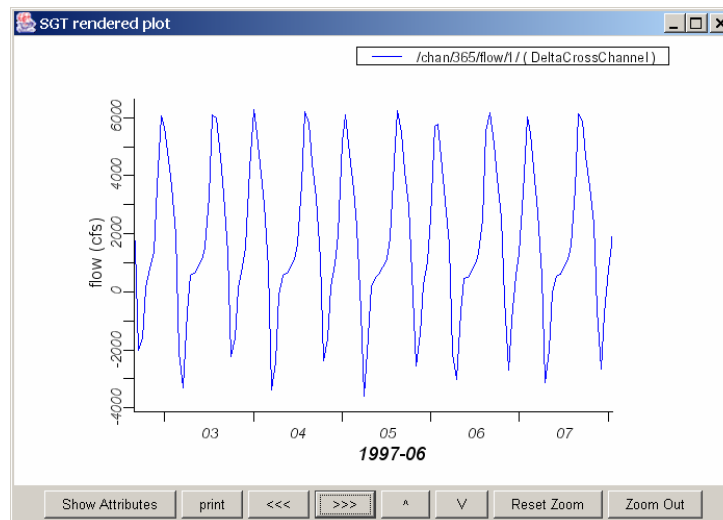

Figure 8.4: DSM2 Binary File Reader Graphing Interface.

8.6 Future Development

The binary output file reader will be expanded to read QUAL's binary file. It will also be linked to established QA/QC logic to enable a user to quickly evaluate a DSM2 simulation. Finally, it is anticipated that the reader will be linked to a report generator tool. This will entail reading from both the hydrodynamic and water quality output files and statistically manipulating these results into a useful format.