

US Army Corps of Engineers Hydrologic Engineering Center

Real-Time Simulation (HEC-RTS) User's Manual



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Real-Time Simulation, HEC-RTS, User's Manual

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Note: The HECE-RTS software is based on the Corps Water Management System (CWMS) software that is available to U.S. Army Corps of Engineers (USACE) offices only. Both software packages share the same directory structure, so a watershed can be built and used with either program. HEC-RTS uses only HEC-DSS and does not connect to a server, while the CWMS software connects to the server and a database.

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CHAPTER 1 Introduction

The U.S. Army Corps of Engineers (USACE) operates about 700 storage reservoir and lock and dam projects constructed under the USACE's Civil Works water resources program. The USACE water management mission is to regulate river flow with these projects to provide national benefits of flood control, navigation, hydroelectric power generation, water supply, irrigation, erosion control, water quality, environmental enhancement, and other authorized purposes. For USACE offices the Corps Water Management System (CWMS) software was developed to aide in addressing real-time decision. CWMS expanded and enhanced the data and information available to USACE staff members who must make decisions about the operation of Federal water management facilities or who must monitor and approve such decisions made by operation partners. The data and information made available through CWMS includes precipitation data and forecasts as well as data and information about the current state of watersheds, likely future state of watersheds, and consequences of management actions. The data and information help water managers and others make informed operation decisions.

The Hydrologic Engineering Center's (HEC) Real Time Simulation (HEC-RTS) software is based on the CWMS software for use by non-USACE offices. HEC-RTS still provides the same data and information that CWMS provides, HEC-RTS just performs these functions in a different manner than CWMS. This document is the User's Manual for Version 3.0 of the HEC-RTS software. This manual describes the capabilities of the software and illustrates its graphical user interface (GUI). The manual details how HEC-RTS is configured to use analysis software that is part of the system. The manual explains the flow of data and information between analysis software and the data components used within HEC-RTS.

1.1 Data and Information Needed by Water Managers

To make informed operation decisions, water managers need:

- Current and potential future scenarios of precipitation.
- Data that describes the current state of watersheds, channels, and water management facilities, including reservoirs, diversions, and other controllable features of the system.
- Information about the likely future state (e.g., one hour to two weeks) of the watersheds, channels, and management facilities.
- Information about the consequences of management actions that alter future states of the natural and managed systems.

Data that describes the current state of the system comes from a network of environmental sensors. These sensors, which are owned and operated by Federal, state, and local government agencies, utility companies, and commercial enterprises, measure:

• Weather conditions, including air temperature, precipitation depths and rates, and evaporation depths and rates.

- Watershed states, including snow accumulation.
- Depth, velocity, and other conditions in streams, rivers, canals, and other waterways.
- Lake or reservoir level (from which storage volume may be inferred), rates of release of water through outlets, settings of spillway gates, and other conditions of lakes, reservoirs, and diversions.

Data from sensors are transmitted by radio, satellite, telephone, the Internet, and other media to receiving sites, and then to water managers. There, the data are decoded, transformed, checked for quality (validated), and stored in databases. With these data, water managers have near-real-time reports on the current state of the watersheds, channels, and management features. Using the environmental data from the databases, as well as forecasts, as inputs to models of watershed and channel processes, water managers can forecast future availability of water. A water manager can predict the runoff from a watershed hours or even days into the future as a consequence of estimated rain and rain falling now or in the past in the watershed. To do so, the water manager uses a mathematical model that simulates infiltration, overland flow, baseflow, channel flow, and other relevant watershed and channel processes.

With models of water control facilities, water managers can simulate and assess the impact of operation alternatives. For example, a water manager can determine which of two operation alternatives will more likely result in higher downstream water levels due to a large storm. The forecast of future inflow, combined with a mathematical model of the behavior of the reservoir and the downstream channel, makes this possible.

One operation alternative could be to release water now from a rapidly filling reservoir to accommodate future inflows. Another alternative could be to delay release in anticipation that inflows will diminish and large releases will not be required. The manager has, with analysis software, the capability to compare these operation alternatives in a quantitative manner. Information from the simulation permits the manager to assess the economic, environmental, life safety, and other consequences of the operation alternatives. This information will lead to better-informed decisions.

1.2 HEC-RTS Overview

HEC-RTS provides data and information needed to water managers readily through DSS (Data System Storage) files, and to a database system that the user creates. The graphical user interface (GUI) provides a user with the ability to configure watersheds, view and edit data/information, create and run forecasts, and view results. The functions of HEC-RTS are organized into four groups, or modules: **Setup, Acquisition, Visualization**, and **Modeling**.



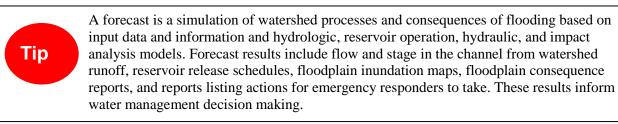
An HEC-RTS watershed is a set of data, information, models, and images that represent watershed lands and the channels, gages, and water control features within the watershed.

The **Setup Module** is the grouping of commands for watershed setup. These are commands for configuring inputs, models, and outputs that describe a watershed's behavior. The user develops a visual representation of the watershed to display in the GUI that is map-based.

The **Acquisition Module** is the commands for acquisition of data are provides. These are commands for monitoring receipt of data from DSS (HEC Data Storage System) files, validating the quality of incoming data, transforming the data (e.g., stage to flow), and editing the data, as required.

The **Visualization Module** provides commands for data visualization, like commands for displaying observed and forecast data to evaluate the hydrometeorological state of the watershed. Water managers may need to review hourly data from hundreds of gages as they make decisions. In the **Visualization Module**, HEC-RTS provides tools to facilitate review of large amounts of data, including summaries presented as graphs, tables, spreadsheets, charts, river profiles, maps, or sometimes a combination of these. Within the **Visualization Model**, the summaries are linked to a watershed map, so that a user can click on an icon and immediately view the data associated with that location or also view computational results.

The **Modeling Module** is the grouping of commands for model execution. These commands assist with setting up and executing the analysis software for forecasting and viewing results. HEC-RTS links the analysis software so that individual models are executed in an orchestrated manner. Data and other inputs are passed to each piece of software with the DSS data exchange software.



HEC-RTS analysis software meets modern software standards, includes an easy-to-use graphical user interface, and executes within current operating systems. The main analysis software are:

| HEC-MetVue | Processes observed meteorological data for input to HEC-HMS (Hydrologic Modeling System). Inputs are either point or gridded estimates of meteorological data such as precipitation and temperature. Outputs are observed meteorological time series formatted for compatibility with HEC-HMS. |
|------------|---|
| MFP | Meteorologic Forecast Processor. Processes meteorological forecasts for input to HEC-HMS. Inputs are forecasted meteorological data such as precipitation and temperature. The user can enter these forecasts manually or obtain them from external sources such as NWS (National Weather Service). |
| HEC-HMS | Simulates watershed response to precipitation. Inputs may include observed or forecasted precipitation, temperature, snowpack, and other environmental conditions. Outputs include flows throughout the watershed, including inflows to reservoirs and local flows below the reservoirs. |

- **HEC-ResSim** Reservoir System Simulation. Simulates behavior of reservoirs and linking channels, following user-specified operations for reservoir release decision making. Inputs include flows into reservoirs and unregulated flows downstream of reservoirs (from HEC-HMS). Outputs include reservoir releases, downstream regulated flows, and reservoir storage conditions.
- **HEC-RAS** River Analysis System. Simulates behavior of channels and adjacent floodplains. Simulation of channels is in one dimension, and simulation of adjacent floodplains is in one or two dimensions. The output from HEC-RAS permits determination of water surface elevations corresponding to flows computed by HEC-HMS or HEC-ResSim. Inputs include flows, and outputs include water surface elevations, depth grids, and inundation maps.
- **HEC-FIA** Flood Impact Analysis. Estimates the consequences of flow or water surface elevations in the system. Inputs include computed or observed flows or water surface elevations throughout the flood plain. Outputs include economic, life loss, or other measures of impact, or optionally, information on actions to be taken in response to flows or water surface elevations that will be experienced.

HEC-RTS ensures that those who need to know the current state of the defined watershed and likely future states have ready access to that information. The capability to access this information is accomplished using information sharing technology, including specially designed websites for display. Figure 1.1 display the HEC-RTS workflow.

1.3 What's New about HEC-RTS Version 3.0?

HEC-RTS Version 3.0 has been enhanced from previous versions. Version 3.0 has the following new features:

- **Improvements to the GUI.** The GUI has been redesigned to simplify use. The interface between the GUI and analysis software is more direct, making watershed configuration and forecasting more efficient.
- **HEC-MetVue.** This meteorological preprocessor generates meteorological (e.g., precipitation) input for HEC-HMS. HEC-MetVue can be used to create plausible rainfall scenarios by translating historical or hypothetical precipitation evens. The Meteorologic Forecast Processor [MFP] generates forecasted meteorological input. HEC-MetVue is designed to display, verify, manipulate, and edit spatial data by interactive/visual means.
- **RAS Mapper**. RAS Mapper is tool that is included in the HEC-RAS software (Version 5.0) that allows a user to create and visualize floodplain geospatial information along with HEC-RAS analysis results.

• **Model parameter editors have been enhanced.** For example, HEC-HMS model parameters may now be adjusted "on the fly" using a graphical editor. This capability allows a user to adjust parameters and quickly see results without needing to re-compute the entire forecast.

1.4 Organization of User's Manual

This manual is generally organized in parallel with the HEC-RTS workflow. The User's Manual is separated into three sections as described in Figure 1.2. The section focused on using HEC-RTS precedes the section focused on configuration because using HEC-RTS is a routine task while setting up watersheds is an infrequent task. Appendices are also included in the manual for supplemental topics and where more detail is needed.

Screenshots were captured using example watersheds. In the GUI, some dialog titles and menu options correspond with the names of items that a user might have specified in the watershed created by a user. Thus, dialog titles and menu options shown in the user's watershed may vary from what is shown here.

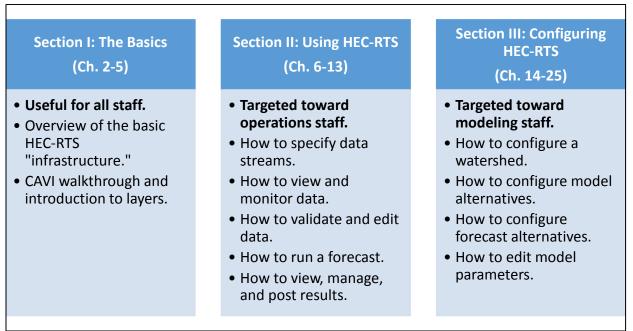


Figure 1.1 Content of Each Section of the HEC-RTS User's Manual

1.5 Additional Documentation

This user's manual is the first volume in a series of HEC-RTS documentation. In addition to this manual, other HEC-RTS documentation includes:

| HEC-RTS Quick Start | Steps the user through the development of | |
|---------------------|---|--|
| Guide | an HEC-RTS watershed. | |

| HEC-RTS Applications Manual | This document is a combined engineering applications/technical reference manual intended to assist engineers in the development of models and the implementation of HEC-RTS. |
|------------------------------------|--|
| Analysis Software Documentation | Documentation on the analysis software that is part of the system, such as HEC- HMS, HEC-ResSim, HEC-RAS, and HEC-FIA, are available on HEC's website: <u>http://www.hec.usace.army.mil/</u> . |
| | However, Version 3.0 may include versions of the analysis software that have not been released to the public. For those, version-specific documentation is available from HEC upon request. |

CHAPTER 2 HEC-RTS Interface

Chapter 1 described how HEC-RTS creates data and information readily available to water managers and introduced the analysis software. As described in Chapter 1, the GUI is the steering wheel of HEC-RTS. The GUI features graphical menus and tools organized by function, or modules. The four modules include:

- **Setup** for watershed configuration.
- Acquisition for data acquisition, monitoring, validation, and editing.
- **Visualization** for viewing data.
- **Modeling** for setting up and executing analysis software for forecasting and viewing results.

This chapter provides an overview of the GUI and basic functions. Here are three navigation tips:

- For simplicity, the GUI "hides" commands that are not applicable to the module or element the user is working on. Thus, if an option appears to be missing, make sure that the correct module or element has been selected and that the option is applicable for that selection.
- Directory trees list elements configured in the watershed. When a user configures a new element, it will be added to the directory tree.
- Commands related to a selected element are typically accessible by right-clicking on the element.

2.1 Starting HEC-RTS

When starting HEC-RTS, double-click the HEC-RTS icon on a user's desktop, or from the taskbar click **Start**, point to **All Programs**, point to **HEC**, point to **HEC-RTS**, and click **HEC-RTS**. The HEC-RTS splash dialog box appears for a few seconds, and then the main window of HEC-RTS displays. The user is now ready to start using HEC-RTS.

2.2 Opening an Existing Watershed

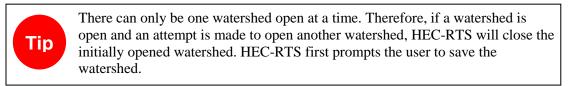
In HEC-RTS, a **watershed** is a set of data, information, models, and images that represent watershed lands and the channels, gages, and water control features within the watershed. A user may open an existing watershed from any of the modules. (If the user needs to create a new watershed, refer to Section 15.2). There are two methods available to open a watershed. First, if the user has opened the watershed before, the user can select the watershed from the **File** menu, point to **Recent Watersheds**, and click on the watershed name. The second way to open a watershed follows:

- 1. First the user must tell HEC-RTS where watersheds are located. From the Tools menu, click Options, the Options dialog box will open. Click Model Directories. From this tab the user will create watershed locations, click Add Location. The Add Watershed Location dialog box will open. Enter a name for the watershed location in the Name field. In the Location field the user can either enter a directory or click Browse. A Select Watershed Location browser will open and the user can browse to the appropriate location. Click Open, the Select Watershed Location browser will close, the selected location will now appear in the Location field on the Add Watershed Location dialog box. Click OK, the Add Watershed Location dialog box will close, and the defined watershed location will appear on the Model Directories tab of the Options dialog box. Click OK, the Options dialog box will close.
- 2. From the **File** menu click **Open Watershed**. The **Open Watershed** dialog box will open (Figure 2.1).

| 🚰 Open Watershed | | | | | | |
|--|---------------|-------------|--|--|--|--|
| Current Watershed | | | | | | |
| | | | | | | |
| Available Locations Available Watersheds | | | | | | |
| CWMS | Name | Description | | | | |
| | Russian River | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Edit | | | | | | |
| | | OK Cancel | | | | |

Figure 2.1 Open Watershed Dialog Box

3. Select the watershed name listed in the **Available Watersheds** box. (A new location can be added by clicking **Edit**; see Step 1) Click **OK**, the **Open Watershed** dialog box will close, and the selected watershed will appear in the HEC-RTS main window.



2.3 HEC-RTS Main Window

The HEC-RTS main window is shown in Figure 2.2 (only part of the window is shown for ease of viewing). Each module in HEC-RTS - **Setup**, **Acquisition**, **Visualization**, and **Modeling** - has menus, tools, and a map window specific to each function.

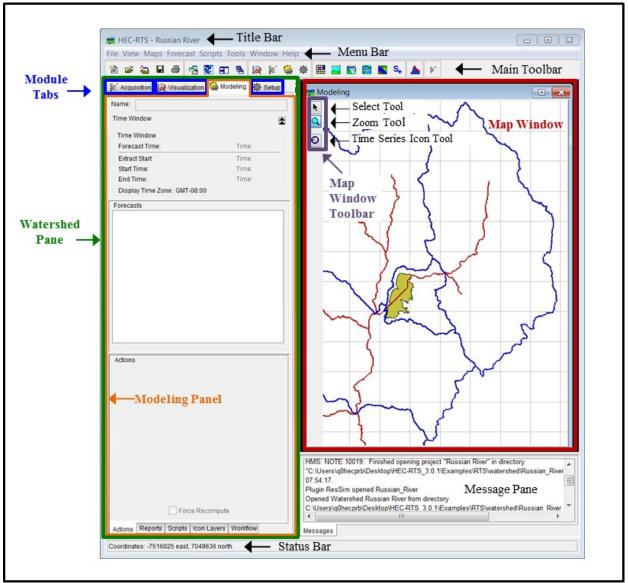


Figure 2.1 CAVI Main Window

These are the basic elements of the main window:

| Title Bar | Displays the name of the active watershed. | | |
|--------------|---|--|--|
| Menu Bar | Contains general and module-specific menus. | | |
| Main Toolbar | Contains shortcut icons for menu commands. | | |

| Module Tabs Watershed Pane | Each is a tabbed menu that houses module-specific commands. Clicking a module tab opens that module in HEC-RTS. The area where the module tabs are located. |
|-------------------------------|---|
| Map Window | Used to setup and display the watershed representation, which is geographically-referenced (geo-referenced). |
| Map Window Toolbar | Houses tools used to setup and navigate within the map window. |
| Messages Window | Displays a scrolling list of messages. System output log information appears in this window from the time HEC-RTS is started and when the software is exited. Messages related to incoming data are colored coded based on the quality of the data. Messages may also report a problem with a system component; problems with field equipment; a caution, warning, or flood event; or other critical situations. |
| Status Bar | Displays map coordinates when the select tool is hovering over a location in the map window. |

2.3.1 Menu Bar

The **File**, **View**, **Maps**, **Tools**, **Window**, and **Help** menus (Figure 2.2) contain commands you can access from all four modules. Some of these menus also contain module-specific commands that appear only within individual modules.

The following are descriptions of the commands and options that are common to all four modules.

| File | From this menu, the user can create, open, close, upload, or download a |
|------|--|
| | watershed, save data associated with the watershed, view watershed properties, |
| | print the map window, and exit HEC-RTS. In addition, most recently opened |
| | watersheds are located at the bottom of the File menu. Available commands |
| | are: New Watershed, Open Watershed, Close Watershed, |
| | Upload/Download Watershed, Save Watershed, Save Watershed As, |
| | Watershed Properties, Print Map, Recent Watersheds, and Exit. |

Edit This menu will appear in all modules and is module specific. Typically, the edit options will be relevant to data element(s) for a specific module.

View This menu is used to add or remove screen items (toolbar icons, the watershed pane, the messages bar, and the status bar); see what units, which time zone, and which coordinate system are being used for viewing; save, restore and manage layouts; choose whether or not to display the default computation point layer within the map window; select which modules tabs will be shown in the watershed pane; and view a list of watershed files (primarily in the folders: maps, study, and HEC-RTS).

Reports This menu is module specific and provides access to reports produced for that module.

- Scripts This menu allows you to execute existing scripts, create, test new scripts and run scripts. Available commands are: Script Editor, Schedule, Script Job Status, and Run.
- Tools This menu allows the user to access data (HEC-DSSVue), set options for the software, specify plug-in editor locations to use, view the "*console.log*" file, view the "*HEC-DSS.log*" file, and view memory usage. Available commands are: **HEC-DSSVue, Options, Install Location Editor, Console Output, HEC-DSS Log**, and **Memory Monitor**.
- Window This menu allows the user to select how to view and select multiple windows, which modules the user wants to view. Available commands are: Duplicate Window, Detach Window, New Map Window, Map Window Properties, Sync Map Window, Tile, Cascade, Next Window, and Previous Window.
- **Help** Displays current version information about HEC-RTS.

2.3.2 Map Window Toolbar

The primary set of tools in the map window toolbar includes the **Select Tool**, **Zoom Tool**, and **Time Series Icon Tool**. The tools change the appearance and functionality of your mouse. Other tools appear in the toolbar depending on which module you are in. Their functions are described in context in other chapters of the manual.

Select Tool

The **Select Tool** allows the user to select elements in the map window. Also, after zooming in, the user can use the **Select Tool** to pan.

Q Zoom Tool

The **Zoom Tool** allows the user to zoom in and out of the map window. To zoom in, hold the mouse button down and outline the area to be enlarged. Right-click to zoom out.

O Time Series Icon Tool

The **Time Series Icon Tool** allows the user to select time series icons (Chapter 18 and 19) on the map window. To select multiple icons, hold down the **SHIFT** key, and click on the time series icons that are to be selected. The user can access commands related to a time series icon by right-clicking the appropriate time series icon.

2.3.3 Time Series Icon Controls

Time Series Icon Controls (Figure 2.3) allow the user to select the attributes for the time series layers that are displayed within the watershed. In order for the tab to appear, a time series layer must be created and data must be available for at least one of the time series icons associated with a time series layer (Chapter 19). The tab is available in all modules, except the **Setup Module**. There are three attributes available - **Icon Type, Value**, and **Layer**.

| Icons Type: | ThumbnailPlot 🔹 |
|-------------|-----------------|
| Values: | 1 Selected |
| Layers: | 1 Selected 🔹 |

Figure 2.2 Time Series Icon Controls

- **Icon Type** The **Icon Type** forces all icons within the map window to display as the selected **Icon Type** in the list. Selecting the **Default** option in the list will display the icons as they were set in the **Time Series Icon Editor**.
- ValueValue allows the user to display the time series icon's data as labels (Figure2.4), which displays next to or on the location of the associated time seriesicon. For example, the user can choose to display the data's total, minimum,and maximum values as labels. Multiple values can be selected at once
- **Layer** Layer allows the user to select which layer or layers are visible in the map window. Multiple layers can be selected at once.

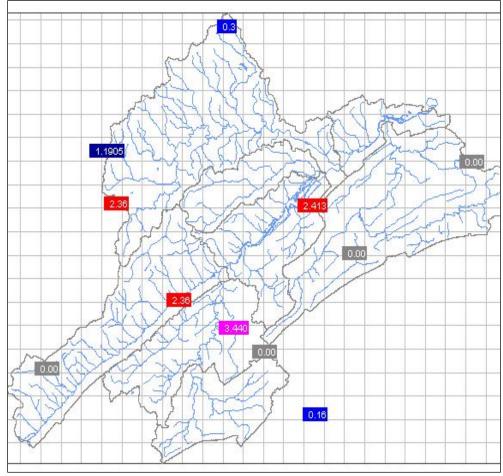


Figure 2.3 Value Labels

2.4 Map Window Elements

Map Window elements allow the user to represent watershed data visually in a geo-referenced context and interact with associated data. The user can create elements and edit the element properties in the **Setup Module** (Chapter 15). In the **Acquisition, Visualization**, and **Modeling** modules, you can plot and tabulate data and results associated with the elements. Additional commands are available according to module and are discussed throughout this manual.

2.5 Viewing of Data and Results

Data can be viewed from both the **Acquisition** and **Visualization** modules. Data are viewed from plots or tables.

Results are viewed from the **Modeling Module** through plots and reports. (Reports available in the **Setup Module** provide the user with information on the display elements that have been defined for the watershed.)

2.5.1 Features of Plots

HEC-RTS plots offer data and results specific to the active module. The data that a user can view were defined in the **Setup Module** at the time series icon locations (Chapter 18). Modeling results can also be viewed at the time series icons or at individual modeling elements (e.g., reservoirs). For example, in the **Acquisition Module**, the plot for one time series icon might open a two-dimensional graph of incoming data at a specific location, while, in the **Modeling Module**, the same time series icon might plot reservoir modeling results at that location (Figure 2.5).

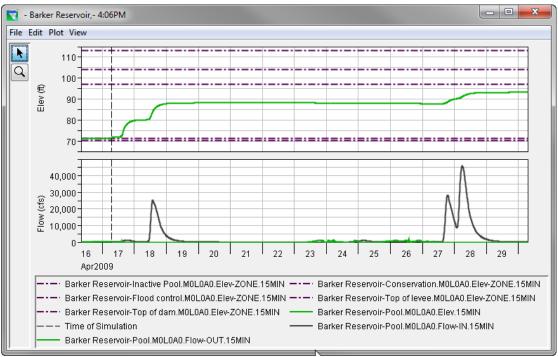


Figure 2.4 Sample Plot: Reservoir Modeling Results

The plot displays the location name in the title bar and has axis labels and a color-coded legend for the data contained in the plot. When a plot depicts results of a model alternative, as in Figure 2.5, a dashed vertical line represents the time of forecast. The **Zoom Tool** from the plot window operates the same as described in Section 2.3.2.

The user can customize the appearance of plots through the use of several editors. To access these editors, use the **Select Tool** and right-click on different elements of the plot (e.g., lines, axis). The user can also access these editors through the **Edit** and **View** menus in the **Plot** dialog box (Figure 2.5). The following provides an overview of the different editors (see Appendix I for more details on customizing plots):

| Curve Properties | Right-clicking on a plot curve or point allows the user to open a curve properties editor where curve colors, styles, and weights as well as labels and quality symbols can be edited. |
|-------------------------|---|
| Viewport Properties | Right-clicking on the viewport of a plot allows the user to open an editor where the border, background, and gridlines of the plot can be customized. |
| Title Properties | Right-clicking on a plot axis allows the user to open a title properties editor where the title of a plot can be customized. |
| Axis Properties | Right-clicking on a plot axis allows the user to open an axis properties editor where the axis scale and tic marks can be customized. |
| Legend Properties | Right-clicking on the legend of a plot allows the user to open an editor where the user can add a title and add icons and text to the left and right blocks of a plot. |
| Label Properties | Right-clicking on an axis label or plot legend allows the user to open a label properties editor where the user can add or change the background color of labels or add a border to the labels. |
| Spacer Properties | If multiple plots are available in the plot window, the user can right- click on the space between the plots to access the Space Properties Editor . From the Space Properties Editor adjustments can be made to the space between plots. |
| Polygon Properties | Right-clicking on a polygon allows the user to open a polygon properties editor where borders and backgrounds can be customized. |

2.5.2 Features of Tables

The same data and information viewed from a plot can also be viewed in tabular form (Figure 2.6). As with plots, the type of data and results displayed depends on the properties the user defined for each time series icon.

| e Edit View Help | | |
|------------------|------------------|----------------------|
| | GMT-08:00 | |
| Ordinate | Date / Time | BARTO FLOW OBS |
| Units | | cfs |
| Туре | | INST-VAL |
| 1 | 14 Jul 01, 16:00 | 37.09 |
| 2 | 14 Jul 01, 17:00 | 36.80 |
| 3 | 14 Jul 01, 18:00 | 36.80 |
| 4 | 14 Jul 01, 19:00 | 35.99 |
| 5 | 14 Jul 01, 20:00 | 35.70 |
| 6 | 14 Jul 01, 21:00 | 35.70 |
| 7 | 14 Jul 01, 22:00 | 34.89 |
| 8 | 14 Jul 01, 23:00 | 34.60 |
| 9 | 14 Jul 01, 24:00 | 34.60 |
| 10 | 15 Jul 01, 01:00 | 34.60 |
| 11 | 15 Jul 01, 02:00 | 33.79 |
| 12 | 15 Jul 01, 03:00 | 33.50 |
| 13 | 15 Jul 01, 04:00 | 33.50 |
| 14 | 15 Jul 01, 05:00 | 33.50 |
| 15 | 15 Jul 01, 06:00 | 33.50 |

Figure 2.5 Data in Tabular Form

The appearance of tables can be customized through the use of commands available from the menu bar of the table window. The user can add commas, separate date/time into two separate columns, make the year four digits, specify the decimal precision of the data, show the quality of the data, show missing data as a value (e.g., -901.0), copy selected cells or the whole table, print, plot, resize the columns of the table, and export the table to an ASCII file.

2.5.3 Printing and Exporting Plots and Tables

Plots and tables can be printed, copied and pasted into other applications, and specify export options for plots. For a more detailed description of printing and exporting, see Appendix J.

2.5.4 Features of Photos and Webcam Images

Photos, webcam images, web pages, or documents can be assigned to time series icons. By adding images to an icon in the **Setup Module**, the user can then access images in the **Visualization, Acquisition**, and **Modeling** modules through the icon shortcut menu. Images and webcams can be viewed in their own separate dialog or as icons on the map window. Figure 2.7 shows a satellite image that can be viewed from a time series icon. If a time series icon represents a dam, links can be assigned to the icon that might be a webcam that displays a real-time video of an actual outlet on that dam. It could also have access to pictures of the dam and reports providing details about the dam. For more information on how to set these features up see Chapter 18.

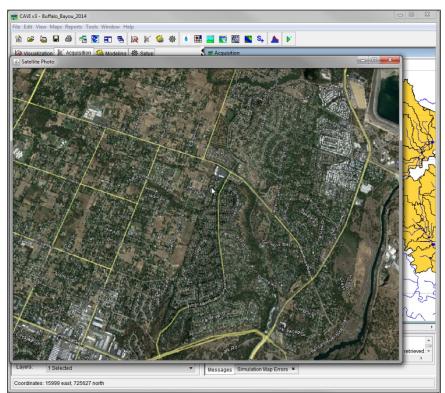


Figure 2.6 Viewing an Image from a Time Series Icon

2.5.5 Running Scripts from Icons

Scripts can be assigned to individual time series icons. The scripts can be used to update the data at given intervals, compute other information from the data, or complete other tasks. Scripts are assigned to the icons in the **Setup Module**, through the **Time Series Icon Editor**. Scripts can also be created in the provided **Script Editor** frame. For more detailed information on assigning and using scripts, see Appendix H.

CHAPTER 3 Understanding Layers

Layers in the HEC-RTS interface are like transparencies laid one on top of the other. Each includes representations of physical images such as roads, county and state boundaries, rivers, and subbasins. These are layered in the map window as color pictures. Each of these images, along with its associated data, is a layer. This chapter describes how to create and manage layers so that required data and information are easily viewed.

There are two types of layers: primary layers (Chapter 4) and map layers (Chapter 5). Primary layers are automatically generated when a new watershed is created and are present in all HEC-RTS watersheds (although some primary layers may be empty in some watersheds). Map layers are optional and are loaded into the watershed by the user.

HEC-RTS creates primary layers when a stream alignment, time series icons, map window elements, and gridded precipitation data are created. (A time series icon is a symbol in the map window that provides quick access to time-series data and information that has been assigned to the icon.) HEC-RTS also creates a primary layer when a forecast alternative has been selected for computation. Primary layers are module specific. Map layers are physical images, which help visualize the watershed. Map layers can be loaded in several formats, which are discussed in Chapter 5. This includes maps from the Internet, such as a Google street map. With the **Display Map Coordinates** function in the **Maps** menu, the user can set which coordinates the **Map Window** will use (watershed or loaded Internet map).

All layers are hierarchical. Primary layers can contain sub-layers. For example, the **Time Series Icons Layer** (Chapter 19) can have several user-defined sub-layers that represent various types of data and information such as flow and precipitation.

3.1 Map Layers Editor

The **Map Layers Editor** (Figure 3.1) allows the user to add map layers, organize layers, view all the layers associated with the watershed, and add sub-layers to primary layers. The **Map Layers Editor** can be accessed from any of the modules. From the **Maps Menu**, click **Map Layers**. The **Map Layers Editor** will open (Figure 3.1). The following sections describe the commands available in the **Map Layers Editor**.

3.1.1 Menu Bar

The menu bar of the **Map Layers Editor** contains commands for managing watershed layers. The following is a summary of the available menus and the commands associated with each one.

| 📻 Map Layers | |
|--|--------|
| Layers Edit View | |
| Currently Opened Maps | |
| Visualization | |
| Acquisition | |
| Modeling | |
| Setup | |
| Map Layers Study Study Time Series Icons nppoto_lakes.shp np_lakes.shp np_lakes.shp np_shed.shp np_count.shp | - III |
| | ÷ |
| ОК | Cancel |

Figure 3.1 Map Layers Editor

- Layers From this menu, map layers can be added, images imported, and map layers removed. The Close command from this menu closes the Map Layers Editor.
- **Edit** From this menu, after selecting a map layer from the **Currently Opened Maps** box, the user can rearrange and access the properties of the selected layer.
- View This menu has one command, Always On Top, which keeps the Map Layers Editor on top of all other HEC-RTS forms when checked.

3.1.2 Layer Tree

The **Map Layers Editor** contains a tree for controlling the display of layers in the watershed. The tree represents the hierarchical arrangement of layers. The top level of the tree is the **Map Layers Folder** (Figure 3.1), which contains all of the layers in the watershed. Beneath the **Map Layers Folder** is a branch for each primary or map layer. When a plus sign (expands) is displayed, the user can click the plus sign, which expands the selected branch and display. Either sub-layers appear or a legend for the layer appears. When a minus sign (collapses) is displayed, clicking the minus sign collapses the branch. By double-clicking on a layer, the user can expand/collapse the branch and also opens the selected layers **Properties Editor**. Figure 3.2 shows the **Map Layers Editor** with the **Study Layer** expanded.

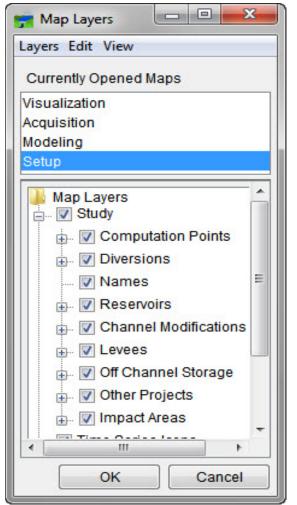


Figure 3.2 Map Layers Editor with the Study Layer Expanded

The checkbox turns display of a layer or sub-layer on or off. If a layer is unchecked, its sublayers will not display, even if they are checked.

3.1.3 Layer Organization

Layers in the **Map Window** can be organized with the **Map Layers Editor**. By default, the primary layers are at the top of the tree. Map layers are added to the bottom of the tree. Layers are drawn as shown in the **Map Layer Editor**. So typically background images are on the bottom, and layers containing smaller, more-detailed items such as time series icons, gages, and rivers are on top.

To rearrange the order of layers:

 Select the layer that will be rearranged in the Layer Tree of the Map Layers Editor. From the Edit menu or from the layer's shortcut menu, choose Move Up or Move Down. Other available commands are Move to Top (moves the selected layer to the top of the tree) and Move to Bottom (moves the selected layer to the bottom of the tree).

- 2. Continue to change the position of each layer until the necessary features are visible on the map window.
- 3. Click **OK**, and the **Map Layers Editor** closes.

3.2 Time Series Icon Controls

The **Time Series Icon Controls** in the **Visualization**, **Acquisition**, and **Modeling** modules allows the user to change the **Time Series Icons Layers** visible within the map window quickly. The following actions can occur: set specific sub-layers to display, select different value labels (captions such as Name, Average, Min, Max, etc., are displayed next to the time series icons), and display only icons with similar properties. Also, display graphics such as pictures that are updated from websites as well as documents can be displayed. For more on setting up sub-layers under the **Time Series Icons Layer** see Chapter 19. Chapter 18 describes how to set up **Time Series Icons**.

3.3 Layer Visualization Scaling

Layers may be set to become visible or invisible as zooming in or out occurs in a **Map Window** (see Chapter 4 and 5). This provides for the ability to display finer levels of detail as zooming in on regions occurs in the map window, and avoids clutter when displaying the full area. This might include time series icons not appearing for less significant gages, detailed map layers becoming visible, and raster or other images appearing that are not as distinguishable at a coarser zoom level. All layers can have visualization scales set, except for the **Study** and **Modeling** layers.

CHAPTER 4 Primary Layers

4.1 Overview

Primary Layers include the **Stream Alignment** layer, the **Time Series Icons** layer, and the **Study** layer (Computation Points, Reservoirs, Impact Areas, and other watershed configuration element types). The layers appear in the **Map Layers** editor (Figure 4.1) accessible from the **Maps Menu**. (If a **Primary Layer** is not displayed, double-click the corresponding node in the **Setup** tab to make the layer appear in the **Map Layers** editor. For example, to bring up the **Stream Alignment Layer** in the **Map Layers** editor, double-click the **Stream Alignment Node** in the **Setup** tab.) Layers can be turned on and off by clicking the checkbox next to the layer in the **Map Layers** editor.

Primary Layers are automatically generated when a new watershed is created. **Primary Layers** are present in all CAVI watersheds (although some layers may be empty in some watersheds) and are foundational to CAVI (whereas **Map Layers** are optional, see Chapter 5). This chapter describes how they are configured and managed.

| 💼 Map Layers | | | x |
|----------------------------|----|-------|------|
| Layers Edit | | | |
| Currently Opened Maps | | | |
| Acquisition | | | |
| Setup | | | |
| Modeling | | | - 11 |
| Visualization | | | - 11 |
| | | | - 11 |
| | | | - 11 |
| | | | - 11 |
| | | | - 11 |
| | | | - 11 |
| | | | |
| Map Layers | | | - |
| 🖬 🐨 🔽 Time Series Icons | | | E |
| 🖶 🕡 streams.shp | | | |
| tim v stream_gages.shp | | | |
| | | | |
| Bunaro_Bayou_Subbasins.shp | | | |
| | | | - |
| | ОК | Cance | |

Figure 4.1 Map Layers Editor

4.2 Time Series Icon Layer

The **Time Series Icons Layer** includes all of the time series icons that you have defined for your watershed. The icons are available in all modules. For more details on creating **Time Series Icons Layers** see Chapter 19.

4.3 Study Layer

The **Study Layer** appears in the **Setup Module** only. The **Study Layer** has sub-layers for each configuration element type. Expanding the **Study Layer Node** in the **Map Layers** editor (Figure 4.2) displays its sub-layers. CAVI creates these sub-layers before any configuration elements have been defined.

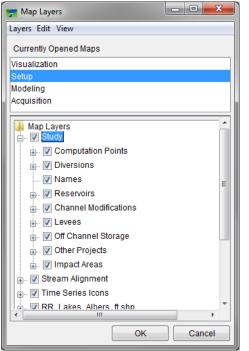


Figure 4.2 Study Layer in the Map Layers Editor

4.3.1 Study Layer Properties

The user can change the appearance of some of the configuration elements in the **Study Layer**. To do this:

- 1. In the Map Layers editor, right-click Study in the layer tree.
- 2. Select **Properties** in the shortcut menu. The **Drawing Properties Editor** (Figure 4.3) opens. The **Drawing Properties Editor** has six tabs, which represent the configuration element types available in your watershed.
- 3. Depending on the configuration element type (e.g., reservoirs, levees), you can change the color of the element, the size of the element, whether the element is displayed, whether the label of the element is drawn, and what size and type of font the label of the element is displayed in.

For example, from the **Reservoir** tab, the user can set the width and colors of the different elements that make up a reservoir, whether to display the reservoir polygon (triangle), whether to display the reservoir label, and set the font for the reservoir label. By default, the labels for the

| Properties Editor | | × |
|--|---|--------------|
| Reservoir Levees Diversions Channel Modification | Computation Point Impact Area | |
| Triangle Element: Triangle Fill Color: cyan Triangle Outline Color: blue | Storage Reach Element: Storage Reach Fill Color: Storage Reach Outline Color: | cyan V |
| Draw Reservoir Triangle Dam Element Dam Fill Color Iightgray | Storage Reach Width: | 8 • |
| Dam Width: 10 - | ОК | Cancel Apply |

Figure 4.3 Drawing Properties Editor

reservoirs appear in the map window. If the user does not want to display the labels, uncheck **Draw Reservoir Name**, and click **Apply**. To change the appearance of the reservoir name, use the options in the **Font Chooser** (Figure 4.4). From the **Drawing Properties Editor**, click **Apply** and the reservoir labels will appear in the font and size you chose. The other configuration element types in the **Drawing Properties Editor** have similar properties.

| 📻 Font Ch | ooser 💌 |
|------------------|-------------------------------------|
| | AsBbCc 123 |
| Font San Bold | sSerif Sample text AaBbCc 123 |
| Size | 10 Cancel |

Figure 4.4 Font Chooser

4.4 Stream Alignment Layer

The **Stream Alignment Layer** is available in the **Setup Module**. This layer has sub-layers for each stream alignment element. Expanding the **Stream Alignment Layer Node** in the **Map Layers** editor (Figure 4.5) displays its sub-layers (Stream Junctions, Streams, and Stream Nodes).

| 📻 Map Layers 💶 💷 🔀 |
|--|
| Layers Edit View |
| Currently Opened Maps |
| Modeling |
| Setup |
| Acquisition |
| Visualization |
| Map Layers Stream Alignment Stream Junctions Streams Stream Nodes Calibration Plan OK Cancel |

Figure 4.5 Map Layer Editor - Stream Alignment Layer

4.4.1 Stream Alignment Layer Properties

The user can change the appearance of streams and their labels, change the appearance of stream junctions and stream nodes, and set the visualization scale for the **Stream Alignment Layer**. To do this, right-click the **Stream Alignment Layer** in the **Map Layers** editor. From the shortcut menu, click **Properties**. The **Stream Alignment Properties** dialog (Figure 4.6) opens. How to change properties is described in the following sections.

| 📻 Stream Alignment Properti | es | | x |
|-----------------------------|---------------|-------------|---------|
| Scale | | | |
| Current Scale 1:80044 | | | |
| Default | | | |
| Edit Properties | | | |
| Stream Width: | Stream Color: | | |
| 6 🗸 | Custom 👻 | | |
| 🔽 Show Stream Name | Choose Font | | |
| Draw Station Tics | | | |
| Tic Length: | 7 🗸 | | |
| Major Tic Length: | 14 🔹 | | |
| V Draw Tic Labels | Choose Font | | 200 |
| | | Stream Name | |
| Draw Stream Nodes | | | |
| Node Color: | Custom - | | |
| Node Outline Color: | Custom - | | |
| Node Width: | 7 🗸 | | |
| Draw Junctions | | | |
| Junction Color: | green 👻 | | |
| Junction Width: | 12 🔻 | | |
| | ОК | Cancel | pply |

Figure 4.6 Stream Alignment Properties Dialog

4.4.2 Stream Alignment Sub-Layer – Streams

The following are instructions for changing the appearance of the **Streams** in the **Stream Alignment**:

1. The user can set the width of the lines that represent streams with the **Stream Width List** (Figure 4.7).

| Stream Width: | Stream Color: |
|------------------|---------------|
| 7 🔹 | Custom 👻 |
| Show Stream Name | Choose Font |

Figure 4.7 Stream Alignment Properties – Streams

 The user can select the color of the lines that represent the streams with the Stream Color List. The default color is orange. There are several colors to choose from. The user can also create custom colors. From the Stream Color List, click Custom. The Choose A Color dialog (Figure 4.8) opens. See Appendix E for further details on the color chooser.

| 📻 Choose A Color | × |
|---|---|
| Swatches HSV HSL RGB CMYK | |
| | |
| Preview Preview Sample Text | |
| OK Cancel Reset | |

Figure 4.8 Choose A Color Dialog

3. A preview of the stream color changes is shown (Figure 4.9) in the **Stream Alignment Properties** dialog. Click **Apply** to apply the changes.

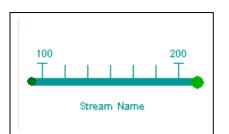


Figure 4.9 Preview Stream Color Changes

- 4. By default, stream labels appear in the **Map Window**. If the user does not want the labels displayed, uncheck **Show Stream Name**, and click **Apply**.
- 5. To change the font of the stream labels, click **Choose Font** next to **Show Stream Name**. The **Font Chooser** dialog (Figure 4.4) opens. Select the font type from the **Type** list, and select a size using the **Size** slider. Click **OK**. The **Font Chooser** dialog will close. Click **Apply** on the **Stream Alignment Properties** dialog. All the stream labels will appear in the font and size you choose.

Tic marks appear on a stream representing the stream stationing. There are two types of tic marks, minor and major. The following are instructions for changing the appearance of tic marks:

1. If the user does not want to display the tic marks, uncheck **Draw Station Tics** (Figure 4.10), and click **Apply**.

| Draw Station Tics | |
|-------------------|-------------|
| Tic Length: | 7 🔹 |
| Major Tic Length: | 14 🔻 |
| 🔽 Draw Tic Labels | Choose Font |

Figure 4.10 Stream Alignment Properties - Tic Marks

- 2. From the **Tic Length List**, the user can set the length of the minor tic marks. To change the length of the major tic marks, use the **Major Tic Length List**. Click **Apply**, and the **Map Window** updates.
- 3. By default, the labels for the tic marks appear in the map window. If the user does not want the labels to display, uncheck **Draw Tic Labels** and click **Apply**.
- 4. To change the font of the tic mark labels, click Choose Font next to Draw Tic Labels. The Font Chooser dialog (Figure 4.4) opens. Select the font type from the Type list, and select a size using the Size slider. Click OK, and The Font Chooser dialog closes. Click Apply on the Stream Alignment Properties dialog. All the tic mark labels will appear in the font and size you chose.

4.4.3 Stream Alignment Sub-Layer – Stream Nodes

The following are instructions for changing the appearance of all **Stream Nodes** in the **Map Window**:

1. If the user does not want to display the **Stream Nodes**, uncheck **Draw Stream Nodes** (Figure 4.11), and click **Apply**.



Figure 4.11 Stream Alignment Properties - Stream Nodes

- 2. The user can select the color of the **Stream Nodes** from the **Node Color List** (Figure 4.11). The default color is green. Similar to streams, you can also create a custom color (Section 4.5.2).
- 3. The user can select the color of the outline of **Stream Nodes** from the **Node Outline Color List**. The default color is dark green. Similar to streams, the user can also create a custom color (Section 4.5.2).
- 4. The width of **Stream Nodes** can be set from the **Node Width** list.

4.4.4 Stream Alignment Sub-Layer – Stream Junctions

The following are instructions to change the appearance of all **Stream Junctions** in the **Map Window**:

- 1. If the user does not want to display **Stream Junctions**, uncheck **Draw Junctions** (Figure 4.12), and click **Apply**.
- 2. The user can select the color of **Stream Junctions** from the **Junction Color** List (Figure 4.12). The default color is dark green. Similar to streams, a custom color can be created (Section 4.5.2).
- 3. Set the width of Stream Junctions from the Junction Width List (Figure 4.12).

| Draw Junctions | |
|-----------------|---------|
| Junction Color: | green 👻 |
| Junction Width: | 12 🔻 |

Figure 4.12 Stream Alignment Properties - Stream Junctions

4.4.5 Scale

The visualization **Scale** feature allows the user to customize stream alignment display settings as they zoom in and out on the **Map Window**. The following are instructions to set the visualization scale for the **Stream Alignment Layer**:

1. To set the visualization scale for the stream alignment to a default, click the **Scale Menu** in the **Stream Alignment Properties** dialog. Select **Set to Defaults**. The visualization scale is set automatically.

2. To create a scale factor, on the **Scale Menu**, click **New**. The **Create New Scale** dialog (Figure 4.13) opens. In the **Scale Cell**, enter values for the scale factor.

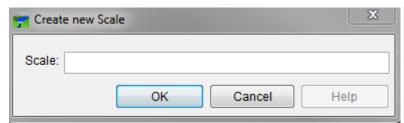


Figure 4.13 Create New Scale Dialog

3. Click **OK**. This creates a new tab in the **Stream Alignment Properties** dialog in which the user can configure the stream alignment's appearance.

4.5 Gridded Data Layer

The **Gridded Data Layer** (Figure 4.14) is available in the **Visualization** and **Modeling Modules**. **Gridded Data Layer** is only available when gridsets are included or computed for the watershed. A **gridset** is a sequence or time series of precipitation grids. The **Gridded Data Layer** contains the gridsets for the watershed that have been created outside of CAVI using the HEC-GridUtil program and Gridded Data calculated by the HEC-MetVue model. Appendix G describes precipitation grids, gridsets, and the HEC-GridUtil program.

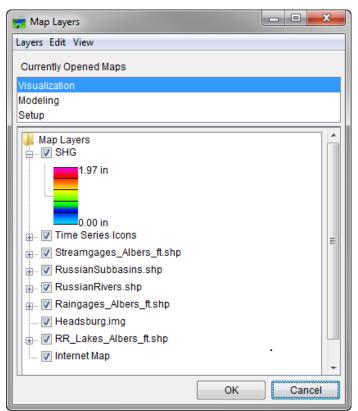


Figure 4.14 Gridded Data Layer

4.5.1 Gridded Data Properties

For the **Gridded Data Layer** (Figure 4.14), the user can configure the appearance of the gridset (Appendix G) being used by the watershed. To configure these properties:

- 1. On the Maps menu, click Map Layers, and the Map Layer dialog will open (Figure 4.1)
- 2. From the tree, right-click **Gridded Data**. From the shortcut menu, click **Properties**. The **Grid Display Options** dialog will open, as shown in Figure 4.15.

| 📻 Grid Display Options | × | |
|---|----------|--|
| SHG | | |
| Properties Scale | | |
| Precipitation Tic Interval() 10.0 Advanced | Scale 50 | |
| Contour Limits | 40 30 | |
| System Specified Min/Max Values 20 | | |
| Maximum() 50.0 Minimum() 0.0 | 10 | |
| OK Cancel | Apply | |

Figure 4.15 Grid Display Options Dialog

4.5.2 Properties

From the **Grid Display Options** dialog (Figure 4.15) you can choose a color contour scheme (default is **Precipitation**), tic interval, and override the minimum/maximum values for the contour limits.

There are several advanced features. These features are accessed by clicking the advanced button which expands the **Grid Display Options** dialog. The advanced options are:

- **Brightness**: The relative lightness or darkness of a color, from full color to black.
- **Saturation**: The relative intensity of the color, from white to full color.
- **Transparency**: The relative opacity of the color from opaque to translucent to transparent.
- **Aspect Shading**: Enabling this feature causes the display color to change based on the viewing angle.

- Adjust Color Scale to Clipping Area: Enabling this feature causes the displayed color ramp to rescale to the maximum and minimum clipping thresholds.
- **Maximum Clipping**: Enabling this feature causes the data above the specified threshold to be displayed as the defined color.
- **Minimum Clipping**: Enabling this feature causes the data below the specified threshold to be displayed as the defined color.

4.5.3 Scale

To set the visualization scale for the Gridded Data Layer:

- 1. On the **Maps** menu, click **Map Layers**, and the **Map Layer** editor will open (Figure 4.1).
- 2. From the tree, right-click **Gridded Data**. From the shortcut menu, click **Properties**, the **Grid Display Options** dialog (Figure 4.15) will open.
- 3. Click the **Scale** tab (Figure 4.16). Both zoom-in and zoom-out scale factors can be set from the **Grid Display Options** dialog. By default the **Gridded Data Layer** is set for **Always show layer**. To set visualization scales click **show layer in the following scale range**.

| 📻 Grid Display Options | × | | |
|--|-----------------|--|--|
| | SHG | | |
| Properties Scale | | | |
| Always show layer | | | |
| Only show layer in the following scale range | | | |
| Only visible below 1: | Set to Current | | |
| Only visible above 1: | Set to Current | | |
| | | | |
| | OK Cancel Apply | | |

Figure 4.16 Grid Display Options Dialog Box - Scale Tab

- 4. To set the scale so that the **Gridded Data Layer** becomes visible as the user zooms-in, set the scale to the current scale by clicking **Set to Current**. If the user wishs to enter a value, in the **Only visible below 1:** box enter the scale factor.
- 5. To set the scale so that the **Gridded Data Layer** becomes visible as the user zooms-out, set the scale to the current scale by clicking **Set to Current**. If the user wishs to enter a value, in the **Only visible above 1:** box enter the scale factor.

- 6. Click **OK**, the **Grid Display Options** dialog closes (Figure 4.16), and the visualization scale is set for the gridded data layer.
- 7. Click **OK**, the **Layer Selector** dialog closes.

4.6 Model Schematic Layer

Once the user has opened a forecast and made a forecast alternative active, the **Model Schematic** Layer, shown in Figure 4.17, becomes available in the **Modeling Module**. The **Model** Schematic Layer contains graphic representations of computational models for the active forecast alternative. Chapter 12 contains detailed information on a forecast, a forecast alternative, and the different computational models represented in the **Model Schematic Layer**.

When the **Study Tree** is expanded, the different sub-layers for some of the models is displayed. Therefore, if the user does not want to see the impacts for the HEC-FIA model, clear **FIA**, and the impact areas from the HEC-FIA model will no longer be visible on the map window. To view the impact areas, click **FIA**. This procedure applies to all of the sub-layers.

| 📻 Map Layers | | x |
|---|-----|----------|
| Layers Edit View | | |
| Currently Opened Maps | | |
| Modeling - Winter2012 - RunWithRain | | <u>^</u> |
| Setup | | |
| Acquisition | | * |
| Map Layers | | Î |
| RAS:Base for Real Time forecasting ResSim:B:calibrate ResSim:Alternative 1 | | |
| FIA:GridsAndXSecsAlternative Time Series Icons Stream Alignment RussianSubbasins.shp | | Е |
| RussianRivers.shp | | |
| | | - |
| ОК | Car | ncel |

Figure 4.17 Model Schematic Layer

4.7 Shortcut Menu for Primary Layers

This shortcut menu is accessed by a right-click on primary layers in the **Map Layers** editor. It provides several ways to manipulate the primary layers. The available commands are:

| Move to Top | Move the layer to the top of the tree. |
|----------------|--|
| Move Up | Move the layer up the tree one position. |
| Move Down | Move the layer down the tree one position. |
| Move to Bottom | Move the layer to the bottom of the tree. |
| Properties | Display the properties of the layer. This opens a dialog. Depending on the format of the layer, this dialog may be editable or not. See Appendix D for further information on the available map editors. |
| Import | Import to layer. Applicable for Stream Alignment layer. |
| Export | Export from layer. Applicable for Stream Alignment layer. |
| Add Icon Layer | Applicable for Time Series Icons layer. |

CHAPTER 5 Map Layers

5.1 Overview

To help visualize a watershed, HEC-RTS has the capability to display various maps of watershed features. The maps display as color pictures, are layered one over the other like transparencies. These **Map Layers** also provide a geographical reference for the watershed. This chapter describes the formats of **Map Layers** and shows how the layers are configured and managed.

Chapter 4 described **Primary Layers**, such as the stream alignment, time series icons, and computation point layers, which are required. **Map Layers** are optional layers.

5.2 Map Layer Formats

Map Layer formats that HEC-RTS can read and display are listed in Table 5.1.

| Description | Common Filename Extension |
|--|------------------------------|
| ArcGIS® shapefile | .shp |
| AutoCAD® DXF | .dxf |
| Raster image | .png, .gif, .jpg, .bmp, .tif |
| USGS digital line graph | .dlg |
| USGS DEM | .dem, .flt |
| ArcGIS® DEM | .asc |
| HEC-FIA SMRMP | .smrmp |
| ASCII NetTIN | .net |
| LizardTech [®] MrSID [®] | .sid |
| OpenStreetMap | .osm |

 Table 5.1 Map Layer Formats Supported by HEC-RTS

5.2.1 ArcGIS® Shapefiles (.shp)

Shapefiles are the native data structure for the ArcGIS® program. Shapefiles store nontopological geometry and attribute information for the spatial features of a data set in a particular format. Usually there are three component files associated with a shapefile: .dbf, .shp, and .shx. The .shp file contains the shapes (points, polylines, or polygons) that are displayed in the layer. Each shape has a record in the .dbf file containing descriptive data called "attributes". The .shx file contains an index that links each shape to its record in the .dbf file. For more information on shapefiles, see the *ESRI Shapefile Technical Description* available here: <u>http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf</u>

5.2.2 AutoCAD® DXF (.dxf)

A Drawing Interchange File (**.dxf**) is created by a Computer-Aided Design (CAD) package, AutoCAD®. This format is a tagged-data representation of an AutoCad® drawing file. Tagged data refers to each data element being preceded by a group code. A group code is an integer indicating the type of data element. The file created is a vector-based graphic. The DXF format is commonly used for data exported from other CAD and GIS (Geographic Information Systems) programs.

5.2.3 Raster Image Types

The raster image formats supported by HEC-RTS are: JPEG format (.jpg or .jpeg), Graphics Interchange Format (.gif), Portable Network Graphic (.png), bitmat (.bmp), and Multi-resolution Seamless Image Database (MrSID or .sid). For HEC-RTS to access these file types, an ASCII text file with an .img extension must be created. The .img file needs to contain the position of the image on the map and the location of the image file, as shown in Figure 5.1. These coordinates need to be given in the watershed's coordinate system, as stated in the Map Coordinate Information dialog (Figure 5.7). This .img file should not be confused with the format for raster images used by the ERDAS (eEarth Resources Data Analysis System) Imagine image processing program. CAVI cannot display files in the ERDAS Imagine .img format.

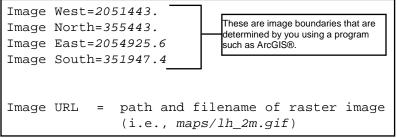


Figure 5.1 Raster Image File

5.2.4 USGS Digital Line Graph (.dlg)

U.S. Geological Survey (USGS) Digital Line Graphs (DLGs) are created from two sources using manual and automated digitizing methods. The two sources are aerial photographs or cartographic sources. DLG files are vector representations of the data. When HEC-RTS interacts with a **.dlg** file it automatically creates a **.dlgbin** file for use.

5.2.5 USGS DEM (.dem)

USGS publishes the file format USGS DEM. A raster file format, **.dem** files usually contain terrain elevations, but the file format can be used for representing any surface. The format allows for internal documentation of the coordinate system, date of publication, etc. These

values are referenced horizontally either to a Universal Transverse Mercator (UTM) projection or to a geographic coordinate system.

5.2.6 ArcGIS® Grid Exports (.asc, .flt)

The **.asc** file is an ASCII file format representation of a grid generated by ArcGIS®. The file consists of keywords followed by values defining the number of columns, number of rows, lower left corner, cell size, no data value, and each cell value. The **.flt** file is a similar format, but split into two files: an ASCII header (**.hdr**) file and a **.flt** file which contains binary representations of the cell values.

5.2.7 HEC-FIA SMRMP (.smrmp)

HEC-FIA Segmented Multi-Resolution Multi-Parameter (SMRMP) file created to operate gridded data (namely, digital terrain grids, inundation depth grids, and arrival time grids) more efficiently.

5.2.8 ASCII NetTIN (.net)

An ASCII file format used to represent a triangulated irregular network (TIN). TIN data is stored in a simple format that defines the nodes, edges, and triangles contained in the TIN. This format is common for transferring TIN data between software.

5.2.9 LizardTech® MrSID® (.sid)

The MrSID® (multi-resolution seamless image database) is a propriety geo-referenced image file format developed by LizzardTech® for use with GIS. This format compresses large raster images files like aerial photographs or satellite imagery for easier viewing. Some MrSID® images contain geo-referencing and positioning information and can be placed in the watershed through the **Import Image** option under the **Layers** menu.

5.2.10 OpenStreetMap (.osm)

An XML file created in the OpenStreetMap (OSM) file format, which is used for saving street map information. This file is generated by HEC-RTS in the watershed's map folder. The OpenStreetMap should not be placed or edited by the user.

5.3 Adding Map Layers

The user can add as many types of map layers as needed. In HEC-RTS Version 3.0, it is no longer necessary that all map layers be in the same coordinate system. HEC-RTS can transform coordinates "on-the-fly" if the coordinate systems are defined properly in ways that HEC-RTS can read, for example an ESRI projection (**.prj**) file. A map projection uses mathematical formulas to relate spherical coordinates on the globe to flat, planar coordinates.

Map layers are added from the **Maps Menu** in any of the modules. When a map layer is added to the watershed, HEC-RTS reads the coordinates of points, lines, and polygons on the map layer and resets the geographic extents of the watershed equal to the smallest rectangle that will contain all objects in the map layer. When adding more than one map layer, the user must ensure that each map layer is projected in the same coordinate system (Appendix C) as the watershed. For example, if an ArcGIS® shapefile (.shp) is added as a map layer that displays the major streams in an area, the geographic extents will change according to the projection of that shapefile. If the shapefile is projected in *State Plane Coordinates* in feet, HEC-RTS will set the geographic extents accordingly, and the units of the stream alignment will be in feet.

To add map layers:

1. Open the **Map Layers** editor from the **Maps Menu**.

| 📻 Map Layers | |
|------------------------------|-----|
| Layers Edit View | |
| Add Maps | |
| Import Image(s) | |
| Remove Map Layer | |
| Close | |
| | |
| Map Layers | |
| 🚛 🕼 Time Series Icons | = |
| 🖶 🐨 RussianSubbasins.shp | |
| 🖶 🐨 🔽 RussianRivers.shp | -11 |
| 🖶 🐨 🔽 RR_Lakes_Albers_ft.shp | |
| 📰 🔽 Internet Map | |
| | - |
| OK Cancel | |

2. Click the Layers Menu item in the Map Layers editor (Figure 5.2).

Figure 5.2 Layers Menu in Map Layers Editor

- 3. Click Add Maps, and the Select Map to Add dialog (Figure 5.3) will open.
- 4. Select the desired map layer format from the **Files of Type** list. Select the filename, and click **Open**. The map layer will appear under the **Maps Folder** in the **Setup** tab.

When enabled, the **Create Copy** checkbox (at the upper right of the dialog) causes the selected map layer to be copied to the watershed's maps folder and then adds the map layer. By default **Create Copy** is enabled. If left unchecked, the map layer is added from the current location.

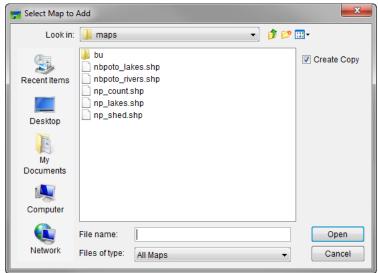


Figure 5.3 Select Map to Add Dialog

5.4 Removing Map Layers

To remove map layers:

- 1. Open the Map Layers editor from the Maps Menu.
- 2. Click Remove Map Layer from the Layers Menu item in the Map Layers Editor.
- 3. The **Remove Map Layers from Watershed** dialog will open (Figure 5.4). Select the map layer to remove. You will be asked if this is really what you want to do. Click **Yes**.

| Remove Map Lay | ers from Water | shed | | x |
|----------------|-----------------|-------------|----|------|
| Existing | | | | |
| Name | | Description | | |
| nbpoto_lakes. | shp | | | • |
| nbpoto_rivers. | shp | | | |
| np_count.shp | | | | |
| np_lakes.shp | | | | |
| np_shed.shp | | | | |
| | | | | - |
| Remove | | | | |
| Name: | nbpoto_rivers.s | shp | | |
| Description: | | | | |
| | | Remove | Ca | ncel |

Figure 5.4 Remove Map Layers from Watershed Dialog

5.5 Shortcut Menu for Map Layers

Right-clicking a map layer (non-primary) in the Map Layers editor (Maps > Map Layers) opens a shortcut menu (Figure 5.5). The shortcut menu provides several ways to manipulate a map layer.

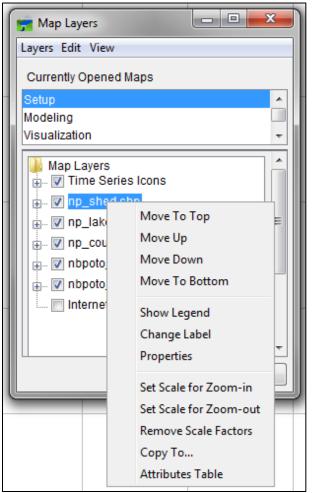


Figure 5.5 Map Layers Shortcut Menu

The available commands are:

| Move to Top | Move the layer to the top of the tree. |
|----------------|--|
| Move Up | Move the layer up the tree one position. |
| Move Down | Move the layer down the tree one position. |
| Move to Bottom | Move the layer to the bottom of the tree. |
| Show Legend | Show the legend for the layer. |
| Hide Legend | Hide the legend for the layer. |

| Change Label | Change the label of the layer in the Map Layers editor. This does not change the filename of the layer. |
|-----------------------------|---|
| Properties | Display the properties of the layer. This opens a dialog. Depending on the format of the layer, this dialog may be editable or not. See Appendix D for further information on the available map editors. |
| Set Scale for Zoom-in | Set the zoom-in visualization scale for the layer as detailed in Section 5.8. |
| Set Scale for Zoom-out | Set the zoom-out visualization scale for the layer as detailed in Section 5.8. |
| Remove Scale Factors | Disable or clear all scale settings for the layer as detailed in Section 5.8. |
| Сору То | Copy the layer to another folder. |
| Attributes Table | Opens the Query Window. The Query Window displays attributes of the map layer. |

5.6 Geographic Reference for Map Layers

To maintain a geographic reference (also called a geo-reference), HEC-RTS uses a user-selected and customizable coordinate system, called the **World Coordinate System** (**WCS**). This superimposes a grid on layer features to establish x and y coordinates in WCS for each point on the layer. The x-coordinate is referred to as "easting", and the y coordinate is referred to as "northing". The user can select the extent of this grid, the dimensions of the cells of the grid, the units of measurement of the grid, and the location of the origin of the grid. Because of this flexibility, the user can specify and use virtually any grid coordinates convenient for CAVI model integration. To do so:

- 1. On the **Maps Menu**, click **Default Map Properties**. The **Default Map Properties** dialog box (Figure 5.6) will open.
- 2. The **Default Map Properties** dialog box contains two tabs: **Map Extents** and **Default Map Layers**.

The Map Extents tab includes:

Coordinate System This field identifies the established coordinate system for the watershed. To edit the coordinate system, click Edit. The Map Coordinate Information dialog box (Figure 5.7) will open. See Appendix C for details on editing the coordinate system. Remember that all layers must exist in one unified coordinate system.

| 📻 Default Map Properties for North Branch v572 | | | | | | |
|--|----------------|-----------|-----------|-------|--|--|
| Map Extents | Default Map | Layers | | | | |
| C | Coordinate Sys | stem: X-Y | | Edit | | |
| l (| Extents: | | | | | |
| | Easting: | | Northing: | | | |
| | Minimum: | -1000 | Min: | -1000 | | |
| | Maximum: | 1000 | Max: | 1000 | | |
| Set Map Extents to Display | | | | | | |
| Grow to Map Extents | | | | | | |
| OK Cancel Apply | | | | | | |

Figure 5.6 Default Map Properties Dialog Box

| 🚰 Map Coordinate Information | | | | | | | | |
|------------------------------------|---------------------------------|---|----|----|----|----|-------|----|
| Map Coordinate Information | | | | | | | | |
| System: | Albers Equal-Area Conic (SHG) 🔹 | | | | | | | |
| Units: | Meters | | | | | | | |
| Spheroid: | GRS 1980(NAD83) | | | | | | | |
| Latitude o | of the first standard parall | Ν | 29 | d | 30 | '[| 0 |]• |
| Latitude o | of the second standard p | Ν | 45 | d | 30 | • | 0 |]• |
| Longitude | e of the central meridian: | W | 96 | d | 0 | ![| 0 | • |
| Latitude of the projection origin: | | Ν | 23 | d | 0 | '[| 0 |]• |
| False easting: 0 | | | | | 0 | | | |
| False nor | thing: | | | | | | | 0 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Load from | n file | | | ок | | | Cance | |

Figure 5.7 Map Coordinate Information Dialog Box

Extents: Easting Minimum and **Maximum**, and **Northing Minimum** and **Maximum**

These values indicate the location of the left, right, bottom and top borders (respectively) of the grid in the map window (Figure 5.8).

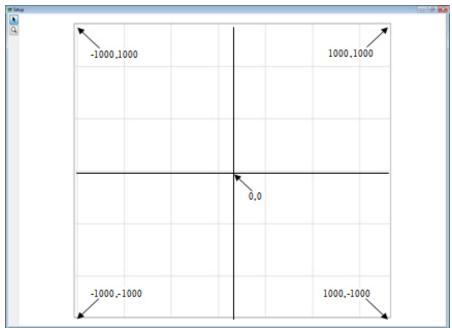


Figure 5.8 Example of Geographic Extents and Equivalent Coordinates

Set Map Extents to Display This will set the limits of the map window. When zooming in on an area, click **Set Map Extents to Display**, the extents on the **Default Map Properties** dialog box (Figure 5.6) will change to the zoomed area.

Grow to Map Extents When this check box is selected, HEC-RTS automatically sets the geographic extents to define the smallest rectangle that encompasses all the objects in the watershed.

The geographic extents of layers must be selected carefully to ensure that the entire watershed is included. In HEC-RTS Version 3.0, it is no longer necessary that all map layers be in the same coordinate system. HEC-RTS can transform coordinates "on-the-fly" if the coordinate systems are defined properly in ways that HEC-RTS can read, for example an ESRI® projection (.prj) file. Therefore, the user may need to use GIS tools to identify or transform the layers from one coordinate system to another before using them with CAVI.

The **Default Map Layers** tab includes a list of map layers that are shown in the map window. The user use check boxes in this tab to show or hide layers.

5.7 Map Layer Properties

As described in Section 5.2, HEC-RTS supports several map layer formats, each with its own properties. To edit those properties:

- 3. Click **Maps > Map Layers**. Select the layer you wish to edit.
- 4. Right-click and select **Properties**. Figure 5.9 is an example properties dialog. Here, the user can specify the visual style for the layer and its labels. Properties dialogs vary depending on the type of layer you are editing.

| 🚰 Edit Polygon Properties | x |
|---|---------|
| C:/CWMS/North_Branch_v572/maps/nbpoto_lakes.shp | |
| Fill Border Labels | |
| Draw Features using: |] |
| One Fill | |
| ☑ Display Fill | |
| Color darkorange | • |
| Style | • |
| Transparency | |
| | 25 |
| | |
| OK Cancel | Apply |

Figure 5.9 Example Layers Properties Dialog

5.8 Setting the Visualization Scale

The easy way to set the visualization scale for map layers is outlined below:

- 1. Click Maps Menu > Map Layers. The Map Layers Editor will open.
- 2. Go to the map window and zoom in to the point at which the map layer becomes visible.
- 3. Right-click the map layer in the layer tree of the **Map Layers Editor**. From the shortcut menu, click **Set Scale for Zoom-in**. This sets the visualization scale for the map layer. If the user goes to the map window and zoom out, the layer will no longer appear.
- 4. Inversely, if the user wants the layer to become visible as the user is zooming out, from the shortcut menu, click **Set Scale for Zoom-out**.
- 5. Visualization scale settings can be cleared or disabled. From the shortcut menu, click **Remove Scale Factors**. The visualization scale for the layer is cleared.
- 6. Click OK. The Map Layers Editor will close.

CHAPTER 6

Using HEC-RTS – Overview

Section II of the HEC-RTS User's Manual describes configure an HEC-RTS watershed. This chapter describes the typical workflow involved in the routine use of HEC-RTS to support the water management process. This chapter will provide information on running models, analyzing results, and, providing information to the user on how to run models when an extreme event occurs.

At this point, the user has the ability to configure a watershed (described in Section III chapters) and the user is ready for the routine tasks of running forecast models; viewing and analyzing results; and, revising model data, as needed.

6.1 Managing Data for HEC-RTS

Data streams in the watershed that need to be monitored will be selected from the time series icon layers, which have already been configured (Chapters 18 and 19). The time series icons will be placed at locations in the watershed that correspond with the data streams, and will be organized into layers (groups), which will make the data streams readily visible. The time series icons are available in the **Acquisition, Visualization**, and **Setup** modules in HEC-RTS and provide access to functions related to the data streams. This includes acquiring, monitoring, validating, and editing data by using the **Acquisition** tab (Chapters 7 through 9). The **Visualization** tab (Chapter 10) provides a flexible set of tools that allows visualization of incoming data (i.e., gridded precipitation data). These visualization tools help the user evaluate the current state of the watershed by comparing the incoming data to threshold values that define normal conditions. For example, let's say an upper threshold value for precipitation data of 3-inches has been defined. If an incoming precipitation value is 4-inches and HEC-RTS has been configured to provide alerts through messages and alarms, the user will be alerted to the abnormal value.

6.1.1 Acquiring Data

From the **Acquisition** tab, the user will retrieve time-series data from gages. These data will typically include precipitation, river flows and stages, temperature, and reservoir releases and elevations. The real-time data can be viewed by defining a time window that is relative to the current time by setting look back and look ahead times (in days or hours). Also, historical data can be viewed by specifying a starting and ending date and time. Figure 6.1 shows an example time window being defined relative to current time.

Refer to Chapter 7 for additional details for data acquisition.

| 🖌 Acquisition 🙀 | Visualization 🍇 Modeling | 🔅 Setup | | | |
|--------------------------|---------------------------|---------|--|--|--|
| Relative to Current Time | | | | | |
| Look Back Time: | 14 Days 🔻 | | | | |
| Look Ahead Time: | 7 Days 🔻 | | | | |
| Specific Time Window | | | | | |
| Start Date: | 01Jan2013 Time: | 1200 | | | |
| End Date: | 03Jan2013 Time: | 1200 | | | |
| Time Zone: GMT-0 | 8:00 | | | | |
| Update Plot Icons | | | | | |
| Data Validation | | | | | |
| Data Status | | | | | |

Figure 6.1 Acquisition Tab – Time Window

6.1.2 Monitoring and Validating Data

In the **Acquisition** tab, time-series data is monitored and validated. Several tools are available to show the quality and quantity of the data. Quality color bars (Figure 6.2) and thumbnail plots (Figure 6.3) provide a quick overview of the acquisition processes by displaying the quality (missing values needing to be filled-in) and quantity (magnitude of data and possible data outliers) of the data.

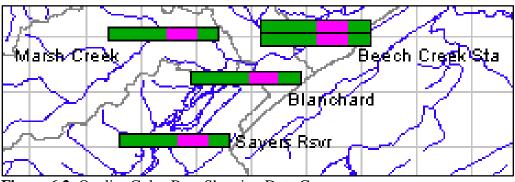


Figure 6.2 Quality Color Bars Showing Data Gaps

If the quality color bar or thumbnail plot for a location indicates that the data are questionable, then the user can check the data using plots (Figure 6.4) and tables (Figure 6.5).

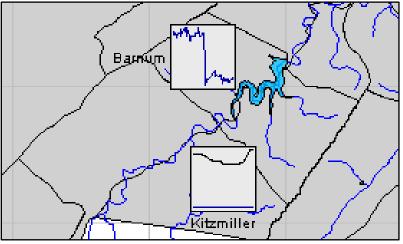


Figure 6.3 Thumbnail Plots Showing Flows and Stages

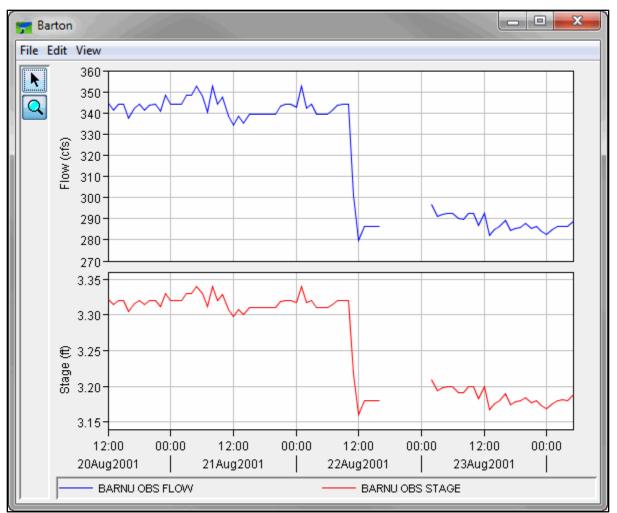


Figure 6.4 Sample Plot Showing Gap in the Data

| ▲ /NPOT/BARNU/FLOW//1HOUR/OBS/ | | | | | | | | | |
|--------------------------------|------------------|----------|----------|--|--|--|--|--|--|
| File Edit View | | | | | | | | | |
| | GMT-05 | i:00 | | | | | | | |
| | | BARNU | BARNU | | | | | | |
| Ordinate | Date / Time | FLOW | STAGE | | | | | | |
| oralitato | Datorrinto | OBS | OBS | | | | | | |
| Туре | | INST-VAL | INST-VAL | | | | | | |
| Units | | cfs | ft | | | | | | |
| 1 | 20 Aug 01, 14:00 | 344.51 | 3.3214 | | | | | | |
| 2 | 20 Aug 01, 15:00 | 341.33 | 3.3140 | | | | | | |
| 3 | 20 Aug 01, 16:00 | 343.90 | 3.3200 | | | | | | |
| 4 | 20 Aug 01, 17:00 | 343.90 | 3.3200 | | | | | | |
| 5 | 20 Aug 01, 18:00 | 337.49 | 3.3050 | | | | | | |
| 6 | 20 Aug 01, 19:00 | 342.19 | 3.3160 | | | | | | |
| 7 | 20 Aug 01, 20:00 | 343.90 | 3.3200 | | | | | | |
| 8 | 20 Aug 01, 21:00 | 341.39 | 3.3141 | | | | | | |
| 9 | 20 Aug 01, 22:00 | 343.81 | 3.3198 | | | | | | |
| 10 | 20 Aug 01, 23:00 | 343.90 | 3.3200 | | | | | | |
| 11 | 20 Aug 01, 24:00 | 340.63 | 3.3124 | | | | | | |
| 12 | 21 Aug 01, 01:00 | 348.17 | 3.3300 | | | | | | |
| 13 | 21 Aug 01, 02:00 | 343.90 | 3.3200 | | | | | | |
| 14 | 21 Aug 01, 03:00 | 343.90 | 3.3200 | | | | | | |
| 15 | 21 Aug 01, 04:00 | 343.90 | 3.3200 | | | | | | |
| 16 | 21 Aug 01, 05:00 | 348.17 | 3.3300 | | | | | | |
| 17 | 21 Aug 01, 06:00 | 348.17 | 3.3300 | | | | | | |
| 18 | 21 Aug 01, 07:00 | 352.45 | 3.3400 | | | | | | |
| 19 | 21 Aug 01, 08:00 | 347.95 | 3.3295 | | | | | | |

Figure 6.5 Sample Table of Historical Data

The **Data Status Summary** (Figure 6.6) report allows the user to view groups of data (e.g., all precipitation data or all flow data). Also, activity of data streams can be checked in this report.

| 🛃 Data Status Summary - FlowStage2.dataStatus | | | | | | | | | |
|---|---------------------------------------|-------------------|---------|--------------------|--|--|--|--|--|
| File Edit View | | | | | | | | | |
| | | | | | | | | | |
| Start Date: 19 Aug 2001 | Start Time: 24:00 | 0 | | | | | | | |
| End Date: 22 Aug 2001 | End Date: 22 Aug 2001 End Time: 24:00 | | | | | | | | |
| Time Zone: Greenwich Mean Time | | | | | | | | | |
| Consider missing when no report after | | | | | | | | | |
| Data Set | | Quality Color Bar | Missing | Time of Last Value | | | | | |
| MasterDB.dss:/NPOT/BARTO/FLOW/01JUN2001 | - 01AUG2001/1HOUR/OBS/ | | 0 | 22Aug01, 21:00 | | | | | |
| Lake Natoma.Flow-Inflow.Inst.1Hour.0.CDEC-raw | 1 | | All | No Data | | | | | |
| MasterDB.dss:/NPOT/BARTO/STAGE/01JUN2001 | - 01AUG2001/1HOUR/OBS/ | | 0 | 22Aug01, 21:00 | | | | | |
| MasterDB.dss:/NPOT/CUMBE/FLOW/01JUN2001 | - 01AUG2001/1HOUR/OBS/ | | 0 | 22Aug01, 21:00 | | | | | |
| | | | | | | | | | |

Figure 6.6 Data Status Summary

Refer to Chapters 7 and 8 for additional details for monitoring and validating data.

6.1.3 Editing Data

When checking the validity of data to verify its accuracy, the user might need to edit questionable data and fill-in missing data. The **Data Validation Editor** (Figure 6.7) in the **Acquisition** tab, will allow the user to edit time-series data.

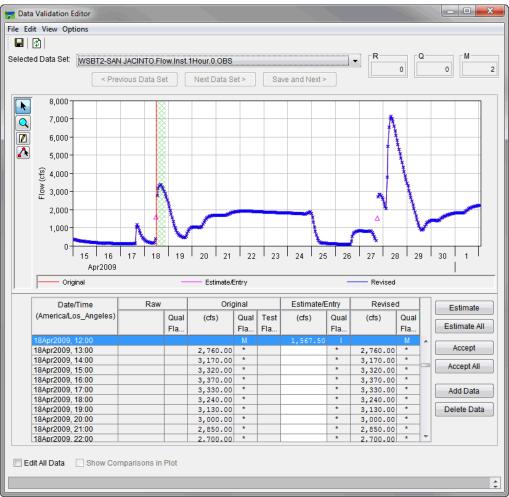


Figure 6.7 Data Validation Editor

The Data Validation Editor allows editing of the data by text-entry or graphical. When there are data gaps (i.e., missing data), this tool is also convenient for estimating values using the graphical editor or the table of data values. After editing the data, the user can choose to accept the changes and store the revised data values back to the HEC-DSS file.

Refer to Chapter 9 for additional details for editing data.

6.1.4 Visualizing Data

The **Visualization** tab allows for viewing current conditions in a watershed and the associated hydrometeorological data in a geo-referenced context (e.g., gridded precipitation), as shown in Figure 6.8.

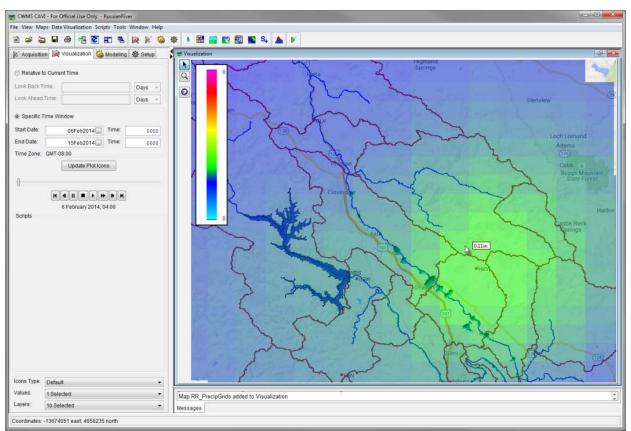


Figure 6.8 Gridded Precipitation Data in Visualization Tab

The grid animation controls provide a view of precipitation grids for the time window chosen for the **Visualization** tab. These controls (Figure 6.9) behave very much like the controls of a video player.

| 📻 Animate | | × |
|-----------|------------------|-----------|
| Configure | | |
| 01JUL2001 | | 31JUL2001 |
| | | |
| | Ҝ┫║■┝≫┝┝ | |
| | 01JUL2001, 00:00 | |

Figure 6.9 Grid Animation Controls in Visualization Tab

Similar to the quality color bars used in the **Acquisition** tab (Section 6.1.1), the threshold color bars (Figure 6.10) in the **Visualization** tab can be used to compare current data against threshold values that have been set for a location. For example, in the **Acquisition Module** the user may wish to display quality color bars to identify missing data, while in the **Visualization Module**, the threshold color bars or thumbnail plots are used to understand a watershed's hydrometeorological conditions. As part of the monitoring and validation routine, the user should review threshold color bars to determine if the incoming data is good and which data needs to be validated. Thumbnail plots and tables can also be used to visualize time-series data.

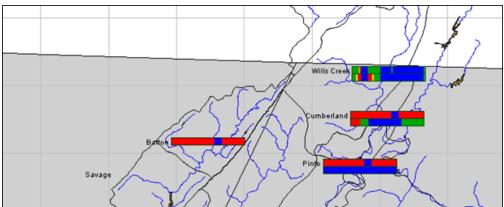


Figure 6.10 Threshold Color Bars in Visualization Tab

Refer to Chapter 10 for additional details for visualizing data.

6.2 Running Forecast Models

Now that the quality of the time-series data has been validated, the user is ready to create an **HEC-RTS Forecast** (Chapter 12). An HEC-RTS forecast is a simulation of watershed processes and consequences of potential flooding from various applications configured in HEC-RTS. The hydrologic application, HEC-HMS, computes flow from forecasted and observed meteorological time-series. The reservoir operation application, HEC-ResSim, computes flow and release schedules. The hydraulic application, HEC-RAS, computes stage and inundation maps. The impact analysis application, HEC-FIA, computes flood consequences and action reports.

Prior to this routine HEC-RTS forecasting, the will have already configured the HEC-RTS watershed. Specifically, **Model Alternatives** will have been configured, **Model Alternative Keys** (Chapter 20) assigned, **Program Order** (Chapter 16) and **Forecast Runs** defined, and **Model Linking** (Chapter 11) configured.

An HEC-RTS forecast might be configured using a typical forecast run that includes something similar to the following model alternatives: normal conditions (for HEC-HMS), normal reservoir operations (for HEC-ResSim), normal river conditions (for HEC-RAS), and no flooding consequences (for HEC-FIA).

If a high rainfall event is forecasted, an HEC-RTS forecast might be created using a forecast run with model alternatives similar to the following: wet basin conditions (for HEC-HMS), restricted downstream channel capacity (for HEC-ResSim), high channel flow (for HEC-RAS), and evacuate with warning (for HEC-FIA).

In the **Modeling Module** (Chapter 11), the user will specify a forecast time window, create and manage forecast extract and post lists, extract time-series data for the forecast, create and manage forecast alternatives, edit model parameters, and run the models. Figure 6.11 shows the data flow concepts through the six standard HEC-RTS analysis applications (HEC-MetVue, MFP, HEC-HMS, HEC-ResSim, HEC-RAS, and HEC-FIA).

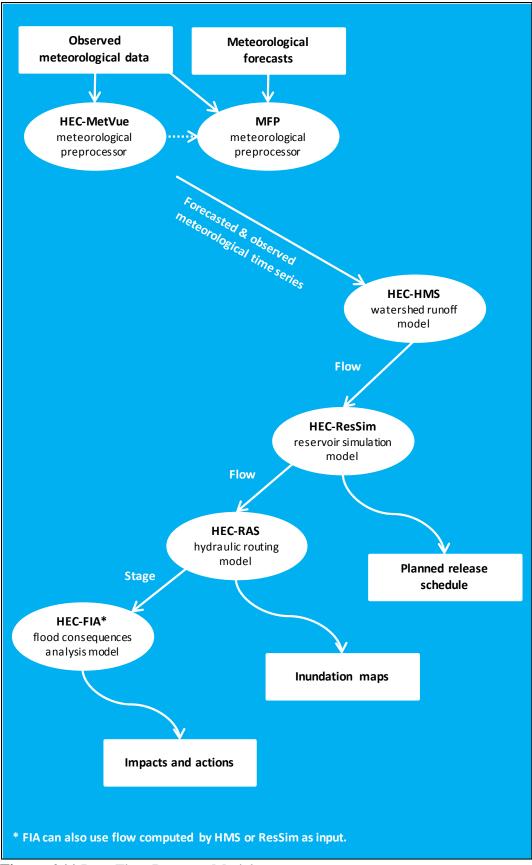


Figure 6.11 Data Flow Between Models

6.2.1 Hydrologic Modeling (HEC-MetVue, MFP, and HEC-HMS)

The meteorological preprocessors HEC-MetVue and MFP will be used to combine observed precipitation data and future precipitation information into a single precipitation dataset that can be used by the watershed runoff model, HEC-HMS.

Using the observed and future precipitation data, HEC-HMS computes runoff, including uncontrolled local flows that are typically used by HEC-ResSim.

The types of data typical that need to be changed for a forecast are loss rates and baseflow.

6.2.2 Reservoir Simulation (HEC-ResSim)

After the upstream boundary flows and uncontrolled local flows have been computed by **HEC-HMS**, the reservoir simulation application HEC-ResSim will use the HMS flows during the operation of the reservoirs to compute regulated flows. Reservoir operations might include zones and rules for day-to-day operations, along with zones and rules for extreme events.

The types of data that might typically be changed for a forecast are the starting conditions for reservoirs. As long as the reservoir starting conditions are linked to real-time data (starting elevations or storages, reservoir or outlet releases, and any other boundary conditions needed by the model), then the user shouldn't have to make any revisions to the HEC-ResSim model in order to run routine HEC-RTS forecasts.

6.2.3 River Analysis (HEC-RAS)

Regulated flows computed by HEC-ResSim are typically used as boundary conditions to the hydraulic routing model, HEC-RAS. Computed flows from HEC-HMS or supplemental models can also be used as input to HEC-RAS. In turn, HEC-RAS computes stage, which is input to HEC-FIA.

The types of data that might typically be changed for a forecast are n values at selected cross sections to match profile information better throughout the lookback period.

6.2.4 Impact Analysis (HEC-FIA)

HEC-FIA analyzes impacts within inundated areas based on computed hydrographs from HEC-ResSim and stages from HEC-RAS. HEC-FIA calculates flood damage determined by rising stage in a stream, river, lake, or reservoir. HEC-FIA also computes action reports that tell responders what actions need to done based on the computed stage values.

The types of data that might typically be changed for a forecast are adjustments to the levee failure stages to see the associated damage and impacts during an event.







6.3 Viewing and Analyzing Results

Viewing of modeling results occurs from the **Modeling** tab by using plots and reports. The user can view results at individual modeling elements (e.g., computation points, reservoirs, impact areas, etc.). Typical results include: tabulated subbasin precipitation depths, subbasin hyetographs, stage and flow hydrographs, reservoir release decisions, hydraulic plots and tables, floodplain inundation maps, and impact reports. Refer to Chapter 13 for more details on results.

6.4 Editing Model Data

After application results have been reviewed, revisions might be needed to model data. The active forecast alternative in the **Modeling** tab, indicates which applications are being used in the forecast. For each application, the user can edit some of the data by clicking on the appropriate application layer in the forecast tree and using the buttons located in the **Actions** tab. Alternately, the user can click on the appropriate application icon in the **Modeling** module's toolbar to open that application's native interface.

For example, if the user wants to change the lookback storage (i.e., starting condition) for a reservoir, the user will edit the HEC-ResSim alternative being used in the forecast alternative. In the forecast tree, click on the HEC-ResSim layer. Now; in the **Actions** tab (see bottom of the **Modeling** tab), click **Edit Alternatives**. At this point, the user now has access to HEC-ResSim's **Alternative Editor**, the **Lookback** tab contains the reservoir starting storage (and elevation) values (among other initial conditions).

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Figure 6.12 Example of Editing Model Data (HEC-ResSim Alternative Editor)

Be sure to save model revisions. If revisions are made using the layers in the **Forecast Tree**, then the revisions are only applicable for the forecast alternative contained in the opened forecast. Other forecast alternatives (as well as other forecasts that have been run with the selected forecast alternative) will not contain the revisions. If the user wants revisions to be available for subsequent forecasts, then save the revisions to the "base" data. To save "base data", select a forecast alternative, click **Save To Base** (located on the **Actions** tab).

6.5 Posting or Saving Forecast Results

Now that a forecast has been run, and the results are satisfactory, the user will want to post (save/store) modeling results to the HEC-RTS DSS file. From the **Setup** tab in the **Models** menu, select **Edit Post** (Figure 6.13). There are many options for selecting which model output data to post.

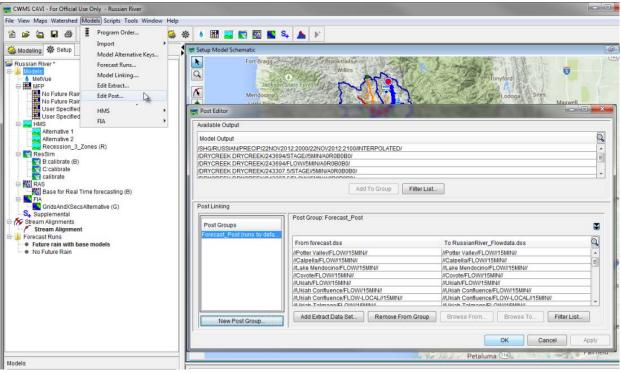


Figure 6.13 Edit Post

As an example, the user might want to only store the reservoir elevation and release time-series values (remember, this is just a simple example). To do so, the user will bring up the **Edit Post** from the **Setup** menu, select the appropriate lines for reservoir elevation, and click **Add To Group**. After the post group is created click **Run Post** in the **Modeling** tab. Figure 6.14 shows an example process of posting forecast results.

Figure 6.13 shows the initial **Edit Post** process in the **Setup** tab, while Figure 6.14 provides the steps to **Run Post** in the **Modeling** tab.

Refer to Chapter 12 for additional details for posting forecast results.

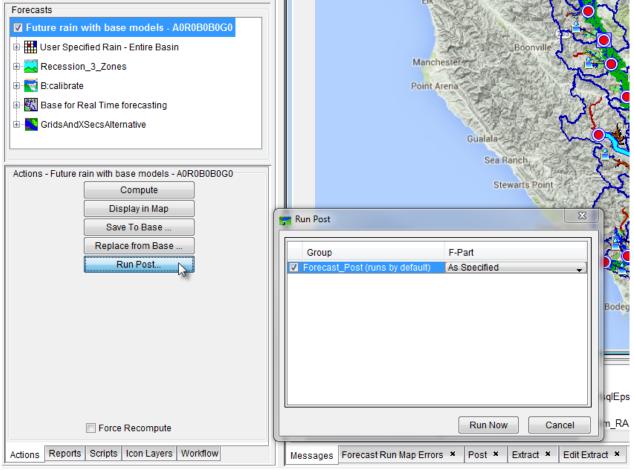


Figure 6.14 Example Process of Posting Forecast Results.

CHAPTER 7 Acquisition Module

The **Acquisition Module** allows the user to examine ongoing data acquisition, evaluate the quality of incoming data, quickly identify problem locations, and validate questionable data. HEC-RTS can be configured to receive incoming data from gages in the field via data streams from networks, including DROT (Domestic Satellite Receive-only Terminals), National Weather Service feeds, and other sources. When data arrive, HEC-RTS automatically compares the received values to preset quality and threshold values and translates the data into a user-readable format. There are three automated transformation processes:

- An optional on-the-fly transformation process carries out a rudimentary comparison of raw data against preset ranges before storing it in an HEC-RTS DSS file.
- For more complex data operations, HEC-RTS executes a selective comprehensive validation/transformation process within a few minutes of data arrival. This includes, for example, validating cumulative precipitation against a subsequent value and duration test then computing hourly incremental precipitation.
- Finally, at fixed times during the day, HEC-RTS revalidates and recalculates/transforms data over a longer period, for example, a week.

Because of these automated transformation and validation processes, the HEC-RTS DSS fioles contains both raw and revised observed data.

While the automated transformation and validation processes happen behind the scenes, HEC-RTS keeps you apprised of the quality of incoming observed data in the database. First, HEC-RTS can display color bars and thumbnail plots that dynamically convey the quality of data at individual locations where data are being collected. Second, plots and tables provide detailed views of incoming data. Thirdly, gages can be viewed in groups (such as precipitation or flow) and see details for more or fewer gages than appear in the geo-referenced map display. Fourth, color-coded buttons display the status of individual data streams and allow the user to view specific information about individual data stream components (for example, a data stream's "heartbeat" and other alarms). See Chapter 8 for further details. These features help assess incoming data, ascertain that the incoming data streams are operational, and identify specific locations where problems may exist in data acquisition.

Once problem gages have been identified, the **Data Validation Editor** can be used to validate data manually (Chapter 9). The **Data Validation Editor** allows the user to select specific locations for validation (ad hoc mode) or to use pre-defined validation lists (list mode). The **Data Validation Editor** can filter data to identify and display only those data time series with questionable, missing, and/or rejected data. Additionally, the **Data Validation Editor** offers tools for both text-entry editing and graphical editing. With the former, the user can enter

corrected values in a table. With the latter, the user can use the mouse to create line segments in a plot to replace questionable or missing data. Also, automated estimates can be used to edit data.

7.1 Acquisition Module

The acquisition module provides tools that facilitate monitoring and validating incoming data. The map window and components of the acquisition module are illustrated in Figure 7.1. A detailed discussion of common screen components is presented in Chapter 2.

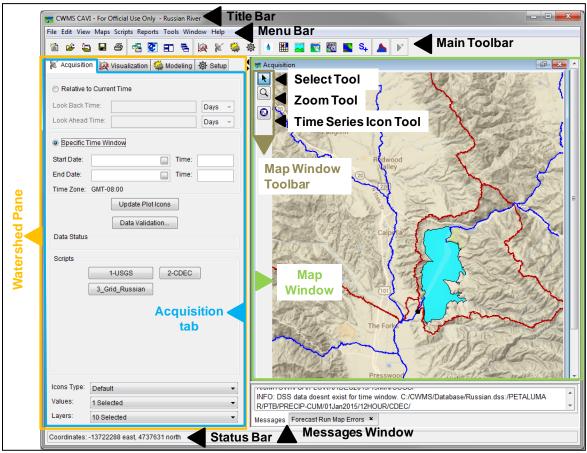


Figure 7.1 Acquisition Module

7.1.1 Menu Bar

The following is an overview of the menu bar (Figure 7.1) when the acquisition module is selected (click the **Acquisition** tab). The **File**, **View**, **Tools**, and **Help** menus are discussed in Chapter 2. The commands available from the menus will facilitate the acquisition and management of time series data for a watershed.

Edit From this menu the user can edit color bar color settings, launch data validation, create a validation list from selected icon time series, edit location descriptive data, edit time series descriptive data, and edit time series data set values in the database. Available commands are: **Icon Quality Colors, Data Validation**,

Create Validation List, Delete Validation List, Locations in CWMS Database, Time Series Descriptions in CWMS Database, and Data Exchange in the CWMS Database.

Reports From this menu the user can view the quality of data sets in the form of color bar lists. The user can select from existing files of color bar lists, or create new custom lists from the database, and save them in files for future use. The only available command is **Data Status Summary**.

7.1.2 Acquisition Module

The **Acquisition Module** (Figure 7.1) contains buttons that execute commands specific to data acquisition. These commands include setting up a time window, updating time series icons in the map window, checking data streams, and opening the data validation editor (Chapter 9).

7.1.3 Map Window

The map window (Figure 7.1) in the **Acquisition Module** contains map layers and layers of time series icons that allow viewing of data acquisition processes in a geo-referenced context. The user can customize how time series icons appear according to the needs and objectives of the watershed being studies. For example, time series locations that need to be evaluated daily for an individual watershed may appear as quality color bars to facilitate quick review of incoming data. On the other hand, the use of time series icons to monitor data provides space-conserving graphical images on the schematic. Customizing the time series icon layers is done in the **Setup Module**, which is described in Chapter 19.

Quality color bars and/or thumbnail plots are normally used in the **Acquisition Map Window** because these item allow provide the capability to scan displayed gages quickly to determine where problems may exist. Both of these icons can be set to update dynamically to reflect the relative quality of the incoming data.

7.1.4 Time Series Icon Controls

Time Series Icon Controls allow the user to select the **Time Series Icon Layer** attributes that are displayed within the watershed. The **Time Series Icon Controls** are located on the **Visualization**, **Acquisition**, and **Modeling** tabs near the bottom of the **Watershed Pane**. There are three attributes available: **Icons Type**, **Value**, and **Layer** (Figure 7.2).

| Icons Type: | Default | • |
|-------------|------------|---|
| Values: | 2 Selected | • |
| Layers: | 1 Selected | • |

Figure 7.2 Time Series Icon Controls

- **Icon Type** Forces all icons within a map window to display as the selected **Icon Type** in the list. Selecting the **Default** option in the list will display the icons as they were set in the **Time Series Icon Editor** dialog.
- Values The Value selection allows time series icon data to be displayed as labels, which display next to or on the location of the associated time series icons. For example, the user could choose to display the data's total, minimum, and maximums values as labels. Multiple values can be selected at once.
- **Layer** Layer allows the user to select the sub-layers that will be visible on a map window. Multiple layers can be selected at once.

By changing the attributes, the user can determine how time series icons will display data within the acquisition process. For more detailed information on how to configure the properties that control the threshold color bar icons displayed (Chapter 19).

7.2 Set Time Window

The user can either set a specific (i.e., fixed) time window (for reviewing a historical event) or set a time window relative to the current time (the default setting, used for monitoring incoming data in real-time).

To set or change the time window:

- 1. In the **Watershed Pane**, click the **Acquisition** tab (Figure 7.3).
- 2. By default, HEC-RTS assumes that incoming data will be monitored, so **Relative to Current Time** is selected. To view historical data, select **Specific Time Window** (Figure 7.3).

| 🖌 Acquisition 🙀 | Visualization ٰ Modeling 🔅 Setup |
|-------------------|----------------------------------|
| Relative to Curre | nt Time |
| Look Back Time: | 14 Days 🔻 |
| Look Ahead Time: | 7 Days 🔻 |
| Specific Time Wi | ndow |
| Start Date: | 01Feb2014 Time: 1200 |
| End Date: | 07Feb2014 Time: 1200 |
| Time Zone: GMT-0 | 8:00 |
| | Update Plot Icons |
| | Data Validation |
| Data Status | |

Figure 7.3 Acquisition Tab

- 3. To set the visualization relative to the current date and time, select the **Relative to Current Time** and enter the **Look Back Time** and select either **Days** or **Hours** as the time unit. Normally, set the time window to extend backward one to thirty days from the current time. Optionally, a **Look Ahead Time** can be entered, select either days or hours; this allows the software to look ahead at data.
- 4. To visualize historical data, select **Specific Time Window** and enter the **Start Date** and **Time** of the time window and the **End Date** and **Time** of the time window.
- 5. Click the **Update Plot Icons** button to complete the time window change.

7.3 Time Series Icon Shortcut Menu

In the **Acquisition Module's Map Window**, the time series icons in the map window have a shortcut menu (Figure 7.4) that allows for viewing data associated with a selected time series icon either in a plot, table, or using Microsoft Excel®. Also, from the shortcut menu the user can access the **Data Validation Editor** (Chapter 9) to edit the data associated with the selected time series icon. Another option is the ability to view the legend of the selected time series icon. The shortcut menu is the same for all of the available time series icons (i.e., for the color bars, thumbnail plots, graphics, or dots).

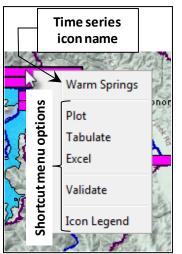


Figure 7.4 Time Series Icon Shortcut Menu

7.4 Monitoring Incoming Data Quality

Monitoring the quality of incoming data is the primary task during the data acquisition process. There are four primary ways to assess the quality of incoming data, to ascertain that data streams are operational, and to identify specific locations with data problems.

• Use of quality color bars and thumbnail plots. HEC-RTS can display icons as color bars or thumbnail plots representing gages where data is being collected. Quality color bars are color coded according to the quality of data at a location. This allows a quick, visual overview of data acquisition processes in the watershed during the specified time window.

- Use of plots and tabular data. When the user has identified locations where problems exist in data acquisition, plots and tables provide detailed views of incoming data, helping you determine the nature of the problem.
- Use of Data Summary Lists. Data Summary Lists allow for the viewing of gages in groups (such as all precipitation or all flow gages) and view details for more or fewer gages than appear in the geo-referenced map display. (See Chapter 8 for further details.)
- Data Stream Status Indicators. Allow for monitoring the data streams of a watershed. A color-coded button displays the status of each data stream, indicating whether it is both running and active. Clicking on these buttons allows the user to view additional information about individual data stream components, such as heartbeat and any alarm conditions. (See Chapter 8 for further details.)

7.4.1 Using Quality Color Bars and Thumbnail Plots

Quality color bars offer a quick overview of data acquisition processes in the watershed, dynamically reflecting the status of incoming data at each location as being acceptable, missing, or questionable. HEC-RTS attaches quality flags to the incoming data based upon thresholds that have been set.

Thumbnail plots provide a miniature plot of the actual data values, and allow the data manager to quickly see which gages are reacting to a hydrometeorological event and which gages are not. Both the quality color bars and the thumbnail plots allow the user to generate either a plot or a tabulation of the data for review.

7.5 Quality Color Bars

A **quality color bar** (Figure 7.5) is a thick, segmented line representing the history of the data quality at a specific location within a time window that has been established. The name of the location appears adjacent to the color bar, and the length of the color bar represents a time line equal to the duration of the time window. Segments along the color bar reflect time intervals, with colors corresponding to the data quality legend that has been defined. The quality color bars are updated dynamically at the time interval entered in the **Set Time Window** (Section 7.2).

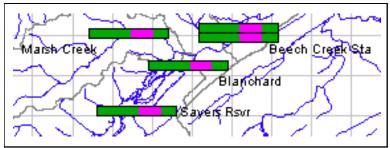


Figure 7.5 Quality Color Bars

As part of a watershed daily routine, the user should review quality color bars to determine if the incoming data is good and which data needs to be validated. To view the legend for quality color bars:

- 1. Right-click on a time series icon in the Map Window.
- 2. Choose **Icon Legend** from the shortcut menu and the **Quality Color Bar Legend** dialog (Figure 7.6) opens.

| Acquisition | 0 de | | | | | | | |
|--------------------------------------|-----------|--|--|--|--|--|--|--|
| Quality | Color | | | | | | | |
| Valid | DarkGreen | | | | | | | |
| Questionable | Yellow | | | | | | | |
| Rejected | Red | | | | | | | |
| Missing | Black | | | | | | | |
| No Report | Magenta | | | | | | | |
| Not Checked | Blue | | | | | | | |
| Data shows no report after 3.0 hours | | | | | | | | |

Figure 7.6 Quality Color Bar Legend

- 3. The legend shows the quality flags for the incoming data and the colors that represent each quality flag. The user can change the color associated with the quality flags.
- 4. From the **Edit** menu, click **Icon Quality Colors**, and the **Quality Color Bar Editor** (Figure 7.7) opens.

| 🚰 Quality Color Bar Editor | × |
|----------------------------|-------------|
| Quality | Color |
| Valid | DarkGreen 🥥 |
| Questionable | DarkGreen 🔺 |
| Rejected | Olive |
| Missing | Green |
| No Report | DarkRed |
| Not Checked | Cardinal = |
| | Red |
| | Pink |
| | Magenta 🔻 |
| Show no report after | 3 hours |
| ОК | Cancel |

Figure 7.7 Quality Color Bar Editor

- 5. To change the color of a quality flag, in the **Color** column of the table click the dropdown list and a list of available colors appears. Click a new and the color appears in the cell of the **Color** column.
- 6. Click **OK**, the **Quality Color Bar Editor** (Figure 7.7) closes, and the **Map Window** refreshes with the new color appearing in all of the quality color bars.
- 7. The **Show no report after** flag (Figure 7.7) is a quality check for irregular time series data sets only. The default is that if more than one hour goes by without data being received, then a **No Report** quality flag is triggered. If the user receives most of the irregular data in three-hour chunks, then a change to increase this quality flag to three (3) hours might be required. Click **Show no report after**, and in the field type the number of hours.
- 8. Click **OK**, the **Quality Color Bar Editor** (Figure 7.7) closes and the **Map Window** refreshes all of the quality color bars.

7.6 Thumbnail Plots

In some cases, the use of thumbnail plots might be required to represent gages and time series locations. **Thumbnail Plots** (Figure 7.8) are miniature versions of the full-size plots available in HEC-RTS, showing data for the time window. The name of the location appears adjacent to the thumbnail plot. As the time window updates, HEC-RTS refreshes the data and updates the thumbnail plot.

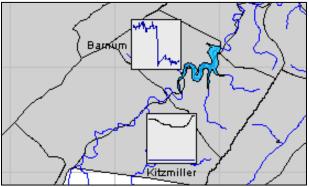


Figure 7.8 Thumbnail Plots

To view the legend for thumbnail plots:

- 1. Right-click a **Thumbnail Plot** and click **Icon Legend**. The **Thumbnail Plot Legend** dialog (Figure 7.9) opens.
- 2. The legend displays the pathname, the color of the curve, and the minimum and maximum values of the curve. The **Thumbnail Plot Legend** dialog provides you with information, to edit the color of the curve shown in the thumbnail plot (Chapter 18).

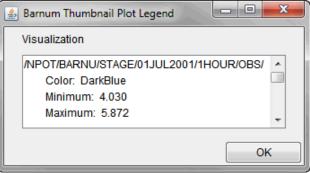


Figure 7.9 Thumbnail Plot Legend Dialog

7.6.1 Using Plots

If the quality color bar or thumbnail plot for a location indicates that the incoming data is questionable or bad, viewing the data in a plot can help you to determine the nature of the problem.

To access plots of incoming data:

- 1. Right-click on a time series icon in **Acquisition Model's Map Window**. From the shortcut menu, (Figure 7.4) click **Plot**.
- This opens a two-dimensional plot(s) that contains data for the selected location for the current time window. Figure 7.10 shows sample plots for both flow and stage gages. Use the Zoom Tool to zoom in on a specific portion of the plot. See Section 2.3.2 for a more detailed description of the Zoom Tool. In addition, a more detailed description on the plots can be found in Section 2.5.1.

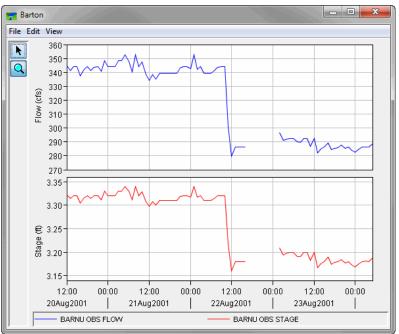


Figure 7.10 Sample Plot

7.6.2 Using Tables

If the quality color bar or thumbnail plot for a location indicates that the incoming data is questionable or bad, viewing the data in a table can help to determine the nature of the problem.

To access tables of incoming data:

- 1. Right-click on a time series icon and click **Tabulate**.
- 2. This opens a table that contains data for that location for the current time window. Figure 7.11 shows a sample table of the data for a flow and stage gages.

| ▲ /NPOT/BARNU/FLO | W//1HOUR/OBS/ | | | 3 | | | | |
|-------------------|------------------|----------|----------|---|--|--|--|--|
| File Edit View | | | | | | | | |
| GMT-05:00 | | | | | | | | |
| | | BARNU | BARNU | Γ | | | | |
| Ordinate | Date / Time | FLOW | STAGE | | | | | |
| | | OBS | OBS | | | | | |
| Туре | | INST-VAL | INST-VAL | | | | | |
| Units | | cfs | ft | | | | | |
| 1 | 20 Aug 01, 14:00 | 344.51 | 3.3214 | | | | | |
| 2 | 20 Aug 01, 15:00 | 341.33 | 3.3140 | Ξ | | | | |
| 3 | 20 Aug 01, 16:00 | 343.90 | 3.3200 | | | | | |
| 4 | 20 Aug 01, 17:00 | 343.90 | 3.3200 | 1 | | | | |
| 5 | 20 Aug 01, 18:00 | 337.49 | 3.3050 | | | | | |
| 6 | 20 Aug 01, 19:00 | 342.19 | 3.3160 | | | | | |
| 7 | 20 Aug 01, 20:00 | 343.90 | 3.3200 | | | | | |
| 8 | 20 Aug 01, 21:00 | 341.39 | 3.3141 | | | | | |
| 9 | 20 Aug 01, 22:00 | 343.81 | 3.3198 | | | | | |
| 10 | 20 Aug 01, 23:00 | 343.90 | 3.3200 | | | | | |
| 11 | 20 Aug 01, 24:00 | 340.63 | 3.3124 | | | | | |
| 12 | 21 Aug 01, 01:00 | 348.17 | 3.3300 | | | | | |
| 13 | 21 Aug 01, 02:00 | 343.90 | 3.3200 | 1 | | | | |
| 14 | 21 Aug 01, 03:00 | 343.90 | 3.3200 | | | | | |
| 15 | 21 Aug 01, 04:00 | 343.90 | 3.3200 | | | | | |
| 16 | 21 Aug 01, 05:00 | 348.17 | 3.3300 | 1 | | | | |
| 17 | 21 Aug 01, 06:00 | 348.17 | 3.3300 | 1 | | | | |
| 18 | 21 Aug 01, 07:00 | 352.45 | 3.3400 | | | | | |
| 19 | 21 Aug 01, 08:00 | 347.95 | 3.3295 | | | | | |

Figure 7.11 Sample Table

3. With a plot open, the data displayed in the plot can also be tabulated from the **Plot** dialog. From the **File** menu, click **Tabulate**. For more details on tabular data, see Section 10.8.2. For printing and exporting tabular data, see Appendix J.

CHAPTER 8

Monitoring and Validating Incoming Data

As explained in Chapter 7, the **Acquisition Module** allows the user to review ongoing data acquisition processes and validated of questionable data. Monitoring data in HEC-RTS, requires setup and the use of the DATCHK software (under separate documentation.)

Data status lists provide the capability to monitor time series datasets by groups (such as all precipitation or all flow gages) and see details for more or fewer time series datasets than appear in the geo-referenced map display. Another way to monitor incoming data is through the data streams. Color-coded buttons display the status of individual data streams and allow the user to view specific information about individual data stream components, (e.g., continuous functioning, other alarms). These features can help assess incoming data, ascertain that the incoming data streams are actually operational, and to identify specific locations where problems may exist in data acquisition.

Once the observed (raw) data is in DSS files, the validation of this this data (revised) can occur either automatically or manually. The manual process requires the use of validation lists to organize the data for ease of editing and validating.

8.1 Data Status Summary

To manipulate data status lists, from the **Acquisition** tab, from the **Reports** menu, click **Data Status Summary**, the **Data Status Summary** dialog (Figure 8.1) will open. If a data status list has been displayed before, the **Data Status Summary** dialog displays the previously viewed data status list.

| 01 Start Time: 24:00 01 End Time: 24:00 | | |
|---|-----------------------|----------------------------|
| | | |
| h Maan Tima | | |
| in Mean Time | | |
| en no report after 3 hours | | |
| (| Quality Color Bar Mis | sing Time of Last Value |
| 0/FLOW/01JUN2001 - 01AUG2001/1HOUR/OBS/ | | 0 22Aug01, 21:00 |
| st.1Hour.0.CDEC-raw | / | All No Data |
| 0/STAGE/01JUN2001 - 01AUG2001/1HOUR/OBS/ | | 0 22Aug01, 21:00 |
| E/FLOW/01JUN2001 - 01AUG2001/1HOUR/OBS/ | | 0 22Aug01, 21:00 |
| st.1Hour.0.CDEC-raw D/STAGE/01JUN2001 - 01AUG2001/1HOUR/OBS/ | | All No Dat 0 22Aug01, 2 |

Figure 8.1 Data Status Summary Dialog

From the **Data Status Summary** dialog (Figure 8.1), the user can create data status lists, select data status lists, copy a data status list, review the quality color bars, review how many values are missing, and find the time and date of the last valid data value for that particular time series data set.

The **Data Status Summary** dialog (Figure 8.1) displays quality color bars and additional summary information for a group of time series gages listed in data status lists. The data status lists allow the user to organize lists of gages for specific needs. For example, a data status list might be created that displays all precipitation gages, all stream gages, or a mix of precipitation and stream gages that are needed for a specific forecast. A data status list contains datasets from DSS files.

8.1.1 Menu Bar

Following is an overview of the **Menu Bar** for the **Data Status Summary** dialog (Figure 8.1). The commands available are:

- File From this menu the user can create a data status list, open a data status list, save a data status list, or copy one data status list to another. Available commands are: New, Open, Save, Save As, and Close.
- Edit From this menu the user can edit the table of information that represents a data status list. Also, the user can insert and delete rows, and get data from the HEC-RTS DSS files. Available commands are: Insert Row(s), Delete Row(s), Browse CWMS Database, and Browse DSS.
- View From this menu the user can plot and tabulate specific datasets, view the missing data segments of a dataset, validate data associated with a dataset, view the quality color bar legend, and refresh the data when the time window for the Data Status Summary dialog has changed. Available commands are: Plot, Tabulate, Missing Segments, Validate, Quality Color Legend, Time Window, and Refresh.

8.1.2 Shortcut Menu

From the table in the **Data Status Summary** dialog (Figure 8.1), select a time series dataset (a row in the table), then right-click on the selected time series dataset, a shortcut menu will be displayed (Figure 8.2). From the shortcut menu the user can plot, tabulate, view missing data, or validate data for the selected time series data set.

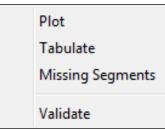


Figure 8.2 Shortcut Menu

8.1.3 Creating a Data Status List

To create a new data status list:

- 1. From the **Data Status Summary** dialog (Figure 8.1), from the **File** menu, click **New**. The table on the **Data Status Summary** dialog is blank. Select data sets from the database as detailed in this section below.
- 2. Once a data path(s) has been selected, click **Set Selected Identifiers**. The **Select Pathnames** dialog closes and the pathname selections will fill the **Data Status Summary** dialog's table (Figure 8.1).
- 3. The table on the **Data Status Summary** dialog (Figure 8.1) displays the selected time series datasets from the DSS files.
- 4. From the **File** menu, click **Save**. A **Save File Browser** (Figure 8.3) opens; in the **File name** field enter a filename for the data status list. Click **OK**, and a confirmation message is displayed saying the file has been saved. By default, the file will be saved to the **shared** directory of the watershed with the extension **.dataStatus**.

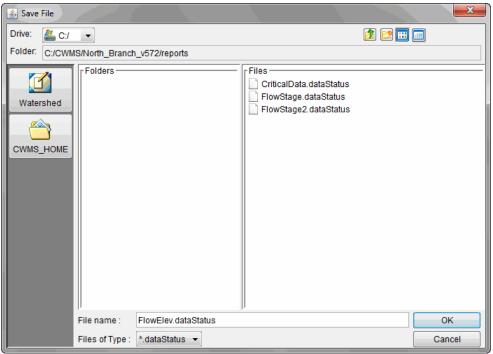


Figure 8.3 Save File Browser

8.1.4 Remove a Dataset from a Data Status List

To remove a dataset from a data status list:

1. Select the data set(s) that needs to be removed in the **Data Status Summary** dialog (Figure 8.1).

2. Click **Delete Row(s)** from the **Edit** menu. When finished with editing, save your changes to the **Data Status Summary**.

8.1.5 Adding DSS Datasets to a Data Status List

To add a dataset from a DSS file:

1. From the **Edit** menu, click **Browse DSS**, the **Select Pathnames** dialog (Figure 8.6) opens.

| le Edit Vi | thnames | lay Groups Collect | ions Advanced | | | | _ | | | |
|------------|---------|--------------------|-----------------|-----------|-------------------|-----------------------|------|----------|---------------|---|
| | | Meta Data | ions Advanced | | | | | | | |
| ile Name: | | | | | | | | | | |
| athnames S | | Pathnames Select | ted: 0 Pathname | es in Fil | e: 0 File Size: 0 | 0.0 KB Library Versio | n: | x64 | | |
| Search | A: | | • | c: | | • | E | | | |
| ly Parts: | в: | | • | D: | | •] | F: | | | |
| Number | | Part A | Part B | | Part C | Part D / range | | Part E | Part F | |
| | | | | | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | Select | De-Select | Clear Select | ions | Restore Sek | sctions Add Path | inam | es Repla | ace Pathnames |] |

Figure 8.4 Select Pathname Dialog

- 2. From the **File** menu, click **Open** and navigate to the desired DSS file. Select the file, and click **Open**. If a DSS file has been opened previously the **Select Pathname** dialog will display the DSS file, otherwise the dialog will be blank.
- 3. On the **Select Pathnames** dialog, the table displays all the available pathnames in the selected DSS file.
- 4. To add time series data sets, highlight the data in the table by clicking on the row and then click **Select** located at the bottom left hand corner of the **Select Pathname** dialog. The selection will display in the selection field. Continue adding pathnames by selecting them in the table and clicking **Select**.
- 5. To remove a dataset, select the path(s) to be removed in the path selection table, then click **De-Select**. To clear all the selected paths, click **Clear Selections**. To restore the previously cleared and de-selected paths, use **Restore Selections**.
- 6. When all pathnames have been selected, click **Add Pathnames** located at the bottom right of the **Select Pathname** dialog.
- 7. To search the DSS file use the **Search By Parts** lists (Figure 8.5). The data will be filtered by the HEC-DSS pathname parts.

8.1.6 Replacing DSS Datasets to a Data Status List

To replace a DSS dataset in a data status list:

- 1. From the **Data Status Summary** dialog, click **Browse DSS** from the **Edi**t menu and the **Select Pathname** dialog opens (Figure 8.6).
- 2. Select the pathnames(s) to be replaced and then click **Select** located at the bottom left hand corner of the **Select Pathname** dialog.
- 3. When finished editing, click **Replace Pathnames** at the bottom right hand corner of the **Select Pathname** dialog.

8.1.7 Open an Existing Data Status List

To open an existing data status list:

1. From the **Data Status Summary** dialog (Figure 8.1), on the **File** menu, click **Open**, and an **Open File** browser (Figure 8.7) opens. Enter a filename in the **File name** field or from the **Files** list select a data status list from the available files.

| 🖆 Open File | | | | × |
|------------------------------|-------------------------|---|-------|--------|
| Drive: 🦀 C:/ 💌 | | | 🏂 📂 🛄 | |
| Folder: C:/CWMS/North_Branch | _v572/reports | | | |
| Watershed CWMS_HOME | | Files CriticalData dataStatus FlowStage.dataStatus FlowStage2.dataStatus | | |
| File name : | CriticalData.dataStatus | | | OK |
| Files of Type : | *.dataStatus ▼ | | [| Cancel |

Figure 8.5 Open File Browser

- 2. The table on the **Data Status Summary** dialog displays the associated time series datasets for the selected data status list.
- 3. Review the data to determine the time window for a forecast, add or delete time series datasets to the data status list, and edit data specific to the time series datasets. If any

changes have been made to the data status list, from the **File** menu, click **Save**. A warning will appear asking the user do you really want to replace the existing data status list.

8.1.8 Make a Copy of an Existing Data Status List

To make a copy of an existing data status list:

- 1. From the **Data Status Summary** dialog (see Figure 8.1), on the **File** menu, click **Open**, and an **Open File** browser (Figure 8.7) opens. Enter a filename in the **File name** field or from the **Files** list select a data status list from the available files.
- 2. The table on the **Data Status Summary** dialog displays the associated time series datasets for the selected data status list.
- 3. From the **File** menu, choose **Save As**, and a **Save File Browser** (similar to Figure 8.6) opens.
- 4. Enter a filename for the new data status list. Click **OK**, and a confirm message is displayed letting the user know the file has been saved.

8.1.9 View Missing Data Segments

HEC-RTS offers another way to focus in on problem data by filtering missing data segments for individual time series datasets. To view details about missing data segments for a time series dataset, select a time series dataset from a data status list that is displayed in the **Data Status Summary** dialog (Figure 8.1).

Select a time series dataset from the table on the **Data Status Summary** dialog (Figure 8.1). From the **View** menu, click **Missing Segments**, and the **Missing Data Segments** dialog (Figure 8.8) opens.

| 🔮 Missing Data Segments | | | | | | | |
|---|-------|----------------|----------------|--|--|--|--|
| /NPOT/BARTO/FLOW/01JUN2001 - 01AUG2001/1HOUR/OBS/ | | | | | | | |
| Number Missing | Hours | Start | End | | | | |
| 1 | 1.0 | 31Aug01, 07:00 | 31Aug01, 08:00 | | | | |
| /NPOT/BARTO/STAGE/01JUN2001 - 01AUG2001/1HOUR/OBS/ No Missing Data /NPOT/CUMBE/FLOW/01JUN2001 - 01AUG2001/1HOUR/OBS/ No Missing Data | | | | | | | |
| | | | | | | | |

Figure 8.6 Missing Data Segments Dialog

Another way to access the **Missing Data Segments** dialog (Figure 8.8) is to select a time series data set from the table on the **Data Status Summary** dialog (Figure 8.1). Right-click a time series dataset, rom the shortcut menu click **Missing Segments**, the **Missing Data Segment** dialog will open (Figure 8.8).

For the selected time series datasets, the **Missing Data Segments** dialog (Figure 8.8) reports internal missing gaps for each time series. The missing gaps are periods in the time series datasets where data values were expected, but are not present, and data values are present before and after these periods to form each gap. For time series datasets that are defined to have a regular interval (e.g., *1Hour*) data values are expected at each interval. For time series datasets with an undefined or irregular interval (i.e., the time series interval is set to *0*) an interval will need to be defined. From the **Data Status Summary** dialog (Figure 8.1), enter a value (in hours) in the **Consider missing when no report after hours** box.

Missing data in critical time series datasets has an impact on HEC-RTS decision support activities. After analyzing the information displayed on the **Missing Data Segments** dialog (Figure 8.8), the user may decide to open the **Data Validation Editor** for the analyzed information to appropriately edit/correct the missing data values (Chapter 9).

8.2 Validating Data Concepts

Data retrieved by the HEC-RTS data capture system passes through an automated validation and transformation process. Arriving data, before any revisions are applied, are preserved in HEC-RTS DSS file(s), and are identified as *raw* data. Data that are automatically processed for validation and for transformation into additional data parameters are separately saved to the EHC-RTS DSS file(s), and are identified as potentially *revised* data.

To edit or validate data manually, use the **Data Validation Editor** (Chapter 9). From the **Data Validation Editor** the user can edit or validate data from the individual time series icons or through time series data sets. The other way to edit data is through validation lists. A validation list is a way to organize your data in the HEC-RTS DSS file(s) for editing or validation.

8.2.1 Selecting Appropriate Data Sets of Validation Lists

When setting up a validation list for manual review of quality and performing potential revisions, it is important to select datasets identified as *revised*. The HEC-RTS standard for identifying the two classes of *raw* and *revised* data is to add a "-raw" or "-rev" to the end of the version component of the HEC-RTS dataset description. For example, the raw and revised data sets for a sample time series of stage data are:

Sample Location.Stage.Inst.1Hour.0.GOES-raw Sample Location.Stage.Inst.1Hour.0.GOES-rev

The *raw* dataset should never be changed from its original captured value. Therefore, dataset descriptions ending in "-raw" should not appear in the validation lists. However, when you select dataset descriptions ending in "-rev" in validation lists, the **Data Validation Editor**

(Chapter 9) will automatically retrieve the "-raw" data as well allowing the user to view and compare both the raw and revised data for that dataset.

The user should never include transformed datasets in validation lists. For example, in the HEC-RTS automated transformation process, the sample location stage from the previous example may be used with a rating table lookup to produce a new stream flow record:

Sample Location.Flow.Inst.1Hour.0.GOES-rev

When editing flow data, and then storing that data to HEC-RTS DSS file(s), the data will probably remain out of sync with the stage dataset. This occurs because transformations are one-way only: i.e., the HEC-RTS transformation process correctly processes a revised stage into a new revised flow by the automated transformation processing, but not vice versa. If transformed values are edited, then the captured data must be manually revised as well, in order to keep them in agreement.

8.2.2 Creating Validation Lists from the HEC-RTS

After reviewing the quality of incoming data, you will have identified locations reporting questionable or invalid data. A **validation list** is a way to organize data in the HEC-RTS DSS file(s) for editing or validation. To create a validation list from time series icons in the map window:

- 1. By default, HEC-RTS will select the time series datasets associated with all of the defined time series icons in the map window.
- 2. If the user just wants to select a set of times series datasets for a validation list, select the time series icons that are needed. From the **Acquisition Module** (Chapter 7), from the map window, click the **Time Series Icon** tool, hold down the **SHIFT** key, and then click on the time series icons to be included in a validation list.
- 3. From the **Edit** menu, click **Create Validation List**. The **Create Validation List** dialog (Figure 8.9) will open.

| Location | Data Set |
|---|---|
| /AUSTIN C/CAZADERO CA/FLOW/01DEC2013/15MIN/U | AUSTIN C/CAZADERO CA/FLOW/01DEC2013/15MI 🗸 |
| /BIG SULPHUR C A G RESORT/CLOVERDALE CA/FLO | /BIG SULPHUR C A G RESORT/CLOVERDALE CA/F 👻 |
| /BIG SULPHUR C/CLOVERDALE CA/FLOW/01DEC201 | [/BIG SULPHUR C/CLOVERDALE CA/FLOW/01DEC2 🚽 |
| /COLGAN C/SANTA ROSA CA/FLOW/01DEC2013/15MI | /COLGAN C/SANTA ROSA CA/FLOW/01DEC2013/15 🗸 |
| /COPELAND C/ROHNERT PARK CA/FLOW/01DEC201 | COPELAND C/ROHNERT PARK CA/FLOW/01DEC2 🚽 |
| /DRY C BLW LAMBERT BR/GEYSERVILLE CA/FLOW/01 | /DRY C BLW LAMBERT BR/GEYSERVILLE CA/FLO 🗸 |
| /DRY C/GEYSERVILLE CA/FLOW/01Jan2015/15MIN/US | /DRY C/GEYSERVILLE CA/FLOW/01Jan2015/15MIN/ 🗸 |
| /DRY C/MOUTH NR HEALDSBURG CA/FLOW/01Jan20 | [/DRY C/MOUTH NR HEALDSBURG CA/FLOW/01Jan 🗸 |
| /EEL R/LAY/PRECIP-CUM/01Jan2015/1HOUR/CDEC/ | /EEL R/LAY/PRECIP-CUM/01Jan2015/1HOUR/CDEC/ |
| /EEL R/LAY/PRECIP-INC/01Jan2015/1HOUR/CDEC/ | /EEL R/LAY/PRECIP-INC/01Jan2015/1HOUR/CDEC/ |
| /EEL R/SCD/PRECIP-CUM/01Jan2015/1HOUR/CDEC/ | /EEL R/SCD/PRECIP-CUM/01Jan2015/1HOUR/CDE 🗸 |
| /EEL R/SCD/PRECIP-INC/01Jan2015/1HOUR/CDEC/ | /EEL R/SCD/PRECIP-INC/01Jan2015/1HOUR/CDEC/ |
| /EF RUSSIAN R/CALPELLA CA/FLOW/01DEC2013/15MI | /EF RUSSIAN R/CALPELLA CA/FLOW/01DEC2013/1 🗸 |
| /LAGUNA DE SANTA ROSA A STONY PT RD/COTATI CA | [/LAGUNA DE SANTA ROSA A STONY PT RD/COTATI 🚽 |
| /LAGUNA DE SANTA ROSA C/SEBASTOPOL CA/FLOW/ | /LAGUNA DE SANTA ROSA C/SEBASTOPOL CA/FL 🚽 |
| /MAACAMA C/KELLOGG CA/FLOW/01DEC2013/15MIN/ | [/MAACAMA C/KELLOGG CA/FLOW/01DEC2013/15MI 🗸 |
| | · · · · · · · · · · · · · · · · · · · |
| Save As: RR_Flows | |

Figure 8.7 Create Validation List Dialog

- 4. The table on the **Create Validation List** dialog will display a list of the selected datasets.
- 5. In the **Save As** box, enter a name. Click **OK**, the **Create Validation List** dialog closes (Figure 8.9). By default, the file will be saved to the watershed **shared** directory with the extension **.validationEditor**.

8.2.3 Creating Validation Lists from Data Status Lists

A useful way to create a validation list is from a data status list:

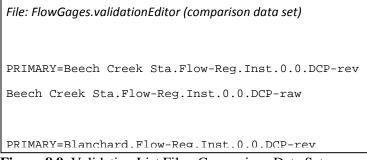
- 1. From the **shared** directory of a watershed, copy a data status list (*.*dataStatus*) file to a validation list (*.*validationEditor*) file (i.e., *cp FlowGages.dataStatus FlowGages.validationEditor*).
- 2. As stated in Section 8.2.1 validation lists should only contain "-rev" records. For the Data Validation Editor (Chapter 9) to be able to edit records from a validation list, each record needs to begin with PRIMARY=. So, for each record in a validation list file, make sure each records starts with PRIMARY=. Figure 8.10 shows an example of a validation list file *FlowGages.validationEditor* that has been edited.

```
File: FlowGages.validationEditor
```

PRIMARY=Beech Creek Sta.Flow-Reg.Inst.0.0.DCP-rev

Figure 8.8 Validation List File

3. If the validation list is to be a comparison dataset, add a record that does not include PRIMARY=. Remember that the HEC-RTS will automatically include the "-raw" record when a "-rev" record is accessed in the **Data Validation Editor** (Chapter 9). Figure 8.11 is an example of a validation list file (*FlowGages.validationEditor*) that has been edited as a comparison data set.



- Figure 8.9 Validation List File Comparison Data Set
- 4. Save the file, the user now has a validation list that will allow easy validation of the selected datasets.

CHAPTER 9 Data Validation Editor

9.1 Data Validation Editor

The **Data Validation Editor** (Figure 9.1) allows the user to select specific time series locations for validation (selected icons) or to use pre-defined validation lists (list mode). See Section 9.2 for further details. Before manually validating data, filtering chosen time series datasets so that only those time series datasets with identified problems will be displayed, is a good idea. Additionally, the **Data Validation Editor** offers tools for both text-entry editing (corrected values in a table) and graphical editing (graphically changing values in a plot).

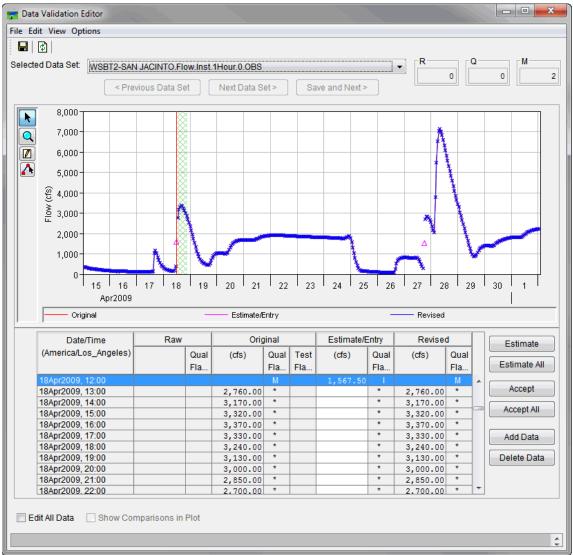


Figure 9.1 Data Validation Editor

From the **Selected Data Set** list (Figure 9.2), a select the specific time series dataset will be viewed or modified.

| Selected Data Set: | BBKT2-SAN JACINTO.Flow.Ins | st.1Hour.0.OBS | | • |
|--------------------|----------------------------|-----------------|-----------------|---|
| | < Previous Data Set | Next Data Set > | Save and Next > | |

Figure 9.2 Selected Data Set List

By default the **Data Validation Editor** (Figure 9.1) only allows the editing of data that has been marked as being rejected, questionable, or missing. The **R** (rejected), **Q** (questionable), and **M** (missing) fields (Figure 9.3) are related to the quality flags of the data and show counts of the data values in the **Original** column of the tabular data area (Section 9.1.6) for the selected data set and time window. To edit the data from the **Data Validation Editor** (Figure 9.1), click **Edit All Data**, or from the **Options** menu, click **Edit All Data**.

| R | Q | M |
|---|---|---|
| 0 | 0 | 0 |
| | | |

Figure 9.3 Data Quality Flags

To view comparison time series datasets from validation lists (Chapter 7), from the **Data Validation Editor** (Figure 9.1) click **Show Comparison in Plot**, or from the **View** menu, click **Show Comparison Data**.

To save the revised data values to a DSS file click the \blacksquare Save icon, or from the File menu, click Save. To undo all of the changes made to either the graphical or tabular data areas since the last Save, click the Undo icon 😰. Note: Once Save has been clicked, the user cannot undo any previous changes.)

9.1.1 Menu Bar

Following is an overview of the **Menu Bar** for the **Data Validation Editor** (Figure 9.1). The commands available are:

| File | Provides options for printing and saving changes to the HEC-RTS DSS file(s), and closing the Data Validation Editor . Available commands are: Save , Print Table , Print Graph , Page Setup , and Close . |
|------|---|
| Edit | A command that allows original data values to be restored when the session is started, a flag to automatically make an estimate for a missing data value, and add data. Available commands are: Restore Original Data , Always Estimate Missing , and Add Data . |
| View | Allows comparison data if a comparison time series dataset has been included in a validation list (Chapter 7), and specify the number of decimal places that will be displayed in the Data Validation Editor . Available commands are: Show Comparison Data , and Show Decimal Places . |

| Options | Commands from this menu include allow editing of all data, process data to DSS file(s) in the background, scale plot to data received directly from the data streams or data that has been validated/transformed, and specify how changes are saved to the DSS file(s). Available commands are: Edit All Data, Save in Background, Scale Plot to Raw Data, and Storage Rule. |
|---------------------------|--|
| Edit All Data | Allows editing of any of the displayed data. |
| Save in Background | When selected, after a Save , the user can continue working while HEC-RTS saves the data in the Revised column to DSS file(s). When this option is not selected (as is the default), the user must wait for the operation to complete. |
| Scale Plot to Raw Data | Scales the plot display to make all data values received directly from the data streams (raw data) and validated and transformed data visible in the plot. This option is active by default because raw data can contain erroneously large or small data values. If the options is deselected, the plot window will scale to validated/transformed data, leaving any raw data outside the plot window. |
| Storage Rule | Submenu that allows the user to specify how changes will be saved to DSS file(s) and accommodates multiple user access. Available commands are: |
| | Delete Insert removes all unprotected data from the incoming data's time window, merges incoming time values between protected data, and updates unprotected data at corresponding times with incoming data. Incoming data is discarded when protected data exists at corresponding times. |
| | Replace All merges incoming time values between data and replaces unprotected data at corresponding times with incoming data. Incoming data is discarded when there is protected data at corresponding times. |
| | Do Not Replace merges incoming time values between data and discards incoming data when there is existing data at corresponding times. |
| | Replace Missing Values Only merges incoming time values between data and replaces unprotected missing data at corresponding times with incoming data. Incoming data is discarded when protected data exists at corresponding times. |
| | Replace with Non Missing merges incoming time values between data and replaces unprotected data at corresponding times with non-missing incoming data. Incoming data is discarded when protected data exists at corresponding times. |

9.1.2 Time Window

The time window used by the **Data Validation Editor** (Figure 9.1) is the same time window that is set for monitoring data in the **Acquisition Module**. See Chapter 6 for information on setting the time window.

9.1.3 Graphical Editing Area

The graphical editing area (Figure 9.4) displays the selected data set graphically. By default, a blue line represents data values that have been validated and transformed (i.e., revised data), and a green line represents data values received directly from the data streams (i.e., raw data).

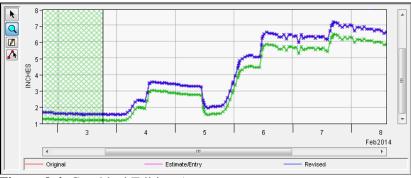


Figure 9.4 Graphical Editing Area

By default, the data shown in the plot scales so that all raw data and validated/transformed data are visible in the plot, this is because raw data can contain erroneously large or small data values. If the user clears Scale Plot to Raw Data from the Options menu (Data Validation Editor), the plot window will scale to validated/transformed data, potentially leaving any raw data beyond the validated/transformed value bounds outside of the plot window.

The data that is visible in the tabular data area (Section 9.1.6) is highlighted as a green-hatched column in the graphical editing area (Figure 9.4). A vertical black line (Figure 9.4) in the graphical editing area or running through the green-hatched column in the graphical edit area indicates the specific record in the tabular data area you have selected.

9.1.4 Graphical Editing Tools

The Graphical Editing Tools on the Data Validation Editor (Figure 9.1) allow viewing and editing of data in the graphical editing area. The available tools are:

Q Zoom Tool

The **Zoom Tool** allows the user to magnify specific sections in the graphical editing area. To use it, click and drag a rectangle around the area to be magnified. If the user needs to zoom out, right-clicking repeatedly will progressively reverse the zoom magnification.



Pointer/Selector Tool

The Pointer/Selector Tool allows the user to navigate in the graphical editing area and move quickly through a large data set. Select one data point then hold the shift key and select another point in the graphical editing area to select a range of data points.

🗾 Single Point Edit Tool

The **Single Point Edit Tool** allows the user to select an individual or a range of data points *, execute estimates A, and to set quality flags in the graphical editing area.

Multi-Point Edit Tool

With the **Multi-Point Edit Tool**, the user can edit data by drawing new plot lines in the graphical editing area.

9.1.5 Shortcut Menus

The user can customize the appearance of the graphical editing area by using several properties editors (Figure 9.5). These properties editors are accessed by right-clicking on the different elements of the plot, and from the shortcut menu, clicking **Edit Properties**. The available shortcut menus and properties editors are listed below:

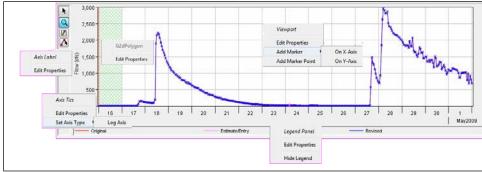


Figure 9.5 Graphical Editing Area - Shortcut Menus

| Polygon Properties | This editor will allow you to customize borders and backgrounds of polygons; in the Data Validation Editor (Figure 9.1 this properties editor is for editing the green-hatched column in the graphical edit area (G2dPolygon shortcut menu). |
|---------------------|--|
| Viewport Properties | This editor will allow you to customize the border, background, and gridlines of the graphical edit area, and also add markers (Viewport shortcut menu). |
| Axis Properties | This editor will allow you to customize the axis scale, tic marks, and axis type (Axis Tics shortcut menu). |
| Label Properties | This editor will allow you to add backgrounds and borders to the labels (Axis Label shortcut menu). |
| Legend Properties | This editor will allow you to move the legend to the right of the plot or to the bottom of the plot, or hide the legend (Legend Panel shortcut menu). |

9.1.6 Tabular Data Area

The tabular data area (Figure 9.6) is a table that allows you to do text-entry data editing. The following is a description of the columns available from the table:

- The **Date/Time** column specifies the time zone for the data and lists the specific date and time for each data point.
- The **Raw** column will display the data received directly from the data streams, along with any quality flags (Table 9.1).

| Date/Time | Raw | Or | iginal | | Estimate/E | intry | Revised | i | |
|-----------------------|-------|----------|--------|-------|------------|-------|----------|-------|----|
| (America/Los_Angeles) | Qual | (cfs) | Qual | Test | (cfs) | Qual | (cfs) | Qual | 1 |
| | Flags | | Flags | Flags | | Flags | | Flags | |
| TO: (p12000, 00.00 | | 100100 | . lage | ago | | ago | 200100 | ago | 4 |
| 18Apr2009, 09:00 | | 153.00 | | | | | 153.00 | | ^ |
| 18Apr2009, 10:00 | | 203.00 | * | | | * | 203.00 | * | |
| 18Apr2009, 11:00 | | 375.00 | * | | | * | 375.00 | * | |
| 18Apr2009, 12:00 | | | M | | 1,567.50 | | | M | |
| 18Apr2009, 13:00 | | 2,760.00 | * | | | * | 2,760.00 | * | |
| 18Apr2009, 14:00 | | 3,170.00 | * | | | * | 3,170.00 | * | 1 |
| 18Apr2009, 15:00 | | 3,320.00 | * | | | * | 3,320.00 | * | 1 |
| 18Apr2009, 16:00 | | 3,370.00 | * | | | * | 3,370.00 | * | 1 |
| 18Apr2009, 17:00 | | 3,330.00 | * | | | * | 3,330.00 | * | 1 |
| 18Apr2009, 18:00 | | 3,240.00 | * | | | * | 3,240.00 | * | 1 |
| 18Apr2009, 19:00 | | 3,130.00 | * | | | * | 3,130.00 | * | |
| 18Apr2009, 20:00 | | 3,000.00 | * | | | * | 3,000.00 | * | |
| 18Apr2009, 21:00 | | 2,850.00 | * | | | * | 2,850.00 | * | |
| 18Apr2009, 22:00 | | 2,700.00 | * | | | * | 2,700.00 | * | 1 |
| 18Apr2009, 23:00 | | 2,540.00 | * | | | * | 2,540.00 | * | 1 |
| 18Apr2009, 24:00 | | 2,360.00 | * | | | * | 2,360.00 | * | 1 |
| 19Apr2009, 01:00 | | 2,160.00 | * | | | * | 2,160.00 | * | 1 |
| 19Apr2009, 02:00 | | 1,960.00 | * | | | * | 1,960.00 | * | |
| 19Apr2009, 03:00 | | 1,750.00 | * | | | * | 1,750.00 | * | 1 |
| 19Apr2009, 04:00 | | 1,540.00 | * | | | * | 1,540.00 | * | 1_ |
| 4040000 05:00 | | | + | | | + | | + | 7 |

Figure 9.6 Tabular Data Area

- The **Original** column contains the validated/transformed data that you are reviewing, again along with any quality flags.
- The Estimate/Entry column allows you to modify data values. When cells in this column are white, you may edit the data. When cells in this column are gray, the rows are protected as being acceptable, having passed validation testing. To allow editing, select Edit Acceptable Data or select Edit Acceptable Data from the Options menu.
- The **Revised** column displays the values you have accepted. The corrected values appear in the **Revised** column, along with quality flags.

| Quality Flag | |
|--------------|--|
| * | no quality (data has not been validated) |
| Q | questionable |
| Р | protected |
| K | keyboard entry |
| E | estimate (graphical) |
| Ι | interpolated estimate |
| NI | negative incremental (rate of change) |
| R | rejected |
| М | set to missing |
| А | explicit form of blank for manual entry of quality |
| + | inserted value |
| | blank; indicates value passed all tests |

Table 9.1 Quality Flags for Data Validation

9.1.7 Inserting/Deleting Values

To add or delete data values in the tabular data area, first select **Edit ALL Data** from the **Options** menu. When selected the **Add Data** and **Delete Data** options become visible. To insert a data value, click **Add Data**. The **Extend Data Set** dialog (Figure 9.7) opens.

| 📻 Extend Data Set | | | × |
|--------------------|-----------------|-----------|---------|
| Insert before 20 A | Aug 2001, 12:00 | | |
| Number Rows: | þ 🚔 | Interval: | 1HOUR 🚽 |
| Start Date: | 20 Aug 2001 🗔 | Time: | 12:00 |
| Append after 24 A | Aug 2001, 05:00 | lata a la | 1HOUR - |
| Number Rows: | | Interval: | |
| End Date: | 24 Aug 2001 🗐 | Time: | 05:00 |
| | | ОК | Cancel |

Figure 9.7 Extend Data Set Dialog

Through the **Extend Data Set** dialog the user can insert data into the time window before the time window dates or append data to the time window.

Insert Before In the Insert Before DD MMM YYYY, HH:MM section of the Extend Data Set dialog, select the number of rows that need to be inserted before the time window start date using the Number Rows selector. The Start Date and Time fields will adjust their values according to the number of rows inserted. Click OK, the Extend Data Set dialog closes, new rows will be generated and added to the beginning of the table. Enter values in the table for the added time periods.

Append After In the Append After DD MMM YYYY, HH:MM section of the Extend Data Set dialog, select the number of rows to append after the time window end date using the Number Rows selector. The End Date and Time fields will adjust their values according to the number of rows entered in the Number of Rows selector. Click OK, the Extend Data Set dialog closes and new rows will be generated and added to the end of the table. Enter values in the table for the added time periods.

To delete a data value, select a row from the table, click **Delete Data**, the row will no longer appear in the table. When deleting there will be no warning, so be sure that you want to delete the data value before clicking **Delete Data**.

9.1.8 Editing Commands

Estimate (Figure 9.8) will automatically compute a data value for selected rows based on acceptable surrounding data in the **Original** column. Rows (tabular editing) or data values

(graphical editing) can be multi-selected for estimation, provided that the selected rows are bracketed by acceptable values. Tthe **Estimate All** will apply the estimate to all applicable data within the table.

| Estimate |
|------------------|
| Estimate Missing |
| Estimate All |
| Accept |
| Accept All |
| Add Data |
| Delete Data |

Figure 9.8 Editing Commands

Accept accepts the changes in selected rows and copies the information to the **Revised** column. Changes are stored in memory and are not yet saved to the HEC-RTS DSS file(s). Additionally, the user can use Accept All to save and accept all applicable data within the table.

9.2 Choosing a Validation Mode

There are two data validation modes, the **Icons** mode and the **List** mode. In the **Icons** mode, is where the selection of time series gages for manual validation occurs from the map window or from the color bars in the **Data Status Summary** dialog (Section 8.1). In the validation **List** mode, a validation list file is being selected. From the **Select Data Validation Data Sets** dialog (Figure 9.9) is where data validation mode selection is made. In addition, the user can control whether a long list of time series datasets should be filtered to only include those time series datasets with specific data quality indicators. These filters are available in the **Display Options** group of the **Select Data Validation Data Sets** dialog (Figure 9.9). This dialog opens any time the validation of data occurs in the watershed.

9.2.1 Icons mode

- 1. By default, all the datasets associated with all of the defined time series icons in the map window will be selected.
- 2. ITo a selected subset of datasets, simply select the time series icons to validate. From the map window, hold down the **SHIFT** key, and then click on the time series icons will be manually validatef.
- 3. From the Control Panel, click Data Validation.
- 4. The Select Data Validation Data Sets dialog (Figure 9.9) opens.

| 📻 Select Data Validation Data Sets |
|---|
| Icons |
| ⊚ List |
| Selection List |
| Display Options |
| Display All Locations |
| Display Locations With Specific Quality Flags |
| Questionable Missing Rejected |
| OK Cancel |

Figure 9.9 Select Data Validation Data Sets Dialog

- 5. If time series icons from the map window have been selected, **Selected Icons** will automatically be selected. If using the default mode, the user will need to click **Icons**.
- 6. Click **OK**; the **Data Validation Editor** (Figure 9.1) opens.

9.2.2 List mode

- 1. From the Select Data Validation Data Sets dialog (Figure 9.9), click List.
- 2. From Selection List select an existing validation list.
- 3. Click OK, and the **Data Validation Editor** (Figure 9.1) opens.



If you access the **Select Data Validation Data Sets** dialog (Figure 9.9) from the **Data Status Summary Dialog** (Figure 8.1), only the **Select Icons** mode is available without comparisons.

9.3 Editing Data

From the **Data Validation Editor** (Figure 9.1) the user can edit data graphically (graphical editing area); enter data in the table (tabular data area); have the program estimate data values based on surrounding data; and accept questioned or rejected data. When finished editing data, save (i.e., commit) results back to the DSS file(s). Whether editing the data graphically or via

the tabular display, the HEC-RTS keeps the graphical and tabular areas synchronized as the user navigates and make changes.

9.3.1 Graphical Editing

Edit data graphically by using the **Graphical Editing Tools**. Note, however, that the user cannot execute estimates for acceptable quality data with the **Graphical Editing Tools** (Section 9.1.3). Editing data graphically can also be accomplished by using the **Single Point Edit Tool** or the **Multi-Point Edit Tool**.

To change an existing point with the **Single Point Edit Tool [7]**:

- 1. If the **Single Point Edit Tool** is not selected, from the graphical editing tools, click the **Single Point Edit Tool**.
- 2. Be sure to put the **Data Validation Editor** in **Edit Mode**, when needing to edit data, select **Edit All Data** from the **Options** menu.
- 3. Point to a location in the graphical editing area and double-click, the point becomes a pink triangle.
- 4. To move the point, select the **Pointer/Selector Tool**, click and drag the pink triangle. The point will only move up and down; as the point moves, the numerical value of the data point will change (see the tabular data area).
- 5. locate the correct location for the data point, right-click on the pink triangle. From the shortcut menu, click **Accept**. The **Quality Flag** will automatically be set to estimate, and the data will be protected.
- 6. A red line will be drawn where the old data value for the point was, and a blue line will connect to the new position of the point.
- 7. If the new data value is correct, click to save the new data value to the HEC-RTS DSS File(s).

With the **Multi-Point Edit Tool** , the user can produce estimates for data along multi-point lines:

- 1. If the **Multi-Point Edit Tool** is not selected, from the graphical editing tools, click the **Multi-Point Edit Tool**.
- 2. Be sure to put the **Data Validation Editor** in **Edit Mode**, when needing to edit data, select **Edit All Data** from the **Options** menu.
- 3. Click the mouse where multiple new values need to be added along a line, movement will be progressively to the right, moving ahead in time.

- 4. At the end of the line, click and then right-click, a pink triangle will now display where the mouse was clicked.
- 5. If the values are correct, click **Accept**. The **Quality Flag** will automatically be set to estimate, and the data will be protected.
- 6. A red line will be drawn where the old data values were, and a blue line will connect to the new position of the points.
- 7. After verifying that the new data values are correct, click 🖬 to save the new data values to the DSS file(s).

9.3.2 Tabular Editing

When the **Data Validation Editor** opens, it jumps directly to the first problem data point, if any. In the tabular data area, the **Estimate/Entry** column allows the modification of numerical data values. When cells in this column display with white backgrounds, data can be edited.

To edit data in the table:

- 1. Be sure to put the **Data Validation Editor** in **Edit Mode**, when needing to edit data that is flagged acceptable, select **Edit All Data** from the **Options** menu..
- 2. To edit data, enter values in the **Estimate/Entry** column (data is given a quality flag of keyboard), or select a cell and click **Estimate** (data is given a quality flag of estimate), this will create a data value that is based on the surrounding data values.
- 3. If satisfied with the values, click **Accept**. The new data value will appear in the **Revised** column with a **Quality Flag** of keyboard or estimate, and the data will be protected.
- 4. A red line will be drawn where the old data values were, and a blue line will connect to the new position of the points.
- 5. If the new data values are correct, click 🔚 to save the new data values to the HEC-RTS DSS file(s).

The tabular data area has a shortcut menu (shown below) that allows the user to set quality flags on data, whether the data is protected or not, and, provides two ways to fill in data values on the table.

Using Fill - Linear:

- 1. This will produce a linear interpolation of values between two values in the **Estimate/Entry** column.
- 2. Enter values in the first and last rows of the range of interest to create two base values (or use **Estimate** to create the new values).

- 3. Select the range of rows, starting with the first base value and ending with the second base value. Select a range of rows either by clicking on a row and dragging, or by clicking one row and then selecting another by holding down the **SHIFT** key.
- 4. Right-click, from the shortcut menu click **Fill Linear**. The cells in the **Estimate/Entry** column of the selected rows will now contain data values produce from a linear interpolation between the two base values.
- 5. If satisfied with the values, click **Accept**. The new data values will appear in the **Revised** column with a **Quality Flag** of keyboard or estimate, and the data will be protected.
- 6. A red line will be drawn where the old data values were, and a blue line will connect to the new position of the points.
- 7. If the new data values are correct, click \blacksquare to save the new data values to the DSS file(s).

Using Fill - Repeat:

- 1. This will duplicate the selected value in all of the selected cells in the **Estimate/Entry** column.
- 2. Enter a new value in the first row (or use **Estimate** to create the new value).
- 3. Select the range of rows, starting with the base value. Select a range of rows either by clicking on a row and dragging, or by clicking one row and then selecting another by holding down the **SHIFT** key.
- 4. Right-click, from the shortcut menu click **Fill Repeat**. The cells in the **Estimate/Entry** column of the selected rows will now contain the same value as the data that was entered for the base value.
- 5. If satisfied with the values, click **Accept** and the new data values will appear in the **Revised** column with a **Quality Flag** of keyboard or estimate, and the data will be protected.
- 6. A red line will be drawn where the old data values were, and a blue line will connect to the new position of the points.
- 7. If the new data values are correct, click \blacksquare to save the new data values to the DSS file(s).

CHAPTER 10 Visualization Module

The **Visualization Module** displays observed data and results of computations, and allows the user to monitor and evaluate the current state of the watershed. Spatial data, such as contours or grid cells, and time series data, such as hydrographs, can also be displayed in the **Visualization Map Window**. As in the **Acquisition Map Window**, icons in the **Map Window** can be set up to change color, allowing visualization of the hydrology in the watershed as data arrives.

Chapters 18 and 19, describe how to set up and configure a watershed's **Visualization Map** with the thumbnail plots and threshold bars for time series icon layers and time series icons. The rest of this chapter provides information on the **Visualization Module**.

10.1 Visualization Interface

The **Visualization Module** provides visual information on the current conditions in a watershed and the associated hydrometeorological data in a geo-referenced context. From the **Watershed Pane**, click the **Visualization** tab (Figure 10.1). The **Visualization Map Window** and the different components for the **Visualization Module** are illustrated in Figure 10.1. A detailed discussion of common screen components is presented in Section 2.3.

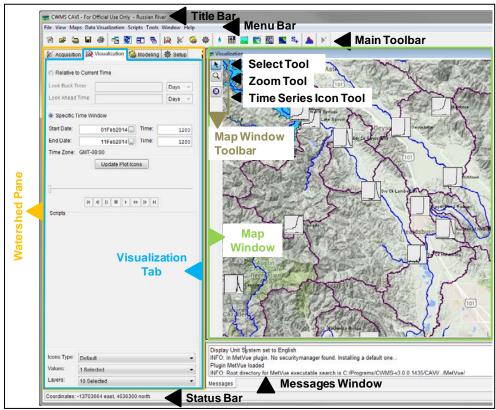


Figure 10.1 Visualization Module

10.1.1 Menu Bar

Following is an overview of the **Menu Bar** (Figure 10.1) for the **Visualization Module**. The **File**, **View**, **Tools**, **Window**, and **Help** menus are discussed in Section 2.3.1. The commands available from the menus allow for viewing the current conditions in a watershed and the associated hydrometeorological data in a geo-referenced context.

- Maps andThis menu contains items that allow the user to setup, configure, and edit
map layers and their display properties. Includes adding a new shapefile,
editing the display color(s) of a shapefile, remove a map layer from the
Map Window. In addition, configuring the Map Window visualization
extents, load a background map from the Internet, and set which
coordinates the Map Window will use. Available commands in the
Maps/Window menus are: Map Layers, Default Map Properties,
Zoom To All, Duplicate Window, Detach Window, Add Map Layers,
Remove Map Layers, Add Internet Map, Display Map Coordinates,
New Map Window, Map Window Properties, Save Map Image, and
Sync Map Windows.
- DataThis menu provides access to the gridded data, which represents the
precipitation for the watershed. The only available command is
GriddedData, which is a sub-menu that allows the user to add or delete
gridsets (a sequence or time series of grids) from the list of gridsets,
update the data grid to display current data for the selected time window,
and provides a list of gridsets, with the active gridset having a check
mark. Available commands are: New Gridset, Edit Gridset, Delete
Gridsets, Cumulative Display, Animation Delay, and None. Also, if
any gridsets are created they will be listed in the GriddedData sub-
menu.

10.1.2 Visualization Tab

The **Visualization** tab (Figure 10.1) contains commands specific for the **Visualization Module**. These commands include setting up a time window, updating time series icons in the **Map Window**, and grid animation controls for visualizing gridded precipitation for the watershed.

10.1.3 Map Window

When the **Visualization** tab is selected (Figure 10.1), the **Visualization Map Window** is displayed. The **Visualization Map Window** contains map layers and time series icons for visualizing watershed processes in a geo-referenced context. The primary function of the **Visualization Module** is to provide a meaningful visual representation of observed data. Threshold color bars or thumbnail plots, which update dynamically to reflect current conditions, are usually used/configured for bserved data locations which are viewed daily and are of critical importance within a watershed. For other locations, time series icons might be used to display data as space-conserving graphical images or dots. Time series icons are setup in the **Setup** tab in the **Watershed Pane**, which is described in Chapter 19.

In most cases, for the **Visualization Module**, the user should configure time series icons to display as threshold color bars. Threshold color bars display current data into multi-colored strips, such as green, amber, and red (colors can be specified by the user), that provide a quick way to view locations that are exceeding critical threshold limits.

10.1.4 Time Series Icon Controls

The **Time Series Icon Controls** provide a mechanism to setup **Time Series Icon Layer** attributes that are displayed within the watershed. The **Time Series Icon Controls** are located on the **Visualization**, **Acquisition**, and **Modeling** tabs. There are three attributes available: **Icons Type**, **Value**, and **Layer** (Figure 10.2).

| Icons Type | Icon Type forces all icons within the Map Window to display as the selected Icon Type in the list. Selecting the Default option in the list will display the icons as they were set in the Time Series Icon Properties Dialog . |
|------------|--|
| Value | The Value selection provides a way to display time series icon data as labels. the labels will display next to or on the location of the associated time series icons. For example, the user could choose to display the data's total, minimum, and maximums values as labels (multiple values can be selected). |
| Layer | Layer allows the user to select sub-layers that are visible in the Map Window (multiple layers can be selected). |

By selecting attributes for the time series icon layer(s), the user can change how all time series icons are displayed within the visualization process at once. For more detailed information on how to configure the properties that control the threshold color bar icons displayed see Chapter 19.

| Icons Type: | Default |
|-------------|--------------|
| Values: | 2 Selected 🔹 |
| Layers: | 1 Selected 🔹 |

Figure 10.2 Time Series Icon Controls

10.2 Preparing to Monitor Current Conditions

To begin monitoring current conditions in a watershed, the time window for viewing and updating the color bars and plot icons in the map display needs to be defined.

10.2.1 Set Time Window

HEC-RTS provides multiple options for defining time windows, set a specific (i.e., fixed) time window (used when reviewing a specific historical event); or, set a time window relative to the current time (which is the default setting, used to monitor incoming data in real-time).

To set or change the time window:

1. Click Specific Time Window on the Visualization Tab (Figure 10.3).

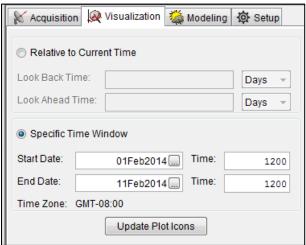


Figure 10.3 Setting the Specific Time Window.

- 2. To set the visualization relative to the current date and time, select the **Relative to Current Time** and enter the **Look Back Time** and select either **Days** or **Hours** as the time unit. Normally the time window would be set to extend backward one to thirty days from the current time. Optionally, the user can enter a **Look Ahead Time** and select either days or hours; this allows HEC-RTS to look ahead at data (useful if looking at forecasted datasets).
- 3. To set the visualization to a historical time window, select **Specific Time Window** and enter the **Start Date** and **Time** of the time window and the **End Date** and **Time** of the time window for the historic data.
- 4. Click Update Plot Icons, and the Specific Time Window specifications will take effect.

10.2.2 Time Series Icon Shortcut Menu

In the **Visualization Module**, the time series icons in the **Map Window** have a shortcut menu (Figure 10.4) that provides the ability to view the data associated with a selected time series icon in a plot, tabulate table, or MS Excel®. Another option is that the user can view the legend of the selected time series icon (Section 10.3.1). The shortcut menu is available for all time series icons (i.e., for the color bars, thumbnail plots, graphics, or dots).

10.3 Visualizing Incoming Data

The **Visualization Module** provides tools for evaluating the current state of the watershed. The module's main display has several visualization tools that help to identify whether critical conditions exist. Icons, plots and graphs, the **Alert Message Bar**, and animated background images can all be used for monitoring observed data for a watershed.

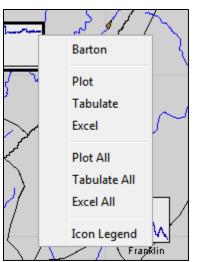


Figure 10.4 Time Series Icon Shortcut Menu

Icons in the **Visualization Module** provide a flexible set of tools to facilitate monitoring and evaluating the current state of the watershed. To view current conditions at a glance, the user can replace graphical icons with dynamic thumbnail plots and threshold color bars that change color to reflect the status of various parameters at a particular location.

10.3.1 Threshold Color Bars

A **Threshold Color Bar** (Figure 10.5) is a thick, segmented line representing a linear histogram that compares current data against threshold values set for a location. Because threshold color bars are location dependent, the values for each time series icon individually (Section 18.5) must be set. The name of the location appears adjacent to the threshold color bar, and the length of the **Threshold Color Bar** represents a time line equal to the duration of the time window. Segments along the color bar reflect time intervals, with colors corresponding to the limits that have been defined. The **threshold color bars** are updated dynamically at the time interval that was entered in the **Set Time Window** dialog (Figure 10.3).

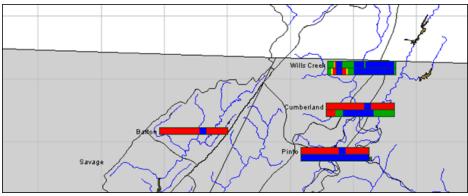


Figure 10.5 Threshold Color Bars

As part of daily routine of reviewing data in a watershed, the user should review threshold color bars to determine if the incoming data is good and which data needs to be validated. To view the legend for **threshold color bars**:

- 1. Select either the **Time Series Icon Tool** or **Selector Tool** from the **Map Window Toolbar**.
- Right-click on a time series icon that has the icon type of a Threshold Color Bar, click Icon Legend from the shortcut menu, and the Threshold Legend dialog (Figure 10.6) opens.

| 🔮 Wills Creek Threshold Legend 🛛 💷 💻 🍽 | | | | |
|--|------------------------------|--|--|--|
| Visualization | | | | |
| /NPOT/WILLS/STAGE//1HOUR/OBS/ | | | | |
| Value | Color | | | |
| < 1.8 | Blue | | | |
| 1.8 to 1.95 | DarkGreen | | | |
| 1.95 to 1.97 | Yellow | | | |
| > 1.97 | Red | | | |
| /NPOT/WILLS/FLOW// | /NPOT/WILLS/FLOW//1HOUR/OBS/ | | | |
| Value | Color | | | |
| < 36 | Blue | | | |
| 36 to 41 | DarkGreen | | | |
| 41 to 43 | Yellow | | | |
| > 43 | Red | | | |
| ОК | | | | |

Figure 10.6 Threshold Legend Dialog

3. The legend shows the threshold values for the current data and the colors that represent each threshold value.

As conditions change at a location, the **threshold color bar** automatically changes colors. For example, at a precipitation location, green might represent precipitation between .01 to .11 inches, corresponding to normal conditions. Orange might represent values greater than .51 inches, but less than 1.0 inch, which indicate a flood warning level. Red would represent values above 1.0 inch, signaling flows above flood stage.

10.3.2 Thumbnail Plots

In some cases, you may wish to use thumbnail plots to represent gages and time series locations. **Thumbnail Plots** (Figure 10.7) are miniature versions of the full-size plots, showing data for the duration of the time window. The name of the location appears adjacent to the thumbnail plot. As the time window updates, the CAVI refreshes the data and updates the plot.

To view the legend for thumbnail plots:

- 1. Select either the **Time Series Icon Tool** or **Selector Tool** from the **Map Window Toolbar**.
- 2. Right-click a thumbnail plot, click **Icon Legend** from the shortcut menu, and the **Thumbnail Plot Legend** dialog (Figure 10.8) opens.

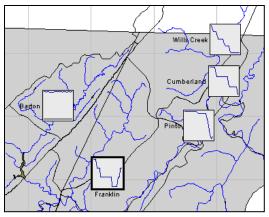


Figure 10.7 Thumbnail Plots

| 4 | Franklin Thumbnail Plot Legend 💷 💷 💌 | J |
|---|--------------------------------------|---|
| | Visualization | |
| | /NPOT/FRANK/FLOW//1HOUR/OBS/ | |
| | Color: DarkBlue | |
| | Minimum: 15.70 | |
| | Maximum: 26.97 | |
| | | |
| | ОК |] |

Figure 10.8 Thumbnail Plot Legend Dialog

3. The legend displays the pathname, the color of the curve, and the minimum and maximum values of the curve. To edit the color of the curve shown in the thumbnail plot, see Section 18.4.

10.3.3 Using Plots

If the threshold color bar or thumbnail plot for a location indicates that the incoming data is questionable or bad, viewing the data in a plot can help you to determine the nature of the problem.

To access plots of incoming data:

- 1. Select either the **Time Series Icon Tool** or **Selector Tool** from the **Map Window Toolbar**.
- 2. Right-click on a time series icon, click **Plot from the** shortcut menu and a **Plot** dialog (Figure 10.9) opens.
- 3. The **Plot** dialog displays a two-dimensional plot that contains data for that location for the current time window. Use the **Zoom Tool** to zoom in on a specific portion of the plot. See Section 2.3.2 for a more detailed description of the Zoom Tool. In addition, a more detailed description on the plots can be found in Section 2.5.1.



Figure 10.9 Plot Dialog

10.3.4 Using Tables

If the color bar or thumbnail plot for a location suggests that the incoming data is atypical or unexpected, viewing the data in a table allows you to examine the data in finer detail.

To access tables of incoming data:

- 1. Select either the **Time Series Icon Tool** or **Selector Tool** from the **Map Window Toolbar**.
- 2. Right-click on a time series icon, click **Tabulate** from the shortcut menu, and the **Table** dialog (Figure 10.10) opens.

| 🔺 /NPOT/DSSAV/FLOW//1HOUR/OBS/ 🗖 📼 🌉 | | | |
|--------------------------------------|--------------------|----------|---|
| File Edit View | W | | |
| | GMT-05:00 | | |
| | | DSSAV | |
| Ordinate | Date / Time | FLOW | |
| | | OBS | |
| Units | | cfs | |
| Туре | | INST-VAL | |
| 1 | 20 Aug 2001, 24:00 | 50.15 | |
| 2 | 21 Aug 2001, 01:00 | 50.16 | |
| 3 | 21 Aug 2001, 02:00 | 50.16 | |
| 4 | 21 Aug 2001, 03:00 | 50.16 | |
| 5 | 21 Aug 2001, 04:00 | 50.16 | |
| 6 | 21 Aug 2001, 05:00 | 50.16 | |
| 7 | 21 Aug 2001, 06:00 | 50.16 | |
| 8 | 21 Aug 2001, 07:00 | 50.83 | |
| 9 | 21 Aug 2001, 08:00 | 52.03 | _ |
| 10 21 Aug 2001 00:00 53 28 | | | |

Figure 10.10 Table Dialog

From the **Plot** dialog (Figure 10.9), the user can also tabulate the data:

- 1. Open a **Plot** dialog as shown in Section 10.3.3.
- 2. From the File menu, click Tabulate, and the Table dialog (Figure 10.10) opens.
- 3. For more details on tabular data, see Section 2.5.2. For printing and exporting tabular data, see Appendix J.

10.4 Precipitation Grids

Precipitation data can be reviewed at the time series icons to examine individual gage reports, identify problems, and confirm the validity of the data. The Visualization module also allows precipitation data to be viewed as grids (Figure 10.11), which gives a view of the precipitation over the whole watershed for an interval of time.

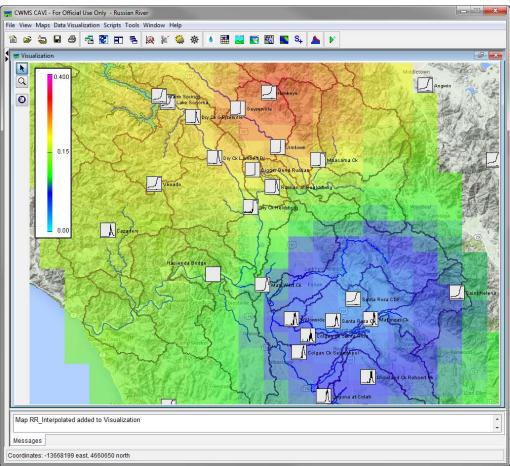


Figure 10.11 Precipitation Grids

Precipitation grids are created by interpolation between gages or by loading radar precipitation reports from the National Weather Service (NWS) or other external sources. Individual precipitation grids are grouped into sequences called "gridsets" using the HEC-GridUtil program (Appendix G). To view gridsets you will use the grid animation controls in the **Visualization Module**.

10.5 Grid Animation Controls

The grid animation controls allows the user to view precipitation grids for the time window that has been chosen. The controls are located on the **Animate** dialog (Figure 10.12) which is accessible from the **Visualization Module**. Choose **Animate** from the **View** menu to display the **Animate** dialog. The dates above the slider bar show the start and end time of the grids that are visible in the display window. The date and time shown beneath the centered controls indicate the date and time of the data currently being displayed. A **slider bar** and **video-player-style buttons** control animated playback. The **slider** perform navigation on the active precipitation gridset for a specific time during the time window. With these playback controls, the user can play an animation of the active precipitation gridset from the beginning to the end of the visualization time window.

| 📻 Animate | | × |
|-----------|------------------|-----------|
| Configure | | |
| 01JUL2001 | | 31JUL2001 |
| | | |
| | Kaitera | |
| | 01JUL2001, 00:00 | |

Figure 10.12 Animation Dialog

The video-player-style buttons (Figure 10.12) function as follows:

| K | Skip to Beginning | Sets the slider at the beginning of the time window and displays the status of data at that time. |
|---|-------------------|--|
| • | Step Back | Steps the image back one time interval. |
| H | Pause | Pauses playback. |
| | Stop | Stops playback. |
| Þ | Play | Plays the animation, one time interval at a time, starting at the location of the slider. |
| ▶ | Step Forward | Steps the image forward one time interval. |
| ₩ | Fast Forward | Plays through the animation in fast forward mode. |
| H | Skip to End | Moves the slider and the image to the status at the end of the time window. |



In order for playback to occur, you must define the coordinate system for both the watershed layers and the gridset and there must be data present for the time window specified. If no grid is available for the time step, the label centered over the grid animation controls will end with **No Data**.

Use **CWMS-Vue** to check for available grids in

CWMS_HOME/dated/db/grid/precip.YYYY.MM.dss. You may need to run gageInterp or your grid-loading program to populate the DSS files for this time interval.

10.6 Precipitation Gridsets

A **gridset** can be thought of as a sequence or time series of grids. Since a single DSS record of grid data contains data for only one time interval, gridsets must be created within the watershed before the viewing of precipitation grids changing through time over the watershed can occur. Gridsets are created by **HEC-GridUtil**. See Appendix G for more instructions on creating gridsets in HEC-GridUtil.

10.6.1 Adding a Gridset

Once a gridset has been created for the watershed, the grdiset needs to be added to the watershed through the **Visualization Module** for viewing in the **Visualization Map Window**.

To add a gridset to the watershed:

1. On the **Data Visualization** menu, point to **GriddedData**, click **New GridSet** (Figure 10.13).

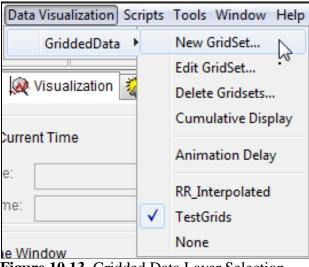


Figure 10.13 Gridded Data Layer Selection

2. The **Create New GRID** dialog will open. Enter a **Name** for the new gridset (required), and a description for the gridset is optional. The new gridesets **Directory** will be automatically generated, but can also be modified.

- 3. Click OK and the Create New GRID dialog will close.
- 4. The **Edit Grid Set** dialog will open. Click **Add File(s)** and navigate to the available precipitation gridsets created in the HEC-GridUtil program. Next set each of the **Grid Set Identifiers** listed using the drop-down options.
- 5. Click **OK** and the **Edit Grid Set** dialog will close.
- 6. The available **GriddedData** sub-menu will list all of the available precipitation gridsets created from the HEC-GridUtil program. To be available to HEC-RTS, a gridset must be defined using the file selection method, and cannot be associated with a fixed time window. The gridsets listed, are the gridsets that have been selected for the watershed using the **New GridSet** (Figure 10.13) option in the **GriddedData** sub-menu.
- 7. To remove gridsets from the watershed, from the **GriddedData** sub-menu select **Delete Gridsets** and the **Delete Object** dialog will open (Figure 10.13).
- 8. Next select the gridsets to be deleted from the watershed. Click **OK** and the **Delete Object** dialog will close.

10.6.2 Selecting a Gridset

To select a gridset:

- 1. On the **Visualization** menu, point to **GriddedData**.
- At the bottom of the submenu, the names of the gridsets that have been added will display. Select the gridset for viewing. None displays no precipitation grids in the Map Window.
- 3. When a gridset is selected for viewing, a checkmark will appear beside its name in the list.

10.6.3 Controlling Properties of a Gridset

The user can control the visibility and color scheme of the gridset through the **Map Layers** dialog (Chapter 3). In the **Visualization Module**, the **Map Layers** dialog displays the selected gridset layer. In addition, the user can control the color scheme, tic intervals, and the minimum/maximum values for the contour limits from the **Gridded Data** layer.

Changing a gridset's properties:

- 1. From the **Maps** menu, click **Map Layers** and the **Map Layers** dialog (Section 3.1) opens.
- 2. From the tree, right-click on a gridset layer, from the shortcut menu click **Properties**. The **Grid Display Options** dialog (Figure 10.14) opens.

| F Grid Display Options | X |
|-------------------------------------|------------------|
| TestGrids | |
| Properties Scale | |
| Precipitation • | Scale 0.07750015 |
| Tic Interval(in) 0.39 Advanced > | 0.06200012 |
| Contour Limits | 0.04650009 |
| V System Specified Min/Max Values | 0.03100006 |
| Maximum(in) 1.969 Minimum(in) 0.000 | 0.01550003 |
| | D.00000000 |
| ОК Са | Apply |

Figure 10.14 Grid Display Options Dialog Box

- 3. The name of the active gridset is displayed at the top of the **Grid Display Options** dialog.
- 4. The list at the top left of the **Grid Display Options** dialog contains six pre-set color contour schemes, with the default being **Precipitation**.
- 5. Set the tic interval by entering a value in the **Tic Interval** field.
- 6. In the **Contour Limits** panel set the minimum and maximum contour values. By default, HEC-RTS automatically determines the minimum and maximum contour values. To enter these values manually, clear **System Specified Min/Max Values**. Then enter values in the **Maximum** and **Minimum** fields.
- 7. For additonal settings, click **Advanced**. The **Grid Display Options** dialog expands (Figure 10.15) to include options for brightness, saturation, transparency, aspect shading, maximum clipping, and minimum clipping.

| 📻 Grid Display Options | × | |
|-------------------------------------|-------|--|
| TestGrids | | |
| Properties Scale | | |
| Precipitation - | Scale | |
| Tic Interval(in) 0.39 Advanced 4 | 0.077 | |
| Contour Limits | | |
| V System Specified Min/Max Values | 0.062 | |
| Maximum(in) 1.969 Minimum(in) 0.000 | 0.062 | |
| Brightness (0.0-1.0) 1.0 | | |
| Saturation (0.0-1.0) | | |
| Transparency (0.0-1.0) | 0.046 | |
| Aspect Shading | | |
| Angle (0-360 Degrees) 160.0 | | |
| Adjust Color Scale to Clipping Area | 0.031 | |
| C Maximum Clipping | | |
| Value | | |
| Color | 0.015 | |
| Minimum Clipping | | |
| Value | | |
| Color | 0.000 | |
| OK Cancel | Apply | |

Figure 10.15 Grid Display Options Dialog – Advanced

- 8. To control the **Brightness** (the amount of white, measured from 0.0 to 1.0), **Saturation** (the amount of black, measured from 0.0 to 1.0), and **Transparency** (the level of opacity or alpha, measured from 0.0 to 1.0) of the gridded data layer, moving the sliders or enter values into the text fields. The color scale to the right will update according to the selections made.
- 9. When using elevation maps, the user may wish to choose Aspect Shading as the color contour scheme. Using Aspect Shading makes the elevation map appear in relief by placing an imaginary light source above the map and shading the elevation contours. When the Aspect Shading option is selected, use the Angle slider to adjust the angle of the light source.
- 10. By default, the **Maximum Clipping** and **Minimum Clipping** options are deselected. If selected, the **Value** sliders and **Color** buttons become available. The **Value** sliders allow the user to specify the amount of clipping within the contour limits specified, or the user can enter values in the boxes. Click **Color**, the **Color Chooser** appears, for more information on the **Color Chooser** see Appendix E.

10.6.4 Controlling the Scale of a Gridset

To set the visualization scale for the gridded data layer:

- 1. From the Maps menu, click Map Layers. The Map Layers dialog (Section 3.1) opens.
- 2. From the tree, right-click on the gridset layer, from the shortcut menu, click **Properties**, the **Grid Display Options** dialog (Figure 10.16) opens.

| 📻 Grid Display Options | | | |
|--------------------------|----------------------|--|--|
| | TestGrids | | |
| Properties Scale | | | |
| Always show layer | | | |
| Only show layer in the f | ollowing scale range | | |
| Only visible below 1: | Set to Current | | |
| Only visible above 1: | Set to Current | | |
| | OK Cancel Apply | | |

Figure 10.16 Grid Display Options Dialog - Scale Tab

3. Click Scale (Figure 10.16). both zoom-in and zoom-out scale factors can be set from the Grid Display Options dialog. By default the Gridded Data Layer is set for Always show layer. To set visualization scales click Only show layer in the following scale range.

- 4. To set the scale so that the gridded data layer becomes visible when zooming-in, set the scale to the current scale by clicking **Set to Current**. If the user wishes to enter a value, from the **Only visible below 1** field, enter the scale factor.
- 5. To set the scale so that the gridded data layer becomes visible when zooming-out, set the scale to the current scale by clicking **Set to Current**. If the user wishes to enter a value, from the **Only visible above 1** field enter the scale factor.
- 6. Click **OK**, the **Grid Display Options** dialog (Figure 10.16) closes, and the visualization scale is set for the gridded data layer.
- 7. Click **OK**, the **Map Layers** dialog (Section 3.1) closes.

Alternatively, the scale can also be edited in the **Edit Grid Set** dialog (Figure 10.17). This **Edit Grid Set** dialog is accessed by selecting a gridset via the **Edit Grid Set** dialog from the **Data Visualization** tab, **GriddedData** menu, click **Edit Grid**

| 📻 Edit Grid Set MARFC | × |
|--|--|
| Select DSS Files | |
| Prefix: precip 👻 | |
| | File List Add File(s) |
| | atabase\db\grid\precip.2001.07.dss atabase\db\grid\precip.2001.08.dss |
| Grid Set Identifier Grid Type (A-Part) Location SHG TMARFO | n (B-Part) Parameter (C-Part) Version (F-Part) |
| Available Time Range | Time Interval 1 Hour - |
| 30 June 2001, 24:00 | Instantaneous |
| 31 August 2001, 22:00 | Coordinate System: SHG Edit |
| 🔽 Set display scale limits | |
| Minimum Value (in): | 0.0 Maximum Value (in): 1.97 |
| Pathname List | OK Cancel |

Figure 10.17 Edit Grid Set Dialog - Scaling Limits

CHAPTER 11 Modeling Module

The **Modeling Module** in HEC-RTS is the grouping of commands for model execution. These include commands for creating and managing forecast alternatives, editing selected model parameters, executing alternatives, and evaluating results.

Figure 11.1 shows the flow of data and information through the software applications. HEC-RTS has six standard software applications available: the meteorological preprocessors HEC-MetVue and MFP, the watershed runoff model HEC-HMS, the reservoir simulation model HEC-ResSim, the hydraulic routing model HEC-RAS, and the flood consequences analysis model HEC-FIA. These software applications and their inputs and outputs are described in Section 1.2.

The meteorological preprocessors HEC-MetVue and MFP combine observed precipitation data and future precipitation information into a single precipitation dataset that can be used by the watershed runoff model (HEC-HMS). Using the observed and future precipitation from a meteorological preprocessor (HEC-MetVue or MFP), HEC-HMS computes runoff. HEC-ResSim uses uncontrolled flows (typically computed by HEC-HMS) as input and simulates reservoir releases. In turn, controlled flows (computed by HEC-ResSim) are used as boundary conditions to the hydraulic routing model HEC-RAS. (HEC-RAS can also use flows computed by HEC-HMS or supplemental models as input). HEC-RAS computes stage, which is input to HEC-FIA. HEC-FIA analyzes flood consequences. (HEC-FIA can also use flow computed by HEC-HMS, or HEC-ResSim as input.)

Results include impact and action reports from HEC-FIA, inundations maps that can be viewed with an HEC-RAS Tool - RAS Mapper, and simulated release schedules from HEC-ResSim.

The following is a typical workflow for forecasting:

- 1. Check that critical data are available using the Acquisition Module (Chapter 7).
- 2. Create a new Forecast. A Forecast (Chapter 12) is a simulation of watershed processes and consequences of flooding based on input data and information and hydrologic, reservoir operation, hydraulic, and impact analysis applications configured. During a Forecast, a Forecast Run is ran at a specific forecast time. (Recall that, a Forecast Run is a single forecast scenario defined by a specific set of data, information, and forecast alternatives.) HEC-RTS copies all the necessary files to a dated forecast directory (Appendix B). The user should check the data for errors and ensure that data was extracted properly.
- 3. Compute the forecast and check results. Forecast results include flow and stage in the channel from watershed runoff, reservoir release schedules, floodplain inundation maps, floodplain consequence reports, and reports listing actions for emergency responders to take. These results inform water management decision making.

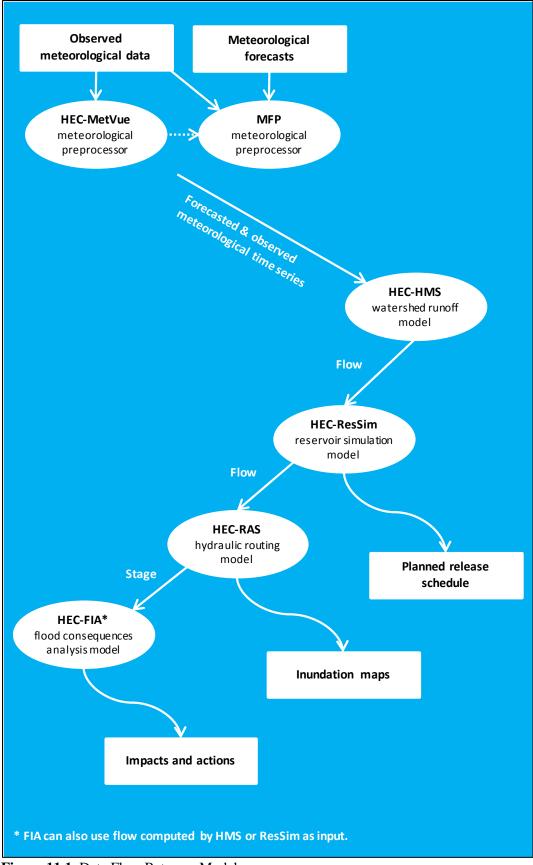


Figure 11.1 Data Flow Between Models

View results tables and plots from the **Modeling Module**. Compute messages provide information about each step of the computation process. Model-specific reports provide details about the individual models. The RAS Mapper Tool form HEC-RAS lets the user view inundation maps. To make adjustments to the models, HEC-RTS has access to model editors; **Forecast Runs** can be edited; and, override controls can be set. These features are discussed in Chapter 20.

4. Manage forecast information. When model results have been reviewed and validated, HEC-RTS provides tools to assist in managing information. Forecast results and data can be posted to DSS file(s), save modeling data, and freeze a forecast to protect it from further editing.

11.1 Modeling Module Interface

The **Modeling Module** is the grouping of commands for model execution. To access the **Modeling Module**, click the **Modeling** tab. The **Modeling Module** is illustrated in Figure 11.2. A detailed discussion of common screen components is presented in Chapter 2.

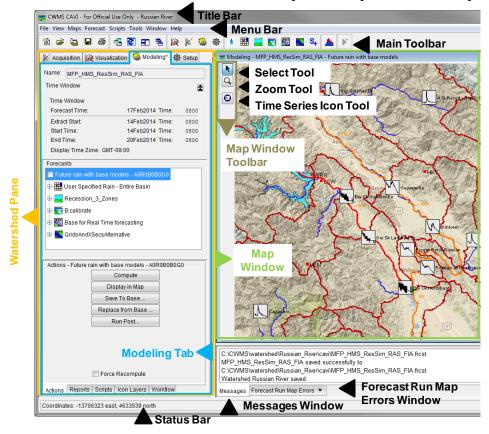


Figure 11.2 Models Module

11.1.1 Menu Bar

The following is an overview of the menu bar for the **Modeling Module** (Figure 11.2). The **File**, **View**, **Tools**, and **Help** menus are discussed in Section 2.3.1.

- ForecastFrom this menu the user can create, edit, open, save, delete and archive forecasts;
review information about the active forecast; post active forecast results to the
database; freeze a forecast so it cannot be edited by other users; and compute all
models or compute individual models. Available commands are: New, Open,
Recent, Continue, Compute Selector, Run Selector, Run Extract, Edit Time
Window, Information, Logs, Close, Save, Archive, Delete, Restore,
Upload/Download Forecast, Default Time Window, Model Linking, Schedule
Forecast Setup, and Manage Scheduled Forecasts.
- **Logs** sub-menu From this sub-menu the user can view the log files from Extract, Post and Compute. Available commands are: **Extract**, **Post** and **Compute**.

The commands in the Forecast menu and Log sub-menu are discussed in Chapter 12.

11.1.2 Modeling Tab

The **Modeling tab** (Figure 11.2) displays the time window, current date and time of the active forecast. Below these details is the **Forecast Run** tree, which allows the user to select alternatives. In the bottom panel, there are five tabs which include **Actions**, **Reports**, **Scripts**, **Icon Layers**, and **Workflow**.

11.1.3 Map Window

In the **Modeling Module**, the **Map Window** contains the model schematic elements for the active forecast in a geo-referenced context. In addition, time series icons are available that provide access to additional model data or other time series data. Time series icons are setup in the **Setup Module**, which is described in Chapter 18.

11.1.4 Time Series Icon Controls

The **Time Series Icon Controls** allow you to select the **Time Series Icon Layer** attributes that are displayed within the Watershed. The **Time Series Icon Controls** are located on the **Visualization**, **Acquisition**, and **Modeling** tabs. There are three attributes available: **Icons Type**, **Value**, and **Layer** (Figure 11.3).

Icons Type The Icon Type forces all icons within the Display Area to display as the selected Icon Type in the list. Selecting the Default option in the list will display the icons as they were set in the Time Series Icon Properties dialog.
 Value The Value selection allows you to display the Time Series Icon's data as labels, which display next to or on the location of their associated Time Series Icons. For example, you can choose to display the data's total, minimum, and maximums values as labels. Multiple values can be selected at once.

LayerLayer allows you to select the Sub-Layers that are visible in the Display Area.Multiple layers can be selected at once.

By selecting the attributes, you can change how all Time Series Icons are displayed within the Visualization process at once. For more detailed information on how to configure the properties that control the threshold color bar icons displayed (Chapter 18).

| Icons Type: | Default 👻 |
|-------------|--------------|
| Values: | 2 Selected 🔹 |
| Layers: | 1 Selected 🔹 |

Figure 11.3 Time Series Icon Controls

11.1.5 Time Series Icon Shortcut Menu

In the **Visualization Module**, the time series icons in the **Display Area** have a shortcut menu (Figure 10.4) that allows you to view the data associated with a selected time series icon in a plot, tabulate table, or MS Excel. Another option is that you can view the legend of the selected time series icon (Section 10.3.1). The shortcut menu is available for all time series icons (i.e., for the color bars, thumbnail plots, graphics, or dots).

11.2 Preparing to Forecast

Before you forecast, you will need to set up the **Program Order** (Chapter 16), create **Model Alternatives** (Chapter 20), assign **Model Alternative Keys** (Chapter 20), and create at least one **Forecast Run** (Chapter 12). You will also set the default time window for your forecast and ensure that data are available for your forecast. Remember, it is essential that you setup the program order, before forecasting.

Chapter 21 contains information on how to create MFP and HEC-MetVue model alternatives. For other programs, refer to the individual user documentation (HEC-HMS, HEC-ResSim, HEC-RAS, and HEC-FIA).

11.2.1 Setting the Default Time Window

The CAVI allows you to set a default forecast period and lookback period for all forecasts you create. If you do not specify a default time window, the CAVI assumes three days back and three days forward from the current day.

To set the default time window:

1. From the **Forecast** menu, click **Default Time Window**, and **Default Time Window** dialog (see Figure 11.4) opens.

| 📻 Default Time Wind | low | |
|---------------------|---------------------|-------------|
| Extract Period: | 3 | Days 🔻 |
| Look Back Period: | 3 | Days 🔻 |
| Forecast Length: | 3 | Days 🔻 |
| Default Lookback | VEnd times to start | /end of day |
| | ОК | Cancel |

Figure 11.4 Default Time Window Dialog

- 2. In the Extract Period field, enter the number of days to extract for your forecast.
- 3. In the Look Back Period field, enter the number of days to look back for your forecast.
- 4. In the **Forecast Length** field, enter the number of days to forecast.
- 5. If you want the lookback and end times to default to the start/end of the day, click **Default Lookback/End times to start/end of day**.
- 6. Click **OK**, and the **Default Time Window** dialog closes.

CHAPTER 12

Forecasts

In HEC-RTS, a **Forecast** is made by using is a **Forecast Run**, at a specific time with boundary condition data available. Forecasts are manipulated in the **Modeling Module**; see Chapter 11 for a detailed description on the **Modeling Module** and its **Map Window**. Before beginning a forecast, critical data should be checked to ensure it is available for the time window of the forecast. See Section 8.1 for details on checking critical data.

12.1 Forecast Shortcut Menu

In the **Modeling Module** in the **Watershed Pane**, from the **Forecast** menu, open a forecast. Then, in the **Modeling** tab, a shortcut menu (Figure 12.1) is available by right-clicking on the forecast run. This shortcut allows the user to **Compute** the forecast, **Display in Map** the forecast results, **View Log File** and open the **Forecast DSS File**.

| 📡 Acquisition 🙀 Visualizatio | n 👹 Modeling - | 🔅 Setup | | |
|---------------------------------|-----------------|------------------|--|--|
| Name: MPF_HMS_ResSim_RAS | | | | |
| Time Window | | | | |
| Time Window | | | | |
| Forecast Time: | 10Feb2014 Time | : 1200 | | |
| Extract Start: | 07Feb2014 Time | : 1200 | | |
| Start Time: | 07Feb2014 Time | : 1200 | | |
| End Time: | 13Feb2014 Time | : 1200 | | |
| Display Time Zone: GMT-08: | 00 | | | |
| Forecasts | | | | |
| Future rain with base mode | ls - A0R0B0B0G0 | | | |
| 🖶 🌐 🎹 User Specified Rain - Ei | ntire Basin Co | ompute | | |
| 🕀 🔜 Recession_3_Zones | Di | isplay in Map | | |
| B:calibrate | Sa | ave To Base | | |
| Replace from Base | | | | |
| 🖶 🏭 Base for Real Time fore | IN IN | un Post | | |
| 🗄 🗄 GridsAndXSecsAlternati | | ompute Log | | |
| | | precast DSS File | | |
| | | tract Log | | |
| Actions - Future rain with base | models - A | and Log | | |

Figure 12.1 Forecast Shortcut Menu

12.2 Creating a Forecast

Creating a forecast:

- 1. From the **Forecast** menu, click **New**, and the **Create New Forecast** dialog (Figure 12.2) opens.
- 2. By default, HEC-RTS assigns the forecast a name based on the current date and time. The forecast name can be modified. In addition, the items in the **Forecast Time** box are based on the current date and time.

| 📻 Create New Forec | ast | | | |
|--------------------|-----------------|---------|----------|---|
| Name: 2013 | .11.13-2000 | | | ٦ |
| Description: | | | | |
| | | | | |
| | | | | - |
| Folder: forecasts | 2013.11.13-2000 | | | |
| | Forecast | | • | |
| Time Window | | | | ٦ |
| Forecast Time: | 13Nov2013 |] Time: | 1300 | |
| Extract Start: | 10Nov2013 |) Time: | 1300 | |
| Start Time: | 10Nov2013 |) Time: | 1300 | |
| End Time: | 16Nov2013 🛄 | Time: | 1300 | |
| | - | _ | | |
| Sel Forecast F | | Descrip | tion | |
| MPE_Large | eEvent_Normal | | | |
| MPE_FLOO | | | | |
| | mmended_Upstrm | | | |
| | | | | |
| | | | | |
| | | 0 | K Cancel | |

Figure 12.2 Create New Forecast Dialog

- 3. Enter a forecast date and time that was determined in the **Acquisition** module (Chapter 7), this would be the latest time a complete set of reliable data is available. For example, in Figure 12.2, a **Forecast Date** of *13Nov2013* has been entered along with a **Forecast Time** of *1300*.
- 4. Once the **Forecast Date/Time** has been entered the name of the forecast is set, which can be modified up until the user clicks the OK button. As illustrated in Figure 12.2, the **Name** box, by default, contains the forecast name of *2013.11.13-1300*.
- 5. By default the combination of the forecast date and time is used in creating a forecast folder on the user's computer system. As illustrated in Figure 12.2, the forecasts **Folder** field contains the name of 2013.11.13-1300. The Folder field is non-editable.

- 6. The selected **Start Time** and **Extract Start** dates should be far enough in the past to meet the following:
 - a. Allow enough time steps to pass between the **Start Time** date and the **Forecast Time** date to allow routing reaches in the reservoir model to show correct flows at the time of forecast.
 - b. Generally, the **Start Time** and the **Extract Start** dates should be before the start of the event for calibration of loss rates for HEC-HMS. If this is not practical, then a time after the initial losses have been satisfied should be chosen. In most cases these dates and time are equal. However, from time to time, the forecaster may wish to extract data prior to the simulation window or may wish to update only the last few hours of data (for example when re-computing a forecast later in the day after more observed data are available).
- 7. The **Extract Start, Start Time** and **End Time** fields will default to dates based on information given in the **Default Time Window** dialog (Figure 12.3).

| 📻 Default Time Wind | wob | 23 |
|---------------------|-----------------------|------------|
| Extract Period: | 3 | Days 🔻 |
| Look Back Period: | 3 | Days 🔻 |
| Forecast Length: | 3 | Days 🔻 |
| Default Lookbac | k/End times to start/ | end of day |
| | ОК | Cancel |

Figure 12.3 Default Time Window Dialog

- 8. From the **Create New Forecast** dialog (Figure 12.2) the default time window can be overridden. Times for the corresponding dates will also need to be entered.
- 9. From the Forecast Runs table (Figure 12.4) on the Create New Forecast dialog (Figure 12.2) select the already defined forecast runs for the forecast that need to be simulated. Clicking the check box in the Selected column of the table selects a forecast run. Multiple forecast runs can be selected.

| Selected | Forecast Run | Description |
|----------|------------------------|-------------|
| V | MPE_LargeEvent_Normal | |
| | MPE_Normal | |
| | MPE_FLOOD | |
| | MPE_Recommended_Upstrm | |
| | | |
| | | |

Figure 12.4 Forecast Runs Table

- 10. Click OK, and the Create New Forecast dialog closes (Figure 12.2).
- 11. HEC-RTS now copies files to the forecast area (Appendix A), the **Creating Forecast** status dialog will display the progress of the forecast being created. HEC-RTS also retrieves (extracts) data from the database based on the entered times. The data is copied to a HEC-DSS file (forecast.dss) for use by the models.
- 12. Check the extract results log (Section 12.8).

The **Create New Forecast** dialog has four options for forecast creation. These options are available in the **Select Type** dropdown list, and include:

- New Forecast. This is the option described above in which the Forecast Time, Extract Start, Start Time, End Time and Forecast Run(s) used in the forecast are specified.
- From Existing Forecast. This option copies the Forecast Time, Extract Start, Start Time, End Time and Forecast Run(s) from a forecast already created. Here, an existing forecast previously created and saved in the watershed can be selected.
- From Archived Forecast. This option copies the Forecast Time, Extract Start, Start Time, End Time and Forecast Run(s) from a forecast that has been archived. Here, the zip file containing the archived forecast is selected. For more information on archiving a forecast see Section 12.12.4.
- From Imported Forecast. This option copies the Forecast Time, Extract Start, Start Time, End Time and Forecast Run(s) from a forecast file stored to disk. Here, the .forecast file to use is specified.

12.3 Open a Forecast

To open a forecast:

1. From the **Forecast** menu, click **Open**, and the **Open Forecast** dialog (Figure 12.5) opens.

| Open Forecast | | | | x |
|---------------|---------------|-------------|--------|---|
| Existing | | | | |
| Name | | Description | | |
| 2009.06.16-0 | 900 | | | ^ |
| 2014.03.27-1 | 300 | | | |
| | | | | • |
| Open | | | | |
| Name: | 2009.06.16-09 | 00 | | |
| Description: | | | | |
| | | Open | Cancel | |

Figure 12.5 Open Forecast Dialog

- 2. From the **Existing** list of available forecasts for the watershed, select the forecast to be opened.
- 3. Click **Open**, and the **Open Forecast** dialog closes. The program will load all of the information associated with the selected forecast. In the **Modeling** tab (Figure 12.1), the top checkbox of the tree will display the name of the selected forecast and the forecast runs associated with the selected forecast. The **Map Window** will display the model representations of the active forecast run.

12.4 Delete a Forecast

Delete a forecast:

1. From the **Forecast** menu, click **Delete**, and the **Delete Forecast** dialog (Figure 12.6) opens.

| Delete Forecast | | |
|---------------------------|---------------|---|
| Existing | | |
| Name | Description | |
| MFP_HMS_ResSim_RAS_FI | A | ^ |
| MPF_HMS_ResSim_RAS | | Ŧ |
| Delete Object | | |
| Name: MFP_HMS_Re | esSim_RAS_FIA | |
| Description: | | |
| Delete forecast directory | | |
| | Delete Cancel | |

Figure 12.6 Delete Forecast Dialog

- 2. In the **Existing** group box is a list of the forecasts that have been created for the watershed. Click a forecast in this list.
- 3. Click **Delete** and a warning will appear asking the user if they really want to delete the forecast. Click **Yes**, the warning dialog closes, and the forecast is removed from the watershed. This process does not physically delete any files; it only deletes the reference of the forecast from the watershed.
- 4. The other alternative is to delete the forecast directory. After selecting the forecast to be deleted, check the box next to **Delete forecast directory** in the **Delete Forecast** dialog. Using this option will delete the whole forecast directory.
- 5. Click **Delete** and a warning will appear asking the user if they really want to delete the forecast. Click **Yes**, the warning dialog closes, and the forecast and its directory will be removed from the watershed.

12.5 Close the Active Forecast

To close the active forecast:

- 1. Click **Close** from the **Forecast** menu.
- 2. The program will unload all of the information associated with the active forecast and the **Modeling Module** region will be blank.

12.6 Edit the Active Forecast

To edit the active forecast:

1. The forecast dates and time are located in the **Modeling** tab below the **Time Window** label (Figure 11.2).

| Forecast Time Window | dow | X | |
|------------------------------|-----------------|----------|--|
| Forecast Time: | 10Feb2014 Time: | 1200 | |
| Extract Start: | 07Feb2014 Time: | 1200 | |
| Start Time: | 07Feb2014 Time: | 1200 | |
| End Time: | 13Feb2014 Time: | 1200 | |
| Display Time Zone: GMT-08:00 | | | |
| | ОК | Cancel | |

Figure 12.7 Forecast Time Window Dialog

- If any of the date and times need to be changed, from the Forecast menu, click Edit Time Window, and the Edit Time Window dialog (Figure 12.7) opens. In the Edit Time Window dialog, enter the new information in the corresponding date and time fields.
- 3. Click OK, and the Edit Time Window dialog box will close.
- 4. To retrieve data from the database again, click **Run Selected Extracts**.
- 5. To add forecast runs to the selected forecast, from the Forecast menu, click Run Selector, and the Forecast Run Selector dialog (Figure 12.8) opens. In the Forecast Run Selector dialog, select the defined forecast runs you wish to add to the forecast by clicking check boxes in the Selected column.

| Selected | Forecast Run | Description |
|----------|------------------------|-------------|
| | MPE_LargeEvent_Normal | |
| 1 | MPE_Normal | |
| | MPE_FLOOD | |
| [7] | MPE_Recommended_Upstrm | |

Figure 12.8 Forecast Run Selector Dialog

6. To remove a forecast run from a forecast, clear the check box in the **Selected** column next to the name of the forecast run you wish to remove from the active forecast.

7. Click OK, the **Forecast Run Selector** dialog closes, and the **Progress** (similar to Figure 12.5) will notify the user of the progress of the update to the selected forecast.

12.7 Save the Active Forecast

To save the active forecast, from the **Forecast** menu, click **Save**, and the program will save information for the active forecast.

12.8 Checking Data

Now that a forecast has been created, the user ready to compute the forecast runs associated with that forecast. Before doing a compute, check the data that was retrieved from the database that will be used during the compute.

To check the retrieved data:

1. From the **Reports** tab in the Modeling Tab Watershed Pane, click **Extract Log**, the **Extract Report** dialog (Figure 12.9) opens.

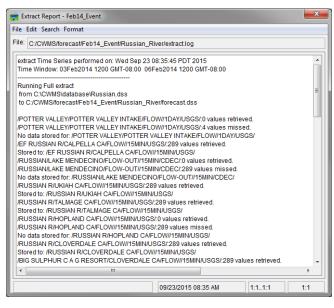


Figure 12.9 Extract Report Dialog

- 2. The **Extract Report** dialog displays the log file that was generated when the extract process was executed. The name of the active forecast appears in the title bar of the **Extract Reports** dialog. The location of the log file is displayed in the File bar at the top of the dialog.
- 3. Displayed are the results from the retrieval of precipitation data and the data needed by the models. The model data is displayed in the first part, with the precipitation data being display last.

- 4. If errors are shown, correct the data using HEC-DSSVue (Appendix F). Remember, data corrections or edits are only for the active forecast.
- 5. When finished reviewing the extract results, click **Close** button, and the **Extract Report** dialog closes.

12.9 Executing a Forecast

Now one or more forecast runs associated with the active forecast are ready to be computed. The **Modeling** tab (Figure 12.10) displays the time information associated with the active forecast, a list of forecast runs associated with the active forecast, and the command to execute the active forecast run.

One or more forecast runs will be executed for the active forecast. There are several ways to do this and the following sections describe in detail how to execute a single forecast run or execute multiple forecast runs.

| 🖹 Acquisition 🙀 Vi | sualization 🍇 Modeling | 🔅 Setup | | |
|--------------------------------|--------------------------|---------|--|--|
| Name: Feb14_Event | | | | |
| Time Window | | | | |
| Time Window | | | | |
| Forecast Time: | 06Feb2014 Time | : 1200 | | |
| Extract Start: | 03Feb2014 Time | : 1200 | | |
| Start Time: | 03Feb2014 Time | : 1200 | | |
| End Time: | 09Feb2014 Time | : 1200 | | |
| Display Time Zone: | GMT-08:00 | | | |
| Forecasts | | | | |
| ✓ Future rain with | base models - A0R0B | 0B0G0 | | |
| 🗉 🕀 User Specified | l Rain - Entire Basin | | | |
| 🛛 🕀 🔀 Recession_3_ | Zones | | | |
| B:calibrate | | | | |
| Base for Real Time forecasting | | | | |
| GridsAndXSecsAlternative | | | | |
| | | | | |
| | | | | |
| Actions - Future rain v | with base models - A0R0E | 30B0G0 | | |
| | Compute | | | |
| | Display in Map | | | |
| | Save To Base | | | |
| Replace from Base | | | | |
| Run Post | | | | |
| | | | | |
| Force Recompute | | | | |
| Actions Reports Sc | ripts Icon Layers Work | flow | | |

Figure 12.10 Modeling Tab

12.9.1 Forecast Run Shortcut Menu

In the **Modeling** tab (Figure 12.10) the forecast run has a shortcut menu (Figure 12.11) that allows the user to compute a forecast run (**Compute**); display the forecast run in the map (**Display in Map**); Save forecast run to base (**Save To Base**); replace forecast run from base (**Replace from Base**); run the post (**Run Post**); compute the forecast log report (**Compute Log**); open the forecast DSS file (**Forecast DSS File**); and extract the forecast log report (**Extract Log**).

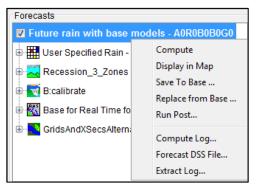


Figure 12.11 Forecast Alternative Shortcut Menu

12.9.2 Computing a Single Forecast Run

When a forecast run is highlighted, click **Compute** in the **Actions** tab of the **Modeling** tab (Figure 12.10) will compute the highlighted forecast run.

Optionally, from the forecast run shortcut menu (Figure 12.11) or from the **Forecast** menu, the **Compute Manager** (Figure 12.12) can be used to compute.

| 🚰 Compute Manager | 1 |
|--------------------|---|
| MPF_HMS-ResSim_RAS | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| Compute Close | |

Figure 12.12 Compute Manager Dialog

To compute using the Compute Manager:

- 1. From the **Forecast** menu, click **Compute Selector**. The **Compute Manager** dialog (Figure 12.12) opens.
- 2. Select the check box next to the forecast run to compute.
- 3. Click **Compute** and selected forecast run(s) will compute.
- 4. Click Close and the Compute Manager dialog closes.

The user can compute the entire forecast run (**Compute**); force a compute of the entire forecast (**Force Recompute** check box), or you can compute through a specific model. For example to compute the forecast run through the HEC-RAS model, right-click the **HEC-RAS** sub-item. Now HEC-RTS will compute the **HEC-MetVue**, **MFP**, **HEC-HMS**, **HEC-ResSim** and **HEC-RAS** model alternatives for the forecast run.

When choosing to compute, the **Compute Progress** dialog (Figure 12.13) opens. The **Compute Progress** dialog provides you information about the compute status at the bottom of the dialog. The dialog also echoes information, warnings and errors in a table at the top of the dialog. When the compute is finished, the **Compute Progress** dialog displays "**Compute Complete**".

| Compute Progress - MPE_LargeEvent_Normal | x |
|--|---|
| HMS: WARNING 40946: Total inflow to reach "R830" is zero. | • |
| HMS: WARNING 40946: Total inflow to reach "R890" is zero. | |
| HMS: WARNING 40012: Could not compute observed flow for element "OutletU1(Shepard)". | |
| HMS: WARNING 40013: Could not compute residual flow for element "OutletU1(Shepard)". HMS: NOTE 15254: Meteorologic model "Gages" | |
| needs to be computed. | |
| Computing HMS model Recommended_LargeEvents | |
| 17% | 1 |
| Overall | |
| Cancel | |

Figure 12.13 Compute Progress Dialog

12.9.3 Computing Multiple Forecast Runs

HEC-RTS provides you a way to execute more than one forecast run at one time:

1. From the **Forecast** menu, click **Compute Selector**. The **Compute Manage** dialog (Figure 12.12) opens.

- 2. Select the check box(s) next to the forecast run(s) to compute. Once the forecast runs are selected, click **Compute**.
- 3. The **Compute Progress** dialog (Figure 12.13) opens and HEC-RTS computes of the forecast runs selected in the **Compute Manager** dialog.
- 4. Click Close, and the **Compute Progress** dialog closes.
- 5. Click Close, and the **Compute Manager** dialog closes.

12.9.4 Re-Computing Forecast Runs

When a forecast run is executed, HEC-RTS remembers what models executed for that forecast run. If changes were made to a model in the forecast sequence, HEC-RTS will re-compute the model when you compute the sequence. If no changes were made to a model and the model was previously computed, HEC-RTS will not recomputed the model in the sequence. If for some reason the entire model sequence for a forecast run needs to be recomputed, from the **Modeling Module**, click the **Force Recompute** check box on the **Action** tab which will "force" a re-compute when the **Compute** button in the **Modeling** tab is clicked. The other way to re-compute the entire model sequence for the active forecast run is hold down the **CTRL** key and click the **Compute** button in the **Modeling** tab (Figure 12.10). The **Compute Progress** dialog (Figure 12.13) will open and all the models will be run.

12.10 Viewing Results

After the active forecast runs have been executed, the results may be reviewed in the **Modeling** tab in the **Watershed Pane**. Results include the log files, which display computational messages from some of the programs, reports from the individual programs, and some of the programs have results available in a graphical form from the **Map Window**. More detail on viewing results can be found in Chapter 13.

12.11 Calibrating and Editing Models

It may be desired to run the models individually for calibration before doing a full compute of the forecast run. This is particularly important for HEC-HMS because there are event-dependent parameters (loss rate and baseflow) that will need to be adjusted for the forecast. HEC-HMS will produce simulation hydrographs, which can be compared with observed hydrographs up to the time of forecast. These comparisons will determine if the HEC-HMS model needs to be adjusted.

In the case of HEC-ResSim, the simulated releases are used as a guide. After reviewing the releases, it might be decided that the releases need to be adjusted to better simulate actual reservoir operations. For HEC-RAS, profile information throughout the lookback period is checked; if results are not satisfactory, you can calibrate HEC-RAS by modifying "n-values" at selected cross sections. In the case of HEC-FIA, the levee failure stages might need to be adjusted to see the associated damage and impacts during an event.

Each program has its own individual editor; these editors are described in detail in Chapter 23. For each program, there are only certain parameters that can be edited. To make additional changes beyond those specific parameters, the model must be revised using the model's standalone application, and re-imported to HEC-RTS.

In Version 3.0, any of the model data can be edited because of the native module interface used. Care should be exercised when editing calibrated models configured to prevent models from "breaking."

12.11.1 Running a Forecast through Individual Models

To run a forecast through an individual model:

- 1. From the **Modeling** tab, right-click on a forecast run program and click **Compute thru** (model name). Note that the models are computed in the same order as the **Program Order** (Chapter 16) that has been set up. For example, to run the forecast run through the HEC-RAS model, click **HEC-RAS**.
- The Compute Progress dialog (Figure 12.13) opens and HEC-RTS begins execution of programs up to the model that has been chosen. For example, to run through HEC-RAS, HEC-RTS will compute the MFP, HEC-HMS, HEC-ResSim, and HEC-RAS model alternatives.

After the completion of the computation, review reports to help in model calibration. Chapter 13 describes in detail the available reports for each individual model.

12.11.2 Editing Individual Model Parameters

After making the initial run and reviewing the reports, it may be decided that parameters of an individual model need to be edited. Each model has its own individual editor, which are described in detail in Chapter 20. Accessing the editor for each individual model is the same:

- 1. From the Modeling tab, right-click on a forecast run in Forecast tree.
- 2. Depending on the forecast run clicked, the shortcut menu displays a range of editing options (Figure 12.14). The editor associated with that forecast run, opens and the necessary parameters can be edited.

```
Compute Through Recommended
Compute
Forecast Configuration
Combined Parameter Editor
Blending
Zone Configurations
```

Figure 12.14 Edit Shortcut Menu

12.12 Managing Forecast Data

HEC-RTS facilitates archiving and sharing of forecast data through four different mechanisms. One way is to save changes to the model alternatives to the base directory to make them available for other forecasts. Another way is to replace a model alternative for a specific forecast with the version in the base directory. In addition, results can be posted to the DSS file to make them available to other users, and the forecast can be frozen to prevent additional computes and further editing of model alternatives.

12.12.1 Saving Changes to the Base Directory

When parameters have been edited, the changes apply only to an individual forecast run and are saved in the forecast directory (see Appendix A an overview of the directory structure). To make changes available for subsequent forecasts, the changes will need to be saved back to the base directory.

To save data to the base directory:

- 1. From the **Modeling** tab, right-click on a forecast run.
- 2. From the shortcut menu (Figure 12.11), click **Save To Base**. The **Save To Base** dialog (Figure 12.15) opens.

| 📻 Save T | 📻 Save To Base | | | | | | | | |
|---------------------------|--|--------------------------------|------------|--|--|--|--|--|--|
| Fore | Forecast: 2014.02.10-1000 | | | | | | | | |
| Forecast | Forecast Run: Future rain with base models | | | | | | | | |
| | Future rain with base models | | | | | | | | |
| Сору | | Model | Model | | | | | | |
| Data | Data Program Alternative ID | | | | | | | | |
| | MFP User Specified Rain - Entire Basin A0 | | | | | | | | |
| V | HMS Recession_3_Zones A0R0 | | | | | | | | |
| ResSim B:calibrate A0R0B0 | | | | | | | | | |
| V | RAS | Base for Real Time forecasting | A0R0B0B0 | | | | | | |
| | FIA | GridsAndXSecsAlternative | A0R0B0B0G0 | | | | | | |
| | | | | | | | | | |
| Sa | ve to Local and § | Server Save to Local | Save None | | | | | | |

Figure 12.15 Save To Base Dialog

- 3. The **Save To Base** dialog displays the name of the **Forecast** and **Forecast Run** that are active. The table displays the **Programs**, **Model Alternatives**, and **Model IDs** that makeup the active forecast run.
- 4. From the **Copy Data** column of the table, select the check boxes beside the **Model Alternative** to copy from the forecast directory to the base directory.
- 5. When the appropriate **Model Alternatives** have been selected, click **Save to Local** (or **Save to Local and Server** if available and desired) (Figure 12.15). HEC-RTS will now

save all files associated with the selected model alternative back to the base directory. When the program is finished, a confirmation message will appear stating that all selected model alternatives were successfully saved.

Note that when you have edited model parameters, the **Save To Base** dialog (Figure 12.15) will also appear when leaving the current forecast by exiting HEC-RTS, creating a new watershed, creating a new forecast, opening an existing forecast, or closing the current forecast. To make changes available for subsequent forecasts, the data will need to be saved back to the base directory. To not save changes for later forecasts, click **Save None**.

12.12.2 Replacing Data from the Base Directory

If, while editing a model alternative, the user needs to revert to the original model alternative (or propagate modifications made through to the forecast), the changed model alternative in the forecast directory can be replaced with the model alternative from the base directory.

To replace a model alternative from the base directory:

- 1. From the **Modeling** tab, right-click a forecast run.
- 2. From the shortcut menu (Figure 12.11), click **Replace from Base**, and the **Replace From Base** dialog (Figure 12.16) opens.

| 📻 Replace | 📻 Replace From Base 📃 💌 | | | | | | |
|------------|---|--------------------------------|------------|--|--|--|--|
| Forec | Forecast: 2014.02.10-1000 | | | | | | |
| Forecast F | Forecast Run: Future rain with base models | | | | | | |
| | Future rain with base models | | | | | | |
| Restore | | Model | Model | | | | |
| Data | Program | Alternative | ID | | | | |
| | MFP User Specified Rain - Entire Basin A0 | | | | | | |
| | HMS Recession_3_Zones A0R0 | | | | | | |
| | ResSim | B:calibrate | A0R0B0 | | | | |
| | RAS | Base for Real Time forecasting | A0R0B0B0 | | | | |
| | FIA | GridsAndXSecsAlternative | A0R0B0B0G0 | | | | |
| Re | Replace From Server Replace from Local Cancel | | | | | | |

Figure 12.16 Replace From Base Dialog

- 3. The **Replace From Base** dialog displays the name of the **Forecast** and **Forecast Run** that are active. The table displays the **Programs**, **Model Alternatives**, and **Model IDs** that makeup the active forecast run.
- 4. From the **Restore Data** (Figure 12.16) column of the table, select the check boxes beside the **Model Alternative** to restore from the base directory to the forecast directory.
- 5. When the appropriate **Model Alternative** has been selected, click **Replace from Local** (or **Replace From Server**) (Figure 12.16). The program will now restore all files associated with the selected **Model Alternative** from the base directory to the forecast

directory. When HEC-RTS is finished, a confirmation message will stating that all selected model alternatives were successfully replaced.

12.12.3 Archive a Forecast

Once you have a configured a forecast you may want to keep an archive your forecast for future retrieval.

To archive a forecast:

- 1. If you have the forecast you are going to archive open, close it by selecting **Close** from the **Forecast** menu.
- 2. From the **Forecast** menu, click **Archive**, and the **Select Forecast to Archive** dialog (Figure 12.17) opens.

| Select Forecast 1 | o Archive | | | x |
|-------------------|-------------|-----------------|-----------|-----|
| Existing | | | | |
| Name | | Description | | |
| 2017.04.27-0 | 900 GMT-0 | 2017.04.27-0900 | GMT-08:00 | ^ |
| 2017.04.27-1 | 000 GMT-0 | 2017.04.27-1000 | GMT-08:00 | |
| | | | | |
| | | | | |
| | | | | |
| | | | | - |
| Open | | | | |
| Name: | 2017.04.27- | 0900 GMT-0800 | | |
| Description: | 2017.04.27- | 0900 GMT-08:00 | | |
| | | Select | Can | cel |

Figure 12.17 Select Forcast to Archive dialog

CHAPTER 13

Results

After the active forecast runs have been executed, the results can be reviewed in the **Modeling** tab in the **Watershed Pane**. Results include the log files, which display computational messages from some of the programs, reports from the individual programs, and some of the programs have results available in a graphical form from the **Map window**. This includes results from **HEC-MetVue**, **MFP**, **HEC-HMS**, **HEC-ResSim**, **HEC-RAS**, and **HEC-FIA**. If the HEC-RAS model included the creation of inundation data, this data can be viewed through **RAS Mapper**, available through the **HEC-RAS** software interface. If time series icons have been set up to view model results, then data can be viewed in a tabular or graphical format on the time series icons.

13.1 Viewing Model Results

Make sure there is an active forecast, which means a forecast has one or more forecast runs and is displayed in the **Forecast Panel**. The available reports are based on forecast runs, so the program needs to know which forecast runs are to be used for the reports and the order of the reports for comparison results.

In the **Forecast Panel** (Figure 13.1), of the **Modeling** tab there is a **Forecast Panel**, which displays the active forecast and the available forecast runs. Beside each forecast run is a checkbox. The checkbox indicates whether the forecast run should be available for the model reports and results plots.

To display the graphic elements of the model alternatives, right-click on the **Forecast Run** in the **Forecast Tree** and select **Display in Map**. At this time, only one forecast run schematic can be displayed per map window. However, multiple map windows can be opened to display multiple schematics.

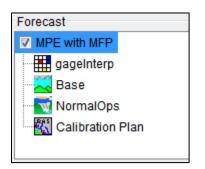


Figure 13-1 Forecast Panel

For example, in Figure 13.1, there are one forecast runs available for the active forecast. Summaries of forecast runs are accessed through right-clicking on the forecast run of interest.

13.2 Log Reports

Available log reports display computational messages for the execution of a forecast run.

13.2.1 Compute Messages

When an execution of a forecast run begins, the **Compute Progress** dialog (Figure 13.2) opens. This **Compute Progress** dialog contains information regarding the status of each step of the computation process. The **Message Output** field contains information regarding the status of each step of the computation process. In addition, if there are errors, warnings or any problems during the execution process.

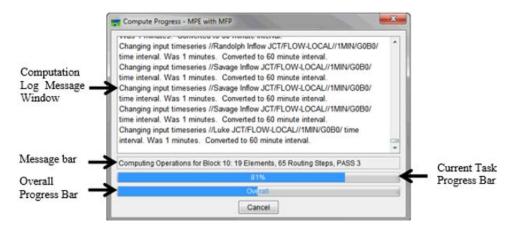


Figure 13-2 Compute Progress Dialog

For each model alternative used in the forecast run being executed, HEC-RTS provides status information by model alternative. The **Message Bar** indicates which model alternative is being executed, the **Current Task Progress Bar** indicates the percentage of completion for the current task, and the **Overall Progress Bar** indicates the percentage of completion of the compute. For example, in Figure 13.2 the **Message Bar** indicates that the HEC-ResSim model alternative is being run, the **Current Task Progress Bar** indicates that the HEC-ResSim portion is *81%* complete, and the **Overall Progress Bar** indicates the entire compute is about *50%* completed. When an execution is finished, then both progress bars will read *100%*, and the **Message Bar** reads *Compute Complete*.

The information from the **Compute Progress** dialog (Figure 13.2) is also available in a log report. This log report contains the same information in the **Message Output** field of the **Compute Progress** dialog. Additionally, the report gives detailed information regarding the model alternatives that were computed.

To view the Log File:

1. The user must be in the Modeling tab in the Watershed Pane.

- 2. To view this report make sure there is an active forecast and at least one forecast run selected (checkbox) for viewing results (Figure 13.1).
- 3. In the **Forecast** panel list right-click the forecast run and choose the **Compute Log** menu item from the context menu or click **Compute Log** from the **Reports** tab.
- 4. The Log File dialog (Figure 13.3) opens.

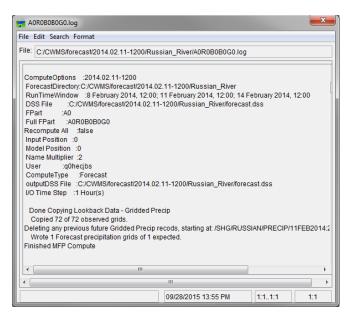


Figure 13-3 Log File Dialog

5. The report displays the location and name of the file, which contains the log file. From the **Log File** dialog, the results of the computation can be viewed.

13.3 HEC-MetVue Results

HEC-MetVue is used in HEC-RTS to process observed and forecasted meteorologic data for input to HEC-HMS. Outputs are meteorologic time series formatted for compatibility with HEC-HMS. These meteorologic time series can be viewed in reports.

13.4 MFP Results

MFP processes observed and forecasted meteorologic data for input to HEC-HMS. Outputs are meteorological time series formatted for compatibility with HEC-HMS. These meteorologic time series are tabulated in the MFP Summary report. The MFP Summary displays information about the MFP model alternative.

13.4.1 MFP Summary

The **MFP Summary** dialog (Figure 13.4) displays information regarding the MFP portion of the forecast run. The report displays the location and name of the file, which contains the **MFP Summary**. In addition, the report displays the name of the forecast run, the time window used,

the date and time of the execution of the MFP model alternative, and the creation of the precipitation grids for observed and future.

To view the **MFP Summary**:

- 1. The user must be in the Modeling tab in the Watershed Pane
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.1).
- 3. Point to **MFP** and right-click, then click on the summary to view, and the **MFP Summary** dialog (Figure 13.4) opens.
- 4. In Figure 13.4, the **MFP Summary** MFP alternative *gageInterp* is shown. The summary shows the sequence of precipitation depths entered by zone, and summaries of each grid used in the forecast. Summaries include the maximum, minimum, and average precipitation depth values and the number of cells in the grid showing precipitation depths greater than zero. Note that the precipitation depths shown in this log file are given in millimeters, regardless of the unit system of the watershed.

| MFP Summary | | | | | | x | |
|--|---|---------------|------------|----------------------|---|---|--|
| File | | | | | | | |
| Filename: C:/CWMS/North_Branch_v607/forecasts/jul2010/mfp/G0.html | | | | | | | |
| Summary for | r MFP | Alterna | tive gage | eInterp | | • | |
| Lookback Start Time: | 27 Jul 20 | 001, 21:00 GM | ЛТ | | | = | |
| Forecast Start Time: | 30 Jul 20 | 001, 21:00 GM | ΔT | | | | |
| Future Precip End Tir | ne: 30 Jul 20 | 001, 22:00 GN | ΔT | | | | |
| Forecast End Time: | 10 Aug 2 | 2001, 21:00 G | MT | | | | |
| Forecast By Zone (mm) End Time (UTC) All subbasins 30 July 2001, 22:00 0.0 Lookback Data Copied 72 observed grids of 72 expected. Missing 0 Future Precip Future State | | | | | | | |
| Wrote 1 Forecast grids | Wrote 1 Forecast grids of 1 expected. Missing 0 | | | | | | |
| | | re Precip Gri | | | | | |
| End Time | Min Value | Max Value | Mean Value | Cells Greater than 0 | | | |
| 30 July 2001, 22:00 | 0.00 | 0.00 | 0.00 | 0 | | | |
| | | | | | | | |
| | Observed Grids (mm) | | | | | | |
| End Time | Min Value | Max Value | Mean Value | Cells Greater than 0 | | - | |
| • | | | | | • | • | |

Figure 13-4 MFP Summary Dialog

5. On the File menu, click Close, and the MFP Summary dialog (Figure 13.4) closes.

13.5 HEC-HMS Results

HEC-HMS may be used to compute watershed runoff, given initial system states and watershed precipitation. The **HEC-HMS Results Report** let you view the individual elements results from the forecast alternative run. There are three ways to access results for individual elements in the forecast run. All methods show the same results.

13.5.1 HEC-HMS Reports Tab

The **HEC-HMS Results Reports Tab** (Figure 13.5) is the first method for displaying timeseries parameter data and forecast summaries for individual watershed elements as defined by the configuration of HEC-HMS. A complete list of the hydrologic elements from the HEC-HMS basin model used in the forecast run appears in a tree beneath a parent folder for the forecast run. To view details for an element, select it from the tree. With an element selected from the tree click on the **Reports** tab and select the element **Graph**, **Time-Series Table**, or **Summary Table** command. The appropriate results will automatically be shown in a new window. Hydrographs and other plots (Figure 13.6) present a visual summary of the run for each element.

| 🖹 Acquisition | Visualization | 縼 Modeling | 🔅 Setup | | | |
|--------------------|-------------------|---------------|---------|--|--|--|
| Name: 2014.12. | 10-1400 | | | | | |
| Time Window | | | | | | |
| Time Window | | | - | | | |
| Forecast Time: | 100 | ec2014 Time: | 1400 | | | |
| Extract Start: | 050 | ec2014 Time: | 1400 | | | |
| Start Time: | 050 | ec2014 Time: | 1400 | | | |
| End Time: | 140 | ec2014 Time: | 1400 | | | |
| Display Time Zo | one: GMT-08:00 |) | | | | |
| Forecasts | | | | | | |
| Future rain | with base mo | dels - A0R0B0 |)B0G0 | | | |
| 🗐 🕀 🎆 User Spec | ified Rain - Enti | re Basin | - | | | |
| 📄 🚍 🧮 Recession | 1_3_Zones | | | | | |
| Potter | Valley | | | | | |
| Calpel | lla | | | | | |
| Lake Mendocino | | | | | | |
| Coyote | | | | | | |
| | | | | | | |
| | | | | | | |
| Reports - Potter \ | /alley | | | | | |
| | Graph | | | | | |
| | Time-Series | Table | | | | |
| | Summary T | able | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Actions Reports | Scripts Icon | Layers Workf | ow | | | |

Figure 13-5 HEC-HMS Results Reports Tab

To view the **HEC-HMS Results** from the Reports tab:

- 1. The user must be in the Modeling tab in the Watershed Pane.
- 2. To view this report make sure there is an active forecast, and at least one forecast run is selected (checkbox) for viewing results (Figure 13.5).

- 3. Select and expand the HEC-HMS tree branch to display the HMS elements, click on a specific element and choose the Reports tab, and click the **Graph**, **Time-Series Table**, or **Summary Table** command.
- 4. Click on the report to view **Graph**, **Time-Series Table**, or **Summary Table** command (Figure 13.5) and the specific **HEC-HMS Results Report** opens.
- 5. For example, Figure 13.6, the selected **HEC-HMS Results Report** for the forecast run *Future rain with base models* is displayed. The *Lake Mendocino subbasin* element has been selected.
- 6. To close the **HEC-HMS Results Report**, click the **Close** button in the upper right corner of the dialog.

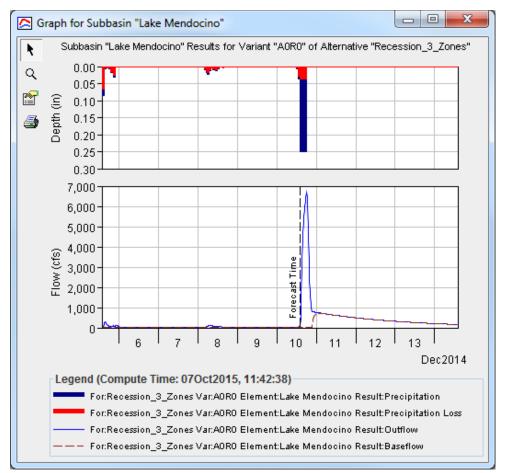


Figure 13-6 HEC-HMS individual element graph.

13.5.2 HEC-HMS Shortcut Menu

From the **Modeling Module**, the map viewer window may be used to view HEC-HMS model alternative results for individual elements:

1. The user must be in the **Modeling** tab in the **Watershed Pane**.

- 2. To use this option make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.5).
- 3. On the **Map Window**, select the **Zoom Tool** and zoom-in on an area where there are HEC-HMS model elements, an example is shown in Figure 13.7.
- 4. Then select the **Pointer Tool**, right-click on the HEC-HMS element of interest. From the shortcut menu (Figure 13.7), click one of the available reports.
- 5. The associated summary report dialog opens.

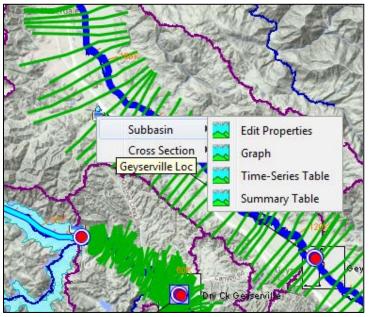


Figure 13-7 HEC-HMS Shortcut Menu Map Window

- 6. Click **Close**, and the plot, time-series table or summary table closes.
- 7. In Figure 13.7, there is another blue line; this represents the HEC-ResSim routing reach. If the user right-clicks on this one they will get a shortcut menu for HEC-ResSim. If they right-click where the two blue lines intersect, the shortcut menu will contain items for both HEC-ResSim and HEC-HMS.

From the **Modeling Module**, the HEC-HMS model alternative results for individual elements in the Watershed Pane Forecasts HEC-HMS tree branch may be accessed:

- 1. The user must be in the Modeling tab in the Watershed Pane.
- 2. To use this option make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.5).
- 3. Select and expand the HEC-HMS tree branch to display the HMS elements.

- 4. Then right-click on the HEC-HMS element of interest. From the shortcut menu (Figure 13.8), click one of the available reports.
- 5. The associated summary report dialog opens.

| Forecasts | | | | | | | |
|---|-------------------|---|--|--|--|--|--|
| Future rain with base models - A0R0B0B0G0 | | | | | | | |
| User Specified Rain - Entire Basin | | | | | | | |
| 🖶 🔀 Recession_3_Zones | | | | | | | |
| | | | | | | | |
| Calpella | | | | | | | |
| | | | | | | | |
| Coyote | Edit | | | | | | |
| I ▲ III | Graph | Ŧ | | | | | |
| | Time-Series Table | | | | | | |
| Forecast Run | Summary Table | | | | | | |

Figure 13-8 HEC-HMS Shortcut Menu Forecast tree

6. Click **Close**, and the plot, time-series table or summary table closes.

13.5.3 HEC-HMS Individual Elements

HEC-HMS individual elements can be selected to view results accessed using the **Graph**, **Time-Series Table**, or the **Summary Table** commands. The appropriate result will open in a new window for the selected individual element. The information included in the graph (Figure 13.6) varies by element type (Junction, Reservoir, etc.), but always includes outflow.

The second optional result is a time-series table. The time-series table includes the same information as the graph, but in numerical format (Figure 13.9). The information included in the summary table (Figure 13.10) also varies by element type, but always includes the peak discharge and time of peak discharge for the computed results.

If selected, the report also displays the element's parameter values in the lower-left panel of the report and flow summaries in the lower-left panel. The flow summaries are divided into simulation totals (start time to end time) and forecast totals, which include only the forecast period (time of forecast to end time).

| End Date Tir D5Dec2014 14:0 05Dec2014 14:3 05Dec2014 14:3 05Dec2014 14:3 05Dec2014 15:0 05Dec2014 15:1 05Dec2014 15:3 05Dec2014 15:3 | of Alternation npute Time: me Precond (IN) 00 15 0.00 15 0.00 15 0.00 15 0.00 15 0.00 | cip Loss) (IN) 6 0.06 6 0.06 6 0.06 | 4, 14:00 5, 11:42:38 | (CFS) 0.0 0.0 0.0 | Baseflow (CFS) 36.2 36.0 35.8 | |
|---|---|--|-------------------------|----------------------------|---|-------------------------------|
| 05Dec2014 14:0 05Dec2014 14:1 05Dec2014 14:2 05Dec2014 15:0 05Dec2014 15:3 05Dec2014 15:3 | (IN) 00 15 0.06 30 0.06 15 0.06 00 0.06 |) (IN) 6 0.06 6 0.06 6 0.06 | (IN) 0.00 0.00 | (CFS) 0.0 0.0 0.0 | (CFS) 36.2 36.0 35.8 | (CFS) 36.2 36.0 35.8 |
| 05Dec2014 14:1 05Dec2014 14:3 05Dec2014 14:4 05Dec2014 15:0 05Dec2014 15:1 05Dec2014 15:3 | 00 15 0.06 30 0.06 45 0.06 00 0.06 | 6 0.06 6 0.06 6 0.06 | 0.00 | 0.0 0.0 0.0 | 36.2 36.0 35.8 | 36.2 36.0 35.8 |
| 05Dec2014 14:1 05Dec2014 14:3 05Dec2014 14:4 05Dec2014 15:0 05Dec2014 15:1 05Dec2014 15:3 | 15 0.06 30 0.06 45 0.06 00 0.06 | 6 0.06 6 0.06 | 0.00 | 0.0 | 36.0 35.8 | 36.0 35.8 |
| 05Dec2014 14:3 05Dec2014 14:4 05Dec2014 15:0 05Dec2014 15:1 05Dec2014 15:3 | 30 0.06 15 0.06 00 0.06 | 6 0.06 6 0.06 | 0.00 | 0.0 | 35.8 | 35.8 |
| 05Dec2014 14:4 05Dec2014 15:0 05Dec2014 15:1 05Dec2014 15:3 | 45 0.06 00 0.06 | 6 0.06 | | | | |
| 05Dec2014 15:0 05Dec2014 15:1 05Dec2014 15:3 | 0.00 | | 0.00 | | 05.7 | 25.7 |
| 05Dec2014 15:1 05Dec2014 15:3 | - | 6 0.06 | | 0.0 | 35.7 | 30.7 |
| 05Dec2014 15:3 | | 0.00 | 0.00 | 0.0 | 35.5 | 35.6 |
| | 15 0.01 | 1 0.01 | 0.00 | 0.1 | 35.4 | 35.4 |
| | 30 0.01 | 1 0.01 | 0.00 | 0.2 | 35.2 | 35.4 |
| 05Dec2014 15:4 | 15 0.01 | 1 0.01 | 0.00 | 0.2 | 35.0 | 35.3 |
| 05Dec2014 16:0 | 0.0 | 1 0.01 | 0.00 | 0.3 | 34.9 | 35.2 |
| 05Dec2014 16:1 | 15 0.01 | 1 0.01 | 0.00 | 0.5 | 34.7 | 35.2 |
| 05Dec2014 16:3 | 30 0.01 | 1 0.01 | 0.00 | 0.6 | 34.6 | 35.2 |
| 05Dec2014 16:4 | 15 0.01 | 1 0.01 | 0.00 | 0.8 | 34.4 | 35.2 |
| 05Dec2014 17:0 | 0.0 | 1 0.01 | 0.00 | 1.0 | 34.3 | 35.2 |
| 05Dec2014 17:1 | 15 0.02 | 2 0.02 | 0.00 | 1.1 | 34.1 | 35.2 |
| 05Dec2014 17:3 | 30 0.02 | 2 0.02 | 0.00 | 1.3 | 34.0 | 35.3 |
| 05Dec2014 17:4 | 15 0.02 | 2 0.02 | 0.00 | 1.5 | 33.8 | 35.3 |
| 05Dec2014 18:0 | 0.02 | 2 0.02 | 0.00 | 1.6 | 33.7 | 35.3 |
| 05Dec2014 18:1 | 15 0.01 | 1 0.01 | 0.00 | 1.8 | 33.5 | 35.3 |
| 05Dec2014 18:3 | 30 0.01 | 1 0.01 | 0.00 | 2.0 | 33.4 | 35.3 |

Figure 13-9 HEC-HMS Time-Series Table.

| III Summary Results for Junction "Cloverdale" |
|--|
| Project: Russian River Forecast Alternative: Recession_3_Zones Variant: A0R0 Junction: Cloverdale |
| Start of Alternative:05Dec2014, 14:00Basin Model:Russian RiverEnd of Alternative:14Dec2014, 14:00Meteorologic Model:InterpolatedCompute Time:07Oct2015, 11:42:38 |
| Volume Units: AC-FT |
| Computed Results |
| Peak Discharge:44729.0 (CFS) Date/Time of Peak Discharge:11Dec2014, 02:45 Volume: n/a |
| Observed Hydrograph at Gage RUSSIAN at CLOVERDALE |
| Peak Discharge:2470.0 (CFS)Date/Time of Peak Discharge:05Dec2014, 23:00Mean Abs Error: 825.5 (CFS)RMS Error: 753.5 (CFS)Volume:(IN)Volume Residual:Nash-Sutcliffe:-0.713 |
| |

Figure 13-10 HEC-HMS Summary Table

13.6 HEC-ResSim Results

HEC-ResSim may be used to simulate operation of a water control system, given inflow and local flow forecasts from HEC-HMS. There are several reports available to view HEC-ResSim results – **Release Decision Report** (Figure 13.11), summary results reports, user created reports,

network reports, and advanced reports. In addition, from the **Map window** HEC-ResSim results at HEC-ResSim elements (e.g., reservoirs, junctions) can be viewed graphically. See the HEC-ResSim User's Manual for more detail on these results.

| File Options | | | | | | | | | |
|-----------------------------|----------------------|----------------------|-----------------------|---------------------|--------------|---------------------|----------------------|--|--|
| | | | | | | | | | |
| Alternative: N0:NormalOps | | | | | | | | | |
| Run: G0B0N0 | | | | | | | | | |
| Lookback: 27 Jul 2001, 1600 | | | | | | | | | |
| Start Time: 30 Jul 2001 | | | | | | | | | |
| End Time: 10 Aug 2001 | , 1600 | | | | | | | | |
| Rule Key: GC=Guide C | urve, RO=Release Ove | erride, EO=Elevation | n Override, ZB=Zone B | 3oundary | | | | | |
| Date-Time | | | | Savage | | | | | |
| 1 | Active Zone | Net Inflow (cfs) | Savage | -Dam | -Dam L&O | -Controlled Outlet | -Uncontrolled Outlet | | |
| | Elev (ft) | , | Active Rule | Active Rule | Uncontrolled | Active Rule | Uncontrolled | | |
| | | | Flow (cfs) | Flow (cfs) | Flow (cfs) | Flow (cfs) | Flow (cfs) | | |
| | | | | | Unctrl | | Unctrl | | |
| 30Jul2001, 16:00 | 1,464.55 | 230.43 | 49.91 | 49.91 | 0.00 | 49.91 | 0.00 | | |
| | Conservation | | MinRelease | MinRel 4 Recreation | Unctrl | MinRel 4 Recreation | Unctrl | | |
| 30Jul2001, 17:00 | 1,464.58 | 221.87 | 150.00 | 150.00 | 0.00 | 150.00 | 0.00 | | |
| | Conservation | | MinRelease | MinRel 4 Recreation | Unctrl | MinRel 4 Recreation | Unctrl | | |
| 30Jul2001, 18:00 | 1,464.59 | 213.72 | 150.00 | 150.00 | 0.00 | 150.00 | 0.00 | | |
| | Conservation | | MinRelease | | Unctrl | | Unctrl | | |
| 30Jul2001, 19:00 | 1,464.61 | 205.98 | 150.00 | 150.00 | 0.00 | 150.00 | 0.00 | | |
| | Conservatic C | | MinRelease | | | | Unctrl | | |
| 30Jul2001, 20:00 | 1,464.62 | 198.60 | 150.00 | 150.00 | 0.00 | 150.00 | 0.00 | | |
| | Conservation | | MinRelease | | | | Unctrl | | |
| 30Jul2001, 21:00 | 1,464.63 | 191.59 | 150.00 | 150.00 | 0.00 | 150.00 | 0.00 | | |
| | Conservation | | | | | | Unctrl | | |
| 30Jul2001, 22:00 | 1,464.64 | 184.91 | 150.00 | 150.00 | 0.00 | 150.00 | 0.00 | | |
| | Conservation | | MinRelease | MinRel 4 Recreation | Unctrl | MinRel 4 Recreation | Unctrl | | |

Figure 13-11 Release Decision Report

13.6.1 Release Decision Report

The **Release Decision Report** provides the decision information that HEC-ResSim reached which are decisions based on operational rules and physical constraints defined in the HEC-ResSim watershed model. In addition, the report displays the forecast run name, forecast run name and the time window information.

To view the **Release Decision Report**:

- 1. The user must be in the **Modeling** tab in the **Watershed Pane**.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.12).
- 3. On the **Forecast** panel, select the HEC-ResSim alternative to see data for and choose **Release Decision Report** from the **Reports** tab (Figure 13.12) and the **Release Decision Report** (Figure 13.11) opens.

| Name: 2014.02.10-1000 Time Window Forecast Time: 10Feb2014 Time: 1000 Extract Start: 07Feb2014 Time: 1000 Start Time: 07Feb2014 Time: 1000 End Time: 13Feb2014 Time: 1000 Display Time Zone: GMT-08:00 Forecasts For | 🖹 Acquisition | 👰 Visualizati | on 🍇 Modelin | g 🔅 Setup | | | | |
|--|----------------|-------------------|----------------|-----------|--|--|--|--|
| Time Window Forecast Time: 10Feb2014 Time: 1000 Extract Start: 07Feb2014 Time: 1000 Start Time: 07Feb2014 Time: 1000 End Time: 13Feb2014 Time: 1000 Display Time Zone: GMT-08:00 Forecasts Forecasts Forecasts GrudsAndXSecsAlternative Reports - B:calibrate Reservoir Summary Flow Summary Flow Summary Gates Summary Stage Summary | Name: 2014. | 02.10-1000 | | | | | | |
| Time Window Forecast Time: 10Feb2014 Time: 1000 Extract Start: 07Feb2014 Time: 1000 Start Time: 07Feb2014 Time: 1000 End Time: 13Feb2014 Time: 1000 Display Time Zone: GMT-08:00 Forecasts Forecasts Forecasts Generation of the set of | Time Window | | | | | | | |
| Forecast Time: 10Feb2014 Time: 1000 Extract Start: 07Feb2014 Time: 1000 Start Time: 07Feb2014 Time: 1000 End Time: 13Feb2014 Time: 1000 Display Time Zone: GMT-08:00 00 Forecasts Image: Forecasts Image: Base Forecasts Image: Base Scalibrate Image: Base Forecasting Image: Base Stage Summary Image: Stage Summary Stage Summary | Time Windo | A/ | | | | | | |
| Start Time: 07Feb2014 Time: 1000 End Time: 13Feb2014 Time: 1000 Display Time Zone: GMT-08:00 Image: Second | | | 0Feb2014 Tim | e: 1000 | | | | |
| End Time: 13Feb2014 Time: 1000 Display Time Zone: GMT-08:00 Forecasts Forecasts Future rain with base models - A0R0B0B0G0 Generation State Base for Real Time forecasting GridsAndXSecsAlternative Reports - B:calibrate Reservoir Summary Flow Summary Gates Summary Stage Summary | Extract Start: | (| 7Feb2014 Tim | e: 1000 | | | | |
| Display Time Zone: GMT-08:00 Forecasts Future rain with base models - A0R0B0B0G0 Future rain with base models - A0R0B0B0 Future rain with base models - A0R0B0B0 Future rain with base models - A0R0B0B0G0 Future rain with base models - A0R0B0B0G0 Future rain with base models - A0R0B0B0 Future rain with base models - A0R0B0 Future rain wi | Start Time: | (| 7Feb2014 Tim | e: 1000 | | | | |
| Forecasts Image: Constraint of the set of the | End Time: | | 3Feb2014 Tim | e: 1000 | | | | |
| Image: Second | Display Time | e Zone: GMT-08 | 00 | | | | | |
| User Specified Rain - Entire Basin Scalibrate Base for Real Time forecasting GridsAndXSecsAlternative Reports - B:calibrate Reservoir Summary Flow Summary Gates Summary Stage Summary | Forecasts | | | | | | | |
| Reports - B:calibrate Reservoir Summary Flow Summary Gates Summary Stage Summary | Future rain | with base mod | els - A0R0B0B0 | GO | | | | |
| Reports - B:calibrate Reservoir Summary Flow Summary Gates Summary Stage Summary | User S | pecified Rain - F | ntire Basin | | | | | |
| B calibrate Base for Real Time forecasting GridsAndXSecsAlternative Reports - B:calibrate Reservoir Summary Flow Summary Gates Summary Stage Summary | | | | | | | | |
| Base for Real Time forecasting GridsAndXSecsAlternative Reports - B:calibrate Reservoir Summary Flow Summary Gates Summary Stage Summary | | | | | | | | |
| CridsAndXSecsAlternative | | | | | | | | |
| Reports - B:calibrate Reservoir Summary Flow Summary Ower Summary Gates Summary Stage Summary | | | | | | | | |
| Reservoir Summary Flow Summary Power Summary Gates Summary Stage Summary | ⊞ | | | | | | | |
| Reservoir Summary Flow Summary Power Summary Gates Summary Stage Summary | | | | | | | | |
| Reservoir Summary Flow Summary Power Summary Gates Summary Stage Summary | | | | | | | | |
| Flow Summary Power Summary Gates Summary Stage Summary | Reports - Bica | | | | | | | |
| Power Summary Gates Summary Stage Summary | | | | | | | | |
| Gates Summary Stage Summary | | Flow Su | mmary | | | | | |
| Stage Summary | | | | | | | | |
| | Gates Summary | | | | | | | |
| Release Decision Report | Stage Summary | | | | | | | |
| | | Release Dec | ision Report | | | | | |
| | | | | | | | | |
| Actions Reports Scripts Icon Layers Workflow | Actions Rend | orte Scripts Ic | on Lavers Wor | kflow | | | | |

Figure 13-12 Reports Tab

4. The user can view a different reservoir's report or change the time window for the information being displayed. On the **Options** menu, choose **Edit Options**, and the **Release Decision Report Options** dialog (Figure 13.13) opens. The user can change the reservoir by using the **Reservoir** drop-down list. The user can also specify a different time window by selecting the **Specify** option and enter the start and end dates.

| Release Decision Report Options |
|----------------------------------|
| Reservoir: Jennings Randolph 🗸 🗸 |
| Time Window |
| Simulation Period |
| ⊘ Specify |
| Start Date: Time: |
| End Date: Time: |
| |
| OK Cancel |

Figure 13-13 Release Decision Report Options Dialog

- 5. From the **File** menu, the report can be printed.
- 6. From the File menu, click Close, and the Release Decision Report closes.

13.6.2 Results Summary Reports

The results summary reports provide information for reservoirs, flow locations, hydropower facilities, and gates. Each report displays the average, maximum, and minimum values.

13.6.2.1 Reservoir Summary Report

This report summarizes the reservoirs for the active forecast run. These results include the storage, elevation, controlled release, and uncontrolled spill parameters for each reservoir. Reported are the average, maximum, minimum values for each parameter.

To view the **Reservoir Summary Report**:

- 1. The user must be in the Modeling tab in the Watershed Pane.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.12).
- 3. On the **Forecast** panel, select the **HEC-ResSim** alternative to see data for. From the **Reports** tab, click **Reservoir Summary** and the **Reservoir Summary Report** (Figure 13.14) opens.
- 4. From the **File** menu, the report can be printed.
- 5. From the **File** menu, click **Close**, and the **Reservoir Summary Report** (Figure 13.14) closes.

| 🟹 Reservoir Summary Report | | | |
|-------------------------------|---------------------|----------|---------|
| File | | | |
| | Simulation: jul2010 | | |
| | Alternative:G0B0N0 | | |
| Lookback: 27 Jul 2001 16:00 | | | |
| Start Time: 30 Jul 2001 16:00 | | | |
| End Time: 10 Aug 2001 16:00 | | | |
| Location/Parameter | Average | Maximum | Minimum |
| Jennings Randolph | | | |
| Storage (ac-ft) | 83855.15 | 90609.52 | 81553.5 |
| Elevation (ft) | 1461.05 | 1468.58 | 1458.4 |
| Controlled Release (cfs) | 712.94 | 5640.89 | 0.0 |
| Uncontrolled Spill (cfs) | 0.00 | 0.00 | 0.0 |
| Savage | | | |
| Storage (ac-ft) | 17341.22 | 18026.10 | 16182.0 |
| Elevation (ft) | 1462.82 | 1464.79 | 1459.4 |
| Controlled Release (cfs) | 114.04 | 200.00 | 49.6 |
| Uncontrolled Spill (cfs) | 0.00 | 0.00 | 0.0 |

Figure 13-14 Reservoir Summary Report

13.6.2.2 Flow Summary Report

This report summarizes the flow at reservoirs and non-reservoir locations for the active forecast run. These results include the regulated flow, unregulated flow, and cumulative local flow for each location. Reported are the average, maximum, minimum values for each parameter.

To view the Flow Summary Report:

- 1. The user must be in the Modeling tab in the Watershed Pane.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.12).
- 3. On the **Forecast** panel, select the **HEC-ResSim** alternative to see data for. From the **Reports** tab, click **Flow Summary** and the **Flow Summary Report** (Figure 13.15) opens.
- 4. From the **File** menu, the report can be printed.
- 5. From the File menu, click Close, and the Flow Summary Report (Figure 13.15) closes.

| 🟹 Flow Summary Report | | | | x |
|-------------------------------|---|---------|---------|---|
| File | | | | |
| | Simulation: jul2010 Alternative:G0B0N0 | | | |
| Lookback: 27 Jul 2001 16:00 | | | | |
| Start Time: 30 Jul 2001 16:00 | | | | |
| End Time: 10 Aug 2001 16:00 | | | | |
| Location/Parameter | Average | Maximum | Minimum | |
| Barton | | | | • |
| Regulated Flow (cfs) | 31.02 | 177.77 | 9.55 | |
| Unregulated Flow (cfs) | 31.02 | 177.77 | 9.55 | 5 |
| Cumulative Local Flow (cfs) | 31.02 | 177.77 | 9.55 | 5 |
| Barton to Savage Inflow JCT | | | | |
| Regulated Flow (cfs) | 31.21 | 176.27 | 9.63 | 3 |
| Unregulated Flow (cfs) | 31.21 | 176.27 | 9.63 | |
| Cumulative Local Flow (cfs) | 31.21 | 176.27 | 9.63 | 8 |
| Cumberland | | | | |
| Regulated Flow (cfs) | 1173.17 | 5929.97 | 253.47 | 1 |
| Unregulated Flow (cfs) | 400.71 | 2879.50 | 101.98 | • |
| Cumulative Local Flow (cfs) | 275.62 | 2140.90 | 72.77 | 1 |
| Jennings Randolph | | | | - |

Figure 13-15 Flow Summary Report

13.6.2.3 Stage Summary Report

This report summarizes the stage at reservoirs and non-reservoir locations for the active forecast run. These results include the regulated stage, unregulated stage, and cumulative local stage for each location. Reported are the average, maximum, minimum values for each parameter. If the appropriate data has not been entered (rating curves) this report will be blank.

1. The user must be in the **Modeling** tab in the **Watershed Pane**.

- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.12).
- 3. On the **Forecast** panel, select the **HEC-ResSim** alternative to see data for. From the **Reports** tab, click **Stage Summary**, and the **Stage Summary Report** (Figure 13.16) opens.

| File | | | | |
|---|---|---------|---------|----|
| | imulation: jul2010 Iternative:G0B0N0 | | | |
| Lookback: 27 Jul 2001 16:00 Start Time: 30 Jul 2001 16:00 End Time: 10 Aug 2001 16:00 | | | | |
| Location/Parameter | Average | Maximum | Minimum | |
| Cumberland | | | | 1. |
| Regulated Stage (ft) | 3.2 | 7.2 | 2.3 | h |
| Unregulated Stage (ft) | 2.4 | 4.8 | 2.0 | |
| Cumulative Local Stage (ft) | 2.2 | 4.1 | 2.0 | |
| Luke | | | | |
| Regulated Stage (ft) | 2.8 | 7.5 | 1.8 | 17 |
| Unregulated Stage (ft) | 1.6 | 4.0 | 1.1 | 1 |
| Cumulative Local Stage (ft) | 1.2 | 2.6 | 1.1 | 1 |
| Pinto | | | | μ |
| Regulated Stage (ft) | 2.5 | 7.8 | 1.3 | 1 |
| Unregulated Stage (ft) | 1.4 | 4.8 | 0.7 | 1 |
| | 1.0 | 3.9 | 0.4 | 1 |

Figure 13-16 Stage Summary Report

- 4. From the **File** menu, the report can be printed.
- 5. From the File menu, click Close, and the Stage Summary Report (Figure 13.16) closes.

13.6.2.4 Power Summary Report

This report summarizes the hydropower information at a reservoir for the active forecast run. These results include generation efficiency, power head, hydraulic losses, energy generated per time step, power generated, plant factor, and flow power for each power plant. Reported are the average, maximum, minimum values for each parameter. If the appropriate data (hydropower plant) has not been entered this report will be blank:

- 1. The user must be in the **Modeling** tab in the **Watershed Pane**.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.12).
- 3. On the **Forecast** panel, select the **HEC-ResSim** alternative to see data for. From the **Reports** tab, click **Power Summary**, and the **Power Summary Report** (Figure 13.17) opens.

| Ri Po | wer Summary Report | | | - • × |
|-------|---|--------------------------------------|---------|---------|
| File | | | | |
| | | mulation: jul2010 ernative:G0B0N0 | | |
| Start | back: 27 Jul 2001 16:00 Time: 30 Jul 2001 16:00 Time: 10 Aug 2001 16:00 | | | |
| | Location/Parameter | Average | Maximum | Minimum |
| No P | ower Data | | | |
| | | | | |

Figure 13-17 Power Summary Report

- 4. From the **File** Menu, the report can be printed.
- 5. From the **File** menu, click **Close**, and the **Power Summary Report** (Figure 13.17) closes.

13.6.2.5 Gate Summary Report

This report summarizes the gates defined for the reservoirs in the active forecast run. Reported is the average, maximum, minimum value for the gate opening at each reservoir where a gate has been defined.

To view the **Gate Summary Report** (if the appropriate data has not been entered this report will be blank):

- 1. The user must be in the Modeling tab in the Watershed Pane.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.12).
- 3. On the **Forecast** panel, select the **HEC-ResSim** alternative to see data for. From the **Reports** tab, click **Gate Summary**, and the **Gate Summary Report** (Figure 13.18) opens.

| 🟹 Gate Summary Report | | | |
|---|-------------------|---------|---------|
| File | | | |
| Si | mulation: jul2010 | | |
| Alt | ernative:G0B0N0 | | |
| Lookback: 27 Jul 2001 16:00 Start Time: 30 Jul 2001 16:00 End Time: 10 Aug 2001 16:00 | | | |
| Location/Parameter | Average | Maximum | Minimum |
| No Gate Setting Data | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Figure 13-18 Gate Summary Report

- 4. From the **File** menu, the report can be printed.
- 5. On the File menu, click Close, and the Gate Summary Report (Figure 13.18) closes.

13.6.3 Graphical Results

From the **Modeling Module**, the graphical results for HEC-ResSim are available from the network components for the active forecast run that includes a HEC-ResSim model alternative. These network components are reservoirs, diverted outlets, routing reaches, junctions, and diversions.

13.6.3.1 Reservoirs

To view the graphical results from a HEC-ResSim reservoir:

- 1. The user must be in the **Modeling** tab in the **Watershed Pane**.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.12).
- 3. On the **Map window**, select the **Zoom Tool** and zoom-in on an area where there is a HEC-ResSim reservoir, an example is shown in Figure 13.19.
- 4. Then select the **Pointer Tool**, right-click the HEC-ResSim reservoir, the polygon and storage reach which will now be highlighted in yellow. From the shortcut menu (Figure 13.19), click one of the available options.

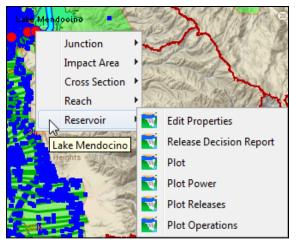


Figure 13-19 HEC-ResSim Shortcut Menu - Reservoir

- 5. If the active forecast run contains HEC-RAS and/or HEC-FIA model alternatives and their results overlap the HEC-ResSim results, the shortcut menu will reflect this. Therefore, the shortcut menu could contain items for HEC-RAS and HEC-FIA.
- 6. Depending on which command was clicked on from the short cut menu (Figure 13.19) the appropriate **Plot** dialog will open. In Figure 13.20, the different **Dialogs** associated with the appropriate shortcut menu item can be seen.
- 7. The user can print, save as a graphic file, and view tabular data of the plot from the **File** menu. See Appendix I for details on how to manipulate plots.

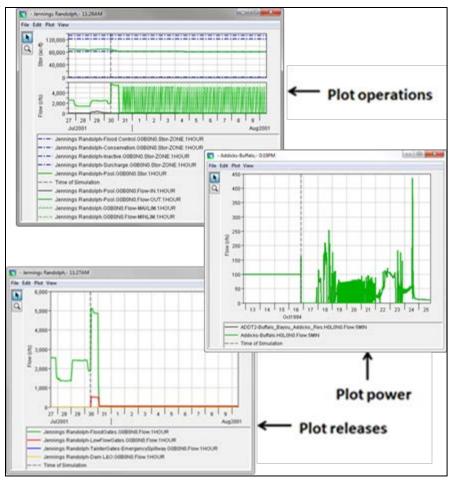


Figure 13-20 HEC-ResSim Plots

Also, from the shortcut menu (Figure 13.19) the **Release Decision Report** (Figure 13.11) can be viewed.

8. User Plots are available from the shortcut menu, but these plots are defined beforehand. User Plots are discussed further in this section below, and more detail is provided in the HEC-ResSim User's Manual.

13.6.3.2 Routing Reaches

To view the graphical results from a HEC-ResSim routing reach:

- 1. The user must be in the Modeling tab in the Watershed Pane.
- 2. To view this plot make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.12).
- 3. In the **Map window**, select the **Zoom Tool** and zoom-in on an area where there is a HEC-ResSim routing reach (blue line).

4. Then select the **Pointer Tool**, right-click on the HEC-ResSim routing reach, it will now be highlighted in yellow. From the **Routing Reach Shortcut** (Figure 13.21), click **Plot**.

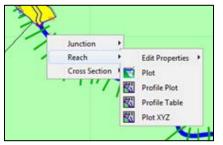


Figure 13-21 Routing Reach Shortcut

- 5. If the active forecast run contains HEC-RAS and/or HEC-FIA model alternatives and their results overlap the HEC-ResSim results, the shortcut menu will reflect this. Therefore, the shortcut menu could contain items for HEC-RAS and HEC-FIA.
- 6. The **Plot** dialog window (Figure 13.22) opens, displaying the graphical results for the routing reach.

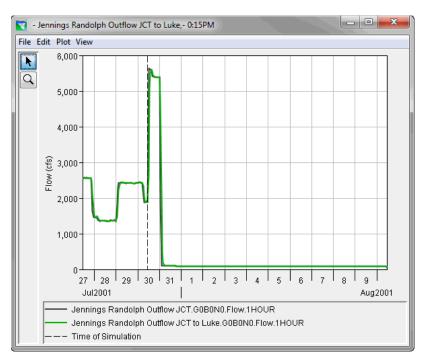


Figure 13-22 Plot Dialog – Routing Reach

- 7. The user can print, save as a graphic file, and view tabular data of the plot from the **File** menu. See Appendix I for details on how to manipulate plots.
- 8. User Plots are available from the shortcut menu, but these plots are defined beforehand. User Plots are discussed further in this section below, and more detail is provided in the HEC-ResSim User's Manual.

13.6.3.3 Diverted Outlets

To view the graphical results from a HEC-ResSim diverted outlet:

- 1. The user must be in the **Modeling** tab in the **Watershed Pane**.
- 2. To view this plot make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.12).
- 3. On the **Map window**, select the **Zoom Tool** and zoom-in on an area where there is a HEC-ResSim diverted outlet (line leaving a reservoir pool with an arrowhead); an example is shown in Figure 13.23.
- 4. Then select the **Pointer Tool**, right-click on the HEC-ResSim diverted outlet, it will now be highlighted in yellow. From the shortcut menu (Figure 13.23), click **Plot**.

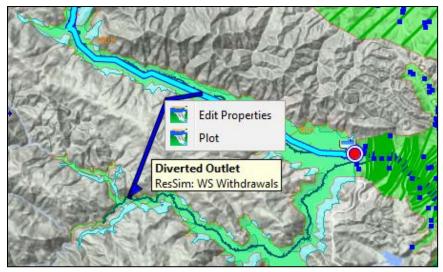


Figure 13-23 HEC-ResSim Shortcut Menu - Diverted

- 5. If the active forecast run contains HEC-RAS and/or HEC-FIA model alternatives and their results overlap the HEC-ResSim results, the shortcut menu will reflect this. Therefore, the shortcut menu could contain items for HEC-RAS and HEC-FIA.
- 6. The **Default Plot** dialog window (Figure 13.24) will open, displaying the graphical results for the diverted outlet.

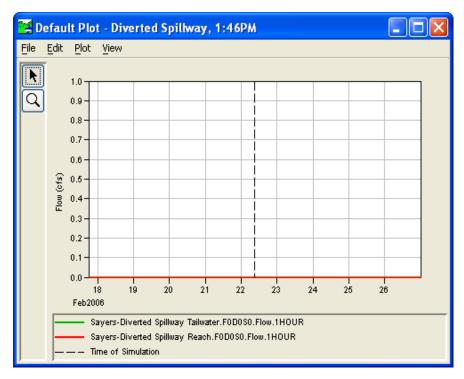


Figure 13-24 Default Plot Dialog Box - Diverted

- 7. The user can print, save as a graphic file, and view tabular data of the plot from the **File** menu. See Appendix I for details on how to manipulate plots.
- 8. User Plots are available from the shortcut menu, but these plots are defined beforehand. User Plots are discussed further in this below, and more detail is provided in the HEC-ResSim User's Manual.

13.6.3.4 Junctions

To view the graphical results from a HEC-ResSim junction:

- 1. The user must be in the **Modeling** tab in the **Watershed Pane**.
- 2. To view the available junction plots, make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.12).
- 3. On the **Map window**, select the **Zoom Tool** and zoom-in on an area where there is a HEC-ResSim junction, an example is shown in Figure 13.25.
- 4. Then select the **Pointer Tool**, right-click on the HEC-ResSim junction, it will now be highlighted in yellow. From the shortcut menu (Figure 13.25), click **Plot** or **Plot Inflow/Outflow**.

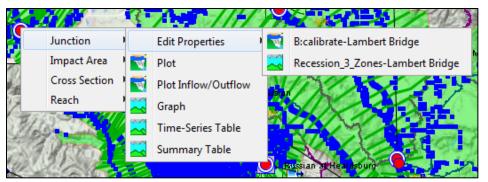


Figure 13-25 HEC-ResSim Shortcut Menu - Junction

- 5. If the active forecast run contains HEC-RAS and/or HEC-FIA model alternatives and their results overlap the HEC-ResSim results, the shortcut menu will reflect this. Therefore, the shortcut menu could contain items for HEC-RAS and HEC-FIA.
- 6. Click a menu item shortcut menu (Figure 13.25) and the appropriate **Plot** dialog (Figure 13.26) opens. In Figure 13.26, you can see the different **Plot Dialogs** associated with the appropriate shortcut menu item.

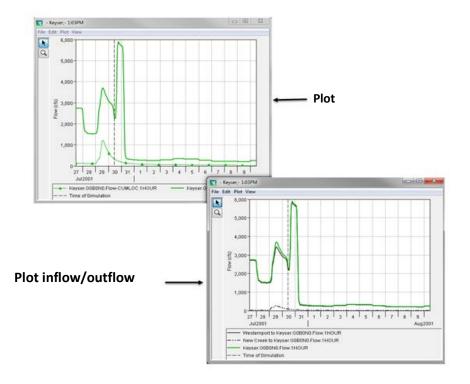


Figure 13-26 HEC-ResSim Plot Dialogs - Junction

7. The user can print, save as a graphic file, and view tabular data of the plot from the **File** menu. See Appendix I for details on how to manipulate plots.

8. User Plots are available from the shortcut menu, but these plots are defined beforehand. User Plots are discussed further in section below, and more detail is provided in the HEC-ResSim User's Manual.

13.6.3.5 User Plots

User-defined plots are only available from a HEC-ResSim model alternative, and therefore are only for HEC-ResSim results. User-defined plots are created from any default HEC-ResSim plot.

To create a user-define plot:

1. From the **Plot Properties** dialog (Figure 13.27) for a junction, remove the **Flow-CUM** curve. The plot now only contains the **Flow** for a junction (Figure 13.28).

| I - Jennings Randolph Outflow JCT,- 7:14PM Properties | |
|---|--|
| Select Viewport: Viewport (1,1) | |
| Curves Viewport Title Axis Legend Marker-Lines Layout | |
| Curves Jennings Randolph Outflow JCT.G0B0N0 Flow-CUMLOC: Jennings Randolph Outflow JCT.G0B0N0.Flow.1HOUR Time of Simulation I Draw Curve | |
| Style Label Legend Item Quality Symbols | |
| Line Draw Line Color: Style: Weight: Fill: None Below Above | Point Draw Points Style: Line Color: darkgreen Fill Color: darkgreen Size: 6 |
| Fill Color: gray Fill Pattern: y | Automatic Symbol Drawing Draw Symbols on Data Points |
| Type: O Stepped O Linear | Skip 30 Offset 0 Draw Symbols at Specified Interval |
| Missing Value Symbols Draw Missing Value Symbols Style: | Offset |
| Line Color: Fill Color: Size: 8 * | Sample |
| | OK Cancel Apply |

Figure 13-27 Plot Properties dialog

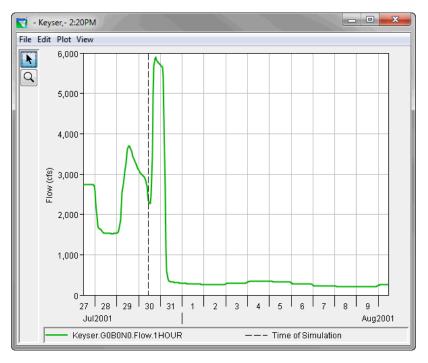


Figure 13-28 Revised Plot – Junction location

2. From the **File** menu, click **Save Template**. The **Export Plot Template** dialog (Figure 13.29) opens.

| 🟹 Export Plot Template |
|------------------------|
| Availability |
| All Applications |
| This Watershed only |
| All Users Watershed |
| All Users |
| Name: RegulatedFlow |
| OK Cancel |

Figure 13-29 Export Plot Template Dialog

- 3. There is a choice of making this user-defined plot available to all applications, this watershed only, all user watersheds, or all users. In Figure 13.28, this user-defined plot will only be available to the watershed that is currently open because **This Watershed only** has been clicked. Type a name for the user-defined plot in the **Name** field. In Figure 13.29 *RegulatedFlow* has been entered for the name. Click **OK**, and the **Export Plot Template** dialog closes.
- 4. To apply a user plot, point to File and click Apply Template.

5. For more information about user-defined plots, see the HEC-ResSim User's Manual.

13.6.4 Live Display

New to HEC-RTS 3.0 is an option to enable dynamic plotting of HEC-ResSim graphical results. Enabling the **Live Display** option causes HEC-ResSim results plots to update automatically when a HEC-ResSim alternative is recomputed.

To enable live plots open a HEC-ResSim graphical results plot, and select the **Live Display...** option from the View menu as shown in Figure 13.30.

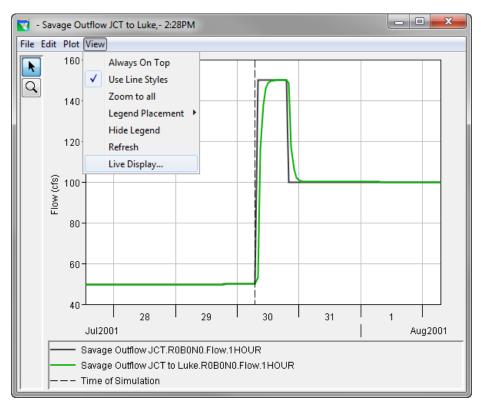


Figure 13-30 Enable Live Display HEC-ResSim results

13.7 HEC-RAS Results

HEC-RAS is used to simulate the behavior of channels in a watershed, given flow rates predicted with HEC-HMS. There are two ways to view HEC-RAS results – The **Reports** tab in the **Modeling Module** or, from the **Map window**. From the **Map window**, you can view graphically HEC-RAS results at HEC-RAS elements (e.g., cross sections, flow hydrographs, stage hydrographs).

13.7.1 Standard Table 1

The **Standard Table 1** is the default summary table. This table gives a summary of some the key output variables.

To view the **Standard Table 1**:

- 1. The user must be in the **Modeling** tab in the **Watershed Pane**.
- 2. To view this report make sure there is an active forecast, and at least one forecast run is selected (checkbox) for viewing results (Figure 13.6).
- 3. From the **Reports** tab, click to **Summary Output Table -** {*Profile Name*}, and the **Profile Output Table** dialog **Standard Table 1 Report** (Figure 13.31) opens.

| ile Opti | ons Std. | Tables | Locations | Help | | | | | | | | |
|---|-----------|---------|-----------|-----------|-----------|-----------|-----------|------------|----------|-----------|-----------|--------------|
| HEC-RAS Plan: G0B0N0C0 River: North Branch Pot Reach: Below Dam | | | | | | | | | | Reload Da | | |
| teach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| Below Dam | 284703 | PF 1 | 750.00 | 1199.81 | 1202.16 | | 1202.34 | 0.006358 | 3.40 | 220.38 | 127.65 | 0.46 |
| Below Dam | 284703 | PF 2 | 1500.00 | 1199.81 | 1203.10 | | 1203.40 | 0.006381 | 4.35 | 345.03 | 138.67 | 0.49 |
| elow Dam | 284703 | PF 3 | 2250.00 | 1199.81 | 1203.86 | | 1204.24 | 0.006367 | 4.95 | 455.00 | 150.43 | 0.50 |
| elow Dam | 284703 | PF 4 | 3750.00 | 1199.81 | 1205.09 | | 1205.60 | 0.006374 | 5.76 | 650.55 | 170.96 | 0.52 |
| Below Dam | 284703 | PF 5 | 6000.00 | 1199.81 | 1206.49 | | 1207.14 | 0.006372 | 6.49 | 1009.03 | 381.15 | 0.54 |
| elow Dam | 284703 | PF 6 | 9000.00 | 1199.81 | 1207.67 | | 1208.46 | 0.006374 | 7.32 | 1486.74 | 427.19 | 0.55 |
| Below Dam | 284703 | PF 7 | 12000.00 | 1199.81 | 1208.62 | | 1209.52 | 0.006376 | 7.99 | 1907.54 | 461.73 | 0.57 |
| elow Dam | 284703 | PF 8 | 15000.00 | 1199.81 | 1209.50 | | 1210.52 | 0.006378 | 8.57 | 2339.66 | 591.21 | 0.58 |
| Below Dam | 284703 | PF 9 | 21000.00 | 1199.81 | 1210.81 | | 1211.99 | 0.006377 | 9.47 | 3218.43 | 713.11 | 0.59 |
| Below Dam | 284703 | PF 10 | 28500.00 | 1199.81 | 1212.07 | | 1213.44 | 0.006381 | 10.44 | 4126.15 | 727.98 | 0.60 |

Figure 13-31 Profile Output Table - Standard Table 1 Report

- 4. The report displays a number of hydraulic variables for stream stations. Certain parameters can be changed for reporting from the **Options** menu. The user can choose which profiles and reaches to display, add a column to the report that includes the profile name, and can choose which system units to view the report in.
- 5. The user can print, copy, and create an ASCII file of the report; from the File menu.
- 6. From the File menu, click Exit, and the Profile Output Table dialog closes.

13.7.2 Standard Table 2

The **Standard Table 2** (Figure 13.32) is the second of the standard summary tables. This table provides information on the distribution of flow between the left overbank, main channel, and right overbank. This table also shows the friction losses, as well as contraction and expansion losses that occurred between each section. Energy losses displayed at a particular cross section are for the losses that occurred between that section and the next section downstream.

To view the **Standard Table 2**:

- 1. The user must be in the Modeling tab in the Watershed Pane.
- 2. To view this report make sure there is an active forecast, and at least one forecast run is selected (checkbox) for viewing results (Figure 13.6).

- 3. From the **Reports** tab, click to **Summary Output Table {Profile Name}**, and the **Profile Output Table** dialog with **Standard Table 1 Report** (Figure 13.32) opens.
- 4. From the **Std. Tables** menu, click **Standard Table 2** and the **Standard Table 2 Report** (Figure 13.32) is opened in the **Profile Output Table** dialog.
- 5. The report displays a number of hydraulic variables for stream stations. Certain parameters can be changed for reporting from the **Options** menu. The user can choose which profiles and reaches to display, add a column to the report that includes the profile name, and can choose which system units to view the report in.
- 6. The user can print, copy, and create an ASCII file of the report; from the File menu.
- 7. From the File menu, click Exit, and the Profile Output Table dialog closes.

| HEC-RAS Plan: A0R0B0B0 River: DryCreek Reach: DryCreek Profile: Max WS | | | | | | | | | Reload Data | | |
|--|-----------|---------|------------|-----------|----------|------------|------------|-------|-------------|---------|-----------|
| Reach | River Sta | Profile | E.G. Elev | W.S. Elev | Vel Head | Frctn Loss | C & E Loss | QLeft | Q Channel | Q Right | Top Width |
| | | | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | (cfs) | (cfs) | (ft) |
| DryCreek | 244007.8 | Max WS | 201.60 | 201.21 | 0.38 | 1.45 | | | 2081.80 | | 399.33 |
| DryCreek | 243694 | Max WS | 199.95 | 199.20 | 0.75 | 1.74 | | | 2080.55 | | 297.27 |
| DryCreek | 243307.5 | Max WS | 197.90 | 197.49 | 0.41 | 0.08 | | | 2079.89 | | 80.48 |
| DryCreek | 243307 | | Lat Struct | | | | | | | | |
| DryCreek | 243093.3 | Max WS | 197.45 | 197.42 | 0.03 | 0.01 | 0.00 | | 2079.63 | | 173.50 |
| DryCreek | 242998 | | Bridge | | | | | | | | |
| DryCreek | 242899.6 | Max WS | 197.04 | 196.86 | 0.18 | 0.16 | | | 2078.79 | | 139.35 |
| DryCreek | 242752.* | Max WS | 196.88 | 196.75 | 0.13 | 0.16 | | | 2078.44 | | 149.88 |
| DryCreek | 242605.5 | Max WS | 196.73 | 196.59 | 0.14 | 0.15 | | | 2078.11 | | 154.13 |
| DryCreek | 242449.* | Max WS | 196.58 | 196.46 | 0.12 | 0.12 | | | 2078.09 | | 169.71 |
| DryCreek | 242293.8 | Max WS | 196.46 | 196.37 | 0.09 | 0.26 | | | 2077.82 | | 199.03 |
| | 242020 5 | May MC | 105 17 | 105 01 | 0.16 | 0 55 | | | 2022 22 | | 164 61 |

Figure 13-32 Profile Output Table Dialog - Standard Table 2 Report

13.7.3 Detailed Output Tables

Detailed output tables show hydraulic information at a single location for a single profile.

To view a **Detailed Output Table**:

- 1. The user must be in the **Modeling** tab in the **Watershed Pane**.
- 2. To view this report make sure there is an active forecast, and at least one forecast run is selected (checkbox) for viewing results (Figure 13.6).
- 3. From the **Reports** tab, click to **Detailed Output Table {Profile Name}**, and the **Detailed Output Table** dialog for **Cross Section Output** (Figure 13.33) opens.
- 4. By default, the report displays the detailed output for cross sections.
- 5. From the **File** menu, the user can copy to the clip board, print current cross section, and print multiple cross sections.

- 6. In the **Options** menu, the user can choose to include interpolated cross section; include errors warning and notes in printout; and change the units system for viewing.
- 7. From the **Type** menu, the user can change the detailed output table type. For more information about the **Detailed Output Tables**, see the HEC-RAS User's Manual.
- 8. Click Exit, and the **Detailed Output Table** dialog closes.

| iver: | North Branch Pot | Profi | e: PF 1 | | | | |
|--------|---------------------|------------------------|-----------------------------------|-----------------------|--------------------|-------------|--|
| each | Below Dam | ▼ RS: | 284703 💌 | Plan: GOB | DNOC0 | · · · · | |
| | | Plan: G0B0N0C0 | North Branch Pot Below Dam R | S: 284703 Profile: | PF 1 | | |
| E.G. E | Elev (ft) | 1202.34 | Element | Left OB | Channel | Right OB | |
| Vel He | ead (ft) | 0.18 | Wt. n-Val. | | 0.050 | | |
| W.S. | Elev (ft) | 1202.16 | Reach Len. (ft) | 494.75 | 494.75 | 494.75 | |
| Crit V | V.S. (ft) | | Flow Area (sq ft) | | 220.38 | | |
| E.G. 5 | Slope (ft/ft) | 0.006358 | Area (sq ft) | | 220.38 | | |
| Q Tot | tal (cfs) | 750.00 | Flow (cfs) | | 750.00 | | |
| Top V | Vidth (ft) | 127.65 | Top Width (ft) | | 127.65 | | |
| Vel To | otal (ft/s) | 3.40 | Avg. Vel. (ft/s) | | 3.40 | | |
| | Chl Dpth (ft) | 2.35 | Hydr. Depth (ft) | | 1.73 | | |
| Conv | . Total (cfs) | 9406.2 | Conv. (cfs) | | 9406.2 | | |
| Lengt | th Wtd. (ft) | 494.75 | Wetted Per. (ft) | | 128.04 | | |
| Min C | h El (ft) | 1199.81 | Shear (lb/sq ft) | | 0.68 | | |
| Alpha | | 1.00 | Stream Power (lb/ft s) | | 2.32 | | |
| Frctn | Loss (ft) | 3.17 | Cum Volume (acre-ft) | | 205.57 | | |
| C&E | Loss (ft) | 0.00 | Cum SA (acres) | | 117.55 | | |
| | | | Errors, Warnings and Note | s | | | |
| Warnii | ng: The energy loss | was greater than | 1.0 ft (0.3 m). between the curre | ent and previous cros | ss section. This m | ay indicate | |
| | | ditional cross section | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Figure 13-33 Detailed Output Table Dialog – Cross Section Output

13.7.4 Profile Plot

From the **Modeling Module**, the only graphical result from a steady flow HEC-RAS model alternative is a plot of the water surface profiles. To view the water surface profile plot:

- 1. The user must be in the **Modeling** tab in the **Watershed Pane**.
- 2. To view this plot make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.6).
- 3. On the **Map window**, select the **Zoom Tool** and zoom-in on an area where there are HEC-RAS cross sections (green lines), HEC-RAS bridges (gray lines) and the HEC-RAS stream centerline (blue line), an example is shown in Figure 13.34.



Figure 13-34 HEC-RAS Shortcut Menu

- 4. Then select the **Pointer Tool**, right-click on the HEC-RAS stream centerline between cross sections and the stream centerline will be highlighted in yellow.
- 5. From the shortcut menu (Figure 13.34), click **Profile Plot**, and the **Profile Plot** (Figure 13.35) opens.
- 6. From the **File** menu the user can copy the plot and values to the clip board, print, and save as a DXF (Drawing Exchange Format) file.
- 7. In the **Options** menu, the user is given the options to zoom, pan, and animate; choose what reaches, profiles, and variables that are displayed in the plot; and manipulate the plots settings which include axis labels, lines, symbols, scaling, grid, zoom window location, fonts, and land markers. See the HEC-RAS User's Manual for more information.
- 8. From the File menu, click Exit, and the Profile Plot closes.

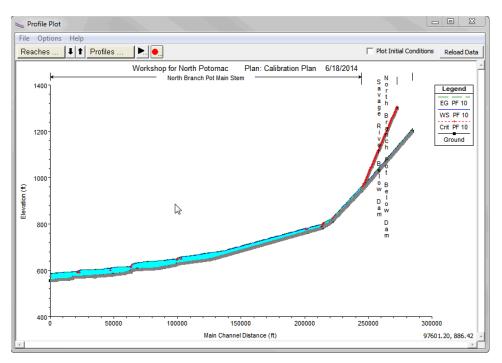


Figure 13-35 HEC-RAS – Profile Plot

13.7.5 Unsteady Flow Results

From the **Modeling Module**, the results from an unsteady flow HEC-RAS model alternative are the same as those available in HEC-RAS. For a complete listing of HEC-RAS results se the HEC-RAS User's Manual. Of particular interest are stage a flow hydrographs.

To view a flow hydrograph:

- 1. The user must be in the Modeling tab in the Watershed Pane.
- 2. To view this plot make sure there is an active forecast (which includes an unsteady flow HEC-RAS model alternative), and at least one forecast run selected (checkbox) for viewing results (see Figure 13.6).
- 3. Select the HEC-RAS model alternative, and click **Stage & Flow Hydrograph Button** (Figure 13.36) on the **Reports** tab in the **Watershed Pane**, this opens the HEC-RAS Sage and Flow Dialog plot (Figure 13.37).
- 4. For further information on the Stage and Flood Hydrographs Dialog (Figure 13.37), see the HEC-RAS User's Manual. To close the Stage and Flood Hydrographs Dialog, from the File menu, click Close.

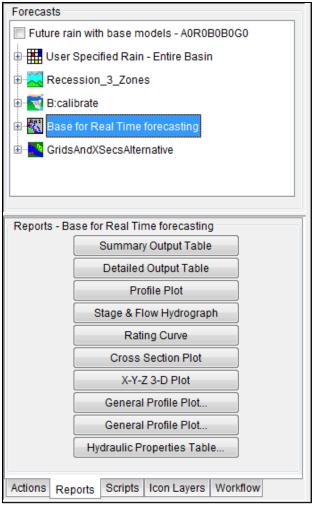


Figure 13-36 HEC-RAS Reports Options

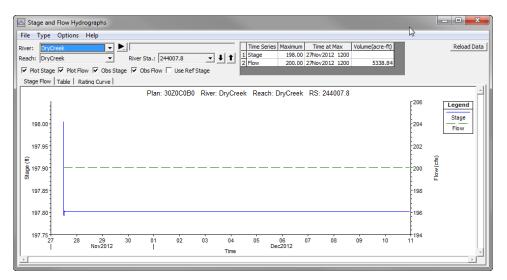


Figure 13-37 HEC-RAS – Flow Hydrograph Plot

13.7.6 Rating Curve Plots

From the **Modeling Module**, the rating curves can be viewed for the selected HEC-RAS model alternative. You can view a rating curve for any location that a rating curve is defined.

To view the **Rating Curve Plot**:

- 1. The user must be in the **Modeling** tab in the **Watershed Pane**.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.6).
- 3. From the **Reports** tab, click to **Rating Curve {Profile Name}**, and the **Rating Curve Plot** (Figure 13.38) opens.

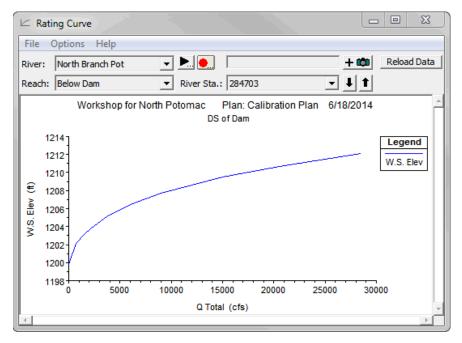


Figure 13-38 Rating Curve Plot

- 4. From the **File** menu the user can copy to the plot and values to the clip board, print, and save as a DXF (Drawing Exchange Format) file.
- 5. In the **Options** menu, the user is given the options to zoom and pan; choose what plans that will displayed in the plot; and manipulate the plots settings which include axis variables, add zero point, datum adjustment lines and symbols, scaling, grid, zoom window location and font size. See the HEC-RAS User's Manual for more information.
- 6. From the **File** menu, click **Exit**, and the **Rating Curve Plot** closes.

13.7.7 Cross Section Plots

From the **Modeling Module**, the cross section plots can be viewed for the selected HEC-RAS model alternative. You can view any cross section by picking the river, reach and river station.

To view a **Cross Section Plot**:

- 1. The user must be in the **Modeling** tab in the **Watershed Pane**.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.6).
- 3. From the **Reports** tab, click to **Cross Section Plot**, and the **Cross Section Plot** (Figure 13.39) opens.

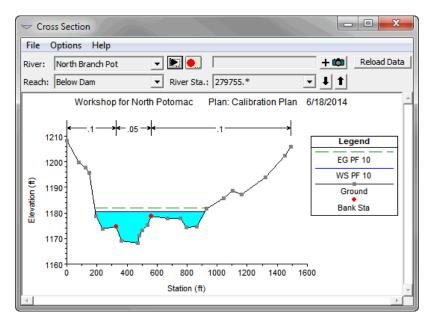


Figure 13-39 Cross Section Plot

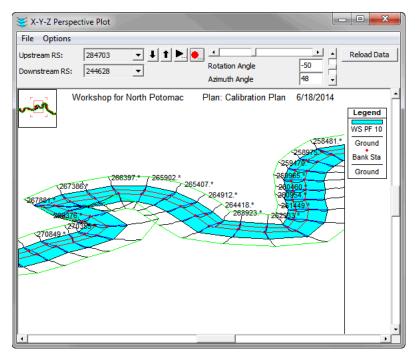
- 4. From the **File** menu the user can copy the plot and values to the clip board, print, and save as a DXF (Drawing Exchange Format) file.
- 5. In the **Options** menu, the user is given the options to zoom, pan, and animate; choose what plan, profiles, and variables that are displayed in the plot; set the velocity distribution; and manipulate the plots settings which include axis labels, lines, symbols, scaling, grid, zoom window location, and fonts. See the HEC-RAS User's Manual for more information.
- 6. From the File menu, click Exit, and the Cross Section Plot closes.

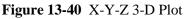
13.7.8 X-Y-Z 3-D Plots

From the **Modeling Module**, the x-y-z 3-D plots can be viewed for the selected HEC-RAS model alternative. The **X-Y-Z 3-D Plot** (Figure 13.40) is a 3-dimensional plot of multiple cross sections within a reach.

To view an X-Y-Z 3-D Plot:

- 1. The user must be in the Modeling tab in the Watershed Pane.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.6).
- 3. From the **Reports** tab, click to **X-Y-Z 3-D Plot {Profile Name}**, and the **X-Y-Z 3-D Plot** (Figure 13.40) opens.





- 4. From the **File** menu the user can copy the plot to the clip board and print.
- 5. In the **Options** menu, the user is given the options to zoom, pan, and animate; choose what plans, profiles, and reaches that are displayed in the plot; set the elevation to lateral width ratio; and manipulate the plots settings which include axis labels, lines, symbols, grid, zoom window location, and WS order. See the HEC-RAS User's Manual for more information.
- 6. From the **File** menu, click **Exit**, and the **X-Y-Z 3-D Plot** closes.

13.7.9 General Profile Plots

From the **Modeling Module**, the general profile plots can be viewed for the selected HEC-RAS model alternative. The **General Profile Plot** (Figure 13.41is used to plot variables other than the water surface in profile.

To view a General Profile Plot:

- 1. The user must be in the Modeling tab in the Watershed Pane.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.6).
- 3. From the **Reports** tab, click to **General Profile Plot {Profile Name}**, and the **General Profile Plot** (Figure 13.41) opens.

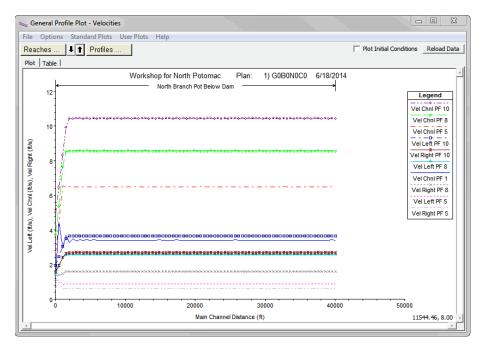


Figure 13-41 General Profile Plot

- 4. From the **File** menu the user can copy the plot and values to the clip board and print.
- 5. In the **Options** menu, the user is given the options to zoom, pan, and animate; choose what reaches, profiles, and variables that are displayed in the plot; and manipulate the plots settings which include axis labels, lines, symbols, scaling, grid, zoom window location, fonts, and land markers.
- 6. In the **Standard Plots** menu, the user is allowed to choose type of plot to be display. The available plots are velocities, flow, area, top width, weighted n, Froude number, hydraulic depth, shear, surface area, volume, and steam power. See the HEC-RAS User's Manual for more information.

7. From the File menu, click Exit, and the General Profile Plot closes.

13.7.10 Hydraulic Properties Tables

From the **Modeling Module**, the hydraulic properties tables can be viewed for the selected HEC-RAS model alternative. The **Hydraulic Properties Table** (Figure 13.42) allows you to view the computed curves after the Hydraulic Table parameters have been entered for the cross section and structures.

To view the Hydraulic Properties Table:

- 1. The user must be in the **Modeling** tab in the **Watershed Pane**.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.6).
- 3. From the **Reports** tab, click to **Hydraulic Properties Table {Profile Name}**, and the **Hydraulic Properties Table** (Figure 13.42) opens.

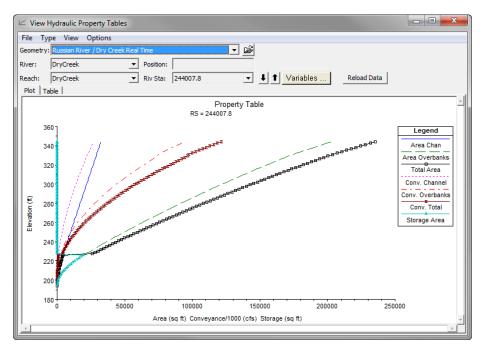


Figure 13-42 Hydraulics Properties Table

- 4. From the **File** menu, the user can copy to the clip board.
- 5. From the **Type** menu,the user can change the type of values that are displayed. There is a choice between cross sections, internal boundaries, and storage area connections. See the HEC-RAS User's Manual for more information.
- 6. Select the **Plot** tab and the **View** menu appears. From the **View** menu, the user can zoom, pan, show symbols on the curves, and compute hydraulics for selected 1B curve.

- 7. In the **Options** menu, the user can choose the number of decimal point to display in the table.
- 8. From the File menu, click Exit, and the Hydraulic Properties Table closes.

13.7.11 RAS Mapper

RAS Mapper is an extension to the HEC-RAS software package and contains tools to display HEC-DSS time-series data, HEC-RAS inundation data, and other model results. To execute **RAS Mapper** from within HEC-RTS, launch HEC-RAS from the CAVI, and click the RAS Mapper button.

The user can select from multiple map views of project areas, click on gages within these views to obtain real-time data in plot or tabular form, and load inundation maps generated through the CAVI to spatially overlay with basemap data. All spatial data supported by ArcGIS®, including ArcGIS® Shapefiles, ArcGIS ® coverages (ESRI), DLG and CAD data, remote sensing imagery, and scanned photography can be used.

See Appendix L for more details on using RAS Mapper.

13.8 HEC-FIA Results

HEC-FIA may be used to predict the consequences associated with conditions predicted with HEC-HMS, HEC-ResSim, and HEC-RAS. There are two reports available of HEC-FIA results – **Individual Structure Damage Report** and **Aggregated Structure Damages Report**. See the HEC-FIA User's Manual for more detail on results.

13.8.1 Individual Structure Damage Report

This report provides information by individual structure, this information includes structure, content, car, other, total damage for each structure, depth of flooding, population at risk (day and night), percent not mobilized, percent caught evacuating, percent clear, and loss of life (day and night) information is also available for each structure. If the alternative is set to run a deterministic computation, this will display a single deterministic answer. However, if the alternative is set to run a Monte Carlo computation, this report will display the average for all of the iterations.

To view the Individual Structure Damage Report:

- 1. The user must be in the Modeling tab in the Watershed Pane.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.43).
- 3. On the **Reports** menu, point to **HEC-FIA**, click the **Individual Structure Damage Report button** and the **Individual Structure Damage Report** will open (Figure 13.44).

- 4. The report displays by structure the damages, flooding depth, life loss and other consequences associated with the defined forecast.
- 5. Click Close, the Individual Structure Damage Report will close (Figure 13.44).

| K Acquisition | 👰 Visualization | 縼 Modeling | 🔅 Setup | | | | |
|----------------|--------------------------------|---------------|---------|--|--|--|--|
| Name: 2014. | 02.09-1200 | | | | | | |
| Time Window | | | | | | | |
| Time Window | N | | | | | | |
| | Forecast Time: 09Feb2014 Time: | | | | | | |
| Extract Start: | 06F | eb2014 Time: | 1200 | | | | |
| Start Time: | 06F | eb2014 Time: | 1200 | | | | |
| End Time: | 126 | eb2014 Time: | 1200 | | | | |
| Display Tim | e Zone: GMT-08:00 |) | | | | | |
| Forecasts | | | | | | | |
| V Future rain | with base models | - A0R0B0B0G0 | 1 | | | | |
| 🕕 🎛 User S | pecified Rain - Enti | re Basin | | | | | |
| 🗉 🔜 Reces | sion_3_Zones | | | | | | |
| 🕒 🛒 🔣 B:calib | rate | | | | | | |
| 🕀 🎇 Base f | or Real Time foreca | asting | | | | | |
| | ndXSecsAlternative | | | | | | |
| | | | | | | | |
| | | | | | | | |
| Reports - Grid | IsAndXSecsAlterna | tive | | | | | |
| In | dividual Structure D | amage Report | | | | | |
| Ag | gregated Consequ | ence Damages | | | | | |
| | Life Los | S | | | | | |
| | ECAM | | | | | | |
| | Impact Respons | e By Rule | | | | | |
| | Critical Infras | tructure | | | | | |
| | | | | | | | |
| | | | | | | | |
| Actions Repo | orts Scripts Icon | Layers Workfl | ow | | | | |

Figure 13-43 Forecast Alternative

| File View Edi | it . | | | | | | | | | | | | | | | | |
|---------------|------------------|----------------|---------------|-----------------|----------|----------|-----------|-----------|---------|--------------------|---------------------|------------------|----------------------|-----------------------|--------------------|--------------|--------------|
| Structure | | Dam | age | | Total | Depth of | Populatio | Populatio | Warning | % Not | % Caught | | % Not | % Caught | | Loss of Life | Loss of Life |
| Name | Struct Damage | Cont Damage | Car Damage | Other Damage | Damage | Flooding | (Day) | (Night) | Time | Mobilized (Day) | Evacuating (Day) | % Clear (Day) | Mobilized (Night) | Evacuating (Night) | % Clear (Night) | (Day) | (Night) |
| AGR1 050. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -1.01 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RES1-2SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.48 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RES2 060 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.45 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 |
| AGR1 050 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.31 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RES1-18 | 16681.93 | 6887.95 | 0.0 | 0.0 | 23569.88 | -0.64 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 |
| RES1-19N | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -3.8 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RES1-1SN | 3243.92 | 1081.31 | 0.0 | 0.0 | 4325.23 | -0.91 | 0.0 | | | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 |
| REST-2SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -3.4 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RES1-1SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -3.82 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 |
| RES1-1SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -3.39 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RES1-1SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.11 | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| AGR1 060 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -1.7 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RE\$2.050 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -3.15 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| AGR1 050 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -3.91 | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 |
| COM4 050 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -3.7 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 |
| RES1-ISN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.4 | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| RES1-2SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.4 | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| RES1-2SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.4 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RES1-1SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.4 | 0.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 |
| REST-ISN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.4 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RES1-2SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.4 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| REST-25N | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.4 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RES1-1SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.4 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RES1-1SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.4 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| RES1-1SN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -2.54 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| DEC4.404 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.4 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |

Figure 13-44 Individual Structure Damage Report

13.8.2 Aggregated Structure Damages Report

The **Aggregated Structure Damages Report** allows the user to aggregate results by any boundary, or the impact area set used to compute results. This functionality uses a point in polygon test on the results files, so be patient if there are many polygons or many structures, it can take a few seconds.

To view the Aggregated Structure Damages Report:

- 1. The user must be in the **Modeling** tab in the **Watershed Pane**.
- 2. To view this report make sure there is an active forecast, and at least one forecast run selected (checkbox) for viewing results (Figure 13.43).
- 3. On the **Reports** menu, point to **HEC-FIA**, click **Aggregated Structure Damages Button**. The **Aggregated Structure Damages Report** will open (Figure 13.45).
- 4. In the **View By** dropdown list, select the boundary category to view results by; the default is impact area.
- 5. Select the results tab you wish to view. By default the report will display the Economic Damages by impact area tab. The report also provides a Structure Flooded tab, an Agricultural Damages tab, a Critical Infrastructure Damages tab, and a Summary Report tab. The Summary Report tab (Figure 13.46) that provides information on urban damages, agricultural damages, total damage, acreage flooded, structures flooded, and population impacted.
- 6. The user can save the report to a text file or print the report.
- 7. Click Close, the Aggregated Structure Damages Report will close.

| | Aggregated | Consequence | Report for Grid | dsAndXSecsAli | ternative\30R0 |)B0F0X 💌 | | | | | |
|---|--|------------------------------|-------------------------------|---------------------------|-----------------------------|-------------------|--|--|--|--|--|
| L | View By: Impact Areas | | | | | | | | | | |
| | Economic Structure Agriculture Summary | | | | | | | | | | |
| | Economic Damage Summary by Impact Areas for GridsAndXSecsAlternative | | | | | | | | | | |
| | Impact Are | Struct Damage (\$1000) | Content Damage (\$1000) | Car Damage (\$1000) | Other Damage (\$1000) | Total (\$1000) | | | | | |
| | Russian R | 5737.87 | 5,983.50 | 880.27 | 0.00 | 12,601.64 | | | | | |
| | | | | | | | | | | | |
| L | | | | Print | Save To Fil | e Close | | | | | |

Figure 13-45 Aggregated Structure Damages Report, Economic Damages Tab

| | Aggregated Consequence Report for GridsAndXSecsAlternative\30R0B0F0X0\07Dec2012 | | | | | | | | | | |
|--|---|--|---|---|--|---|--|---|--|--|--|
| View By: Damage Category | | | | | | | | | | | |
| Economic Structure Agriculture Summary | | | | | | | | | | | |
| Damage Category | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Total | Total | | Total Agria | Total | | | | | | | |
| | | Total | - 1 | | Total | Total | Total | Total | | | |
| | | | - 1 | | | | | Populatio | | | |
| (\$1000) | (\$1000) | (\$1000) | (acre) | Flooded | 2pm Unde | 2pm Over | 2am Unde | 2am Over | | | |
| 2,668.62 | 0.00 | 2,668.62 | 0.00 | 19 | 0 | 0 | 0 | 0 | | | |
| 186.14 | 0.00 | 186.14 | 0.00 | 4 | 0 | 0 | 0 | 0 | | | |
| 0.00 | 0.00 | 0.00 | 0.00 | 1 | 0 | 0 | 0 | 0 | | | |
| 9,746.88 | 0.00 | 9,746.88 | 0.00 | 194 | 0 | 0 | 0 | 0 | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | ile Close | | | |
| | Total Urban Damages (\$1000) 2,668.62 186.14 0.00 | Total Total Urban Crop Damages Damages (\$1000) (\$1000) 2,668.62 0.00 186.14 0.00 0.00 0.00 | Total Total Urban Crop Total Damages Damages Damages (\$1000) (\$1000) (\$1000) 2,668.62 0.00 2,668.62 186.14 0.00 186.14 | Total Total Total GridsAndXS Urban Crop Total Total Agric Damages Damages Flooded (\$1000) (\$1000) (\$1000) (acre) 2.668.62 0.00 2.668.62 0.00 186.14 0.00 186.14 0.00 0.00 0.00 0.00 0.00 | Total Total Total Total Total Total Total Total Acreage Number of Damages Damages Damages Damages Summary Report Total Acreage Number of Structures (\$1000) (\$1000) (\$1000) Flooded Structures 2.668.62 0.00 2.668.62 0.00 19 186.14 0.00 4 0.00 0.00 0.00 0.00 10 100 10 | Total Crop Total Crop Total Total Crop Crop <td>Total Total Total Acreage Number of Structures Total Agric Total Agric</td> <td>Total Urban Total Crop Total Damages Total Agric Acreage Total Number of Structures Total Total Total Q31000) Q31000) Q31000) Total Acreage Number of Flooded Total Total Populatio Populatio Q41000) Q31000) Q31000) Q310000 Qarceal Flooded Structures Populatio Populatio Populatio Populatio Populatio 2pm Unde 2am Unde 2am</td> | Total Total Total Acreage Number of Structures Total Agric Total Agric | Total Urban Total Crop Total Damages Total Agric Acreage Total Number of Structures Total Total Total Q31000) Q31000) Q31000) Total Acreage Number of Flooded Total Total Populatio Populatio Q41000) Q31000) Q31000) Q310000 Qarceal Flooded Structures Populatio Populatio Populatio Populatio Populatio 2pm Unde 2am | | | |

Figure 13-46 Aggregated Structure Damages Report, Summary Report Tab

CHAPTER 14

Configuring HEC-RTS

Section III of the manual describes how to configure an HEC-RTS watershed. Here, we describe a workflow to configure the models within HEC-RTS. This workflow description assumes previous development of the watershed and the individual models in their native software applications (HEC-HMS, HEC-ResSim, HEC-RAS, and HEC-FIA). We explain how to bring the models together into the watershed. For further information, refer to Chapters 14 through 22 for additional details.

14.1 Setting Up Your Models

In HEC-RTS, a watershed is set up to reflect a collection of data, information, application models and images that represent watershed lands, rivers, gages, and water control features with the watershed. The **Setup Module** is used to create a new (or open an existing) watershed. To get to the **Setup Module**, from the main window (Figure 14.1) click **Setup** tab.

In the **Setup Module**, the user sets up items that describe a watershed's physical arrangement. When a new watershed is created, a directory structure is generated where all files associated with the watershed are stored. Once a new watershed has been created, the user is able to import maps from external sources, specify the unit system and time zone for the watershed, add layers containing additional information about the watershed such as stream alignments, and configure elements such as reservoirs, computation points, and impact areas. It is also possible to create time series icons, and set up model program sequences and forecast runs. An example **Setup Module** is shown in Figure 14.1.

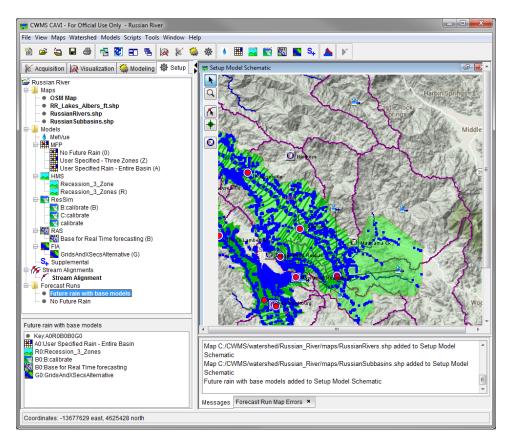


Figure 14.1. Setup Module

Refer to Chapter 15 for additional details for setting up your models.

14.2 Defining the Order of Application Programs

The order of program execution is a fundamental part of the watershed setup, which is defined from the **Setup Module**. Program order must be decided early on in the setup, and if the order is changed after a forecast has been configured, then the flow of data will be disrupted and results will be invalidated. Figure 14.2 shows an example sequence for ordering the application programs.

| 📻 Program O | rder | |
|--------------|-------------|----------------|
| Program Edit | | |
| Name: | Default | - K A 1 of 1 H |
| Description: | Default Pro | ogram Order 🛄 |
| | | Programs |
| 1 | | MFP |
| 2 | | HMS |
| 3 | | ResSim |
| 4 | | RAS |
| 5 | | FIA |
| | | |
| | OK | Cancel Apply |

Figure 14.2 Example Program Order

Refer to Chapter 16 for additional details for defining the order for application programs.

14.3 Establishing the Stream Alignment

A common schematic is used to share effectively common data between application software and to visually represent the watershed. The basis of this schematic is the **Stream Alignment**, upon which various elements are placed.

Background maps can also be used to help in creating the stream alignment. The stream alignment can be manually drawn using background river or stream maps as guides. Astream alignment can be created by importing it from a properly projected GIS layer whose river segments are continuous (i.e., no breaks in the stream flow definition), and whose attributes include the river names.

The stream alignment consists of stream nodes, stream segments, and stream junctions. Stream nodes are used for stream stationing, and exist (at a minimum) at the most upstream point and the most downstream point of a stream. By default, the downstream end of a stream is Station 0. However, the default stationing can be overridden by editing the station values. For example, a user might want to define their own stationing that represents river miles. Stream segments are defined by multiple vertex points, used for shaping the stream segment. Stream junctions are automatically created when multiple stream segments are joined (i.e., at a confluence of the stream's main stem and a tributary). As a visual indication of where a stream junction exists, a light green halo is displayed around the stream node. An example stream alignment is shown in Figure 14.3

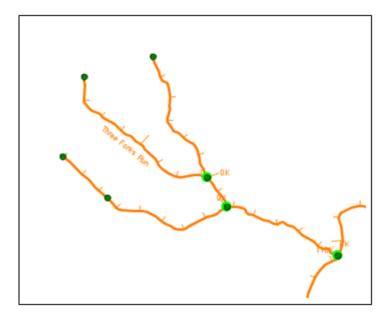


Figure 14.3 Example Stream Alignment

Refer to Chapter 17 for additional details for defining a stream alignment.

14.4 Developing Time Series Icons

The user develops **Time Series Icons** in the **Setup Module** to use in the **Map Window** of the remaining modules to show data and information availability. The information can be time series data, images, web pages, webcams, scripts, and document files. Time series icons can be linked to data from a HEC-DSS file. Time series icons are used as easy access for analyzing incoming data and for providing location specific information.

Time series icons can be represented as symbols, thumbnail plots, or color-coded data quality bars. The user should define and setup the time series icons early in the watershed model development so data can be readily viewed. Occasionally, changes to the time series icons may need to be made to accommodate additional data development. Refer to Chapters 18 and 19 for additional information describing time series icons.

14.5 Editing Elements

In the **Setup Module**, the user can edit a variety of elements that represent watershed data visually in a geo-referenced context and interact with associated data.

14.5.1 Shortcut Menus

There are several elements that are considered projects in HEC-RTS. These include reservoirs, levees, diversions, channel modifications, off channel storage areas, and other projects. All projects are created in the **Setup Module**. Projects configured in HEC-RTS do not effect model computations.

 Reservoir elements are pertinent to the HEC-ResSim application. When a reservoir element is created, a storage reach and at least two computation points (upstream and downstream) are automatically created, along with a pool triangle and at least one dam rectangle. Multiple upstream points are allowed, as well as multiple dam locations. Figure 14.4 shows an example reservoir with multiple inflow points, a storage reach, a reshaped pool triangle, and a dam location.

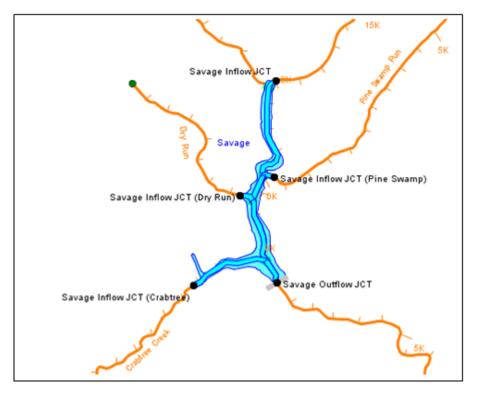


Figure 14.4 Example Reservoir Element

2. Levee elements are drawn to represent earthen barriers built along a stream to provide protection from flooding. A levee can reduce flood damage by preventing flood states from reaching a potential damage area. As such, levees are included as a project element for HEC-FIA reference. Figure 14.5 shows an example of how you might draw a levee (shown as a thick purple line) that follows closely to the stream alignment in the display area of the **Map Window**.



Figure 14.5 Example Levee (represented by thick purple line)

- 3. **Diversions** are pertinent to the HEC-ResSim application. When a diversion element is created, there is a single inflow into the diversion and a single outflow from the diversion that are automatically created. The user can choose whether or not to connect the outflow point to another element in the display area. If the outflow point is not connected, then the diverted water will be lost from the watershed.
- 4. **Channel Modifications**, **Off Channel Storage Areas**, and **Other Projects** elements can be placed as visual references in your **Map Window**. However, project data and corresponding project application of these elements are planned for future versions of HEC-RTS.

14.5.2 Computation Points

Computation Points are created at all locations where time series information is to be exchanged between application programs, and where results to be computed are wanted. Also, some computation points are autmatically created, as previously discussed for reservoirs and diversions.

14.5.3 Impact Areas

An **Impact Area** is any distinct portion of the watershed in which rising stage in a stream, river, lake, or reservoir has a consequence that is to be assessed. The boundaries of an impact area are

defined by drawing the outline of the area and closing the outlines to form the sides of a polygon. The effects of rising stage are indicated by describing the property and population at risk in the area bounded by the polygon as input to HEC-FIA.

Background map layers can be used to assist in placing impact areas at the appropriate locations. As with the other elements, impact areas can only be created in the **Setup Module**. Figure 14.6 illustrates an example impact area, represented by the green filled-in area.

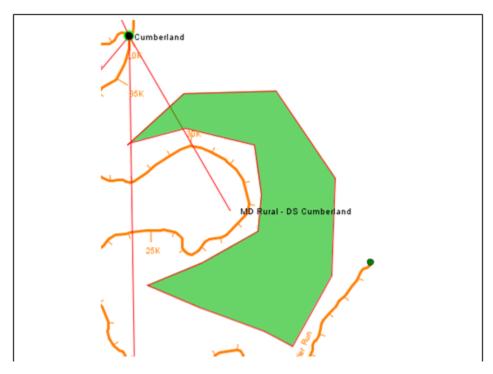


Figure 14.6 Example Impact Area

14.6 Developing Model Alternatives

A **Model Alternative** is a single configuration with a specific set of input and parameters. A second model alternative would be defined by a different configuration or different input or parameters. Since model alternatives do not include time-specific data, you can use a model alternative with any time window.

Initially, alternatives are developed using the software of the native model (e.g., HEC-HMS, HEC-ResSim, HEC-RAS, and HEC-FIA). Then, these alternatives are imported into HEC-RTS. Once they have been imported, the **Setup Module** is used to configure and edit specific model alternatives.

For example, since MFP deals with future precipitation, Model Alternatives can be configured to use in conjunction with HEC-HMS to compute a variety of future precipitation scenarios. Since HEC-HMS simulates watershed response to precipitation, then HEC-HMS alternatives can be used to forecast future flows. These future flows can be used with the reservoir application HEC-ResSim to compute reservoir releases. Regulated flows and stages can be input to HEC-

RAS and HEC-FIA. Basically, all of the individual model alternatives created in the native programs are available to HEC-RTS.

In the **Setup Module**, you will create model alternative keys that will be used in creating a forecast run. Each key is a single alpha-numeric identifier that represents a model alternative. For example, the Key N might represent normal conditions, the Key W might represent wet conditions, and the Key D might represent dry conditions.

Refer to Chapter 20 for additional information on model alternatives.

14.7 Creating Forecast Runs

A **Forecast Run** is a single forecast scenario defined by a specific set of data, information, and model alternatives. A forecast run is created in the **Setup Module**. Use the previously defined model alternative keys to create a forecast run key that consists of a collection of the model alternative keys.

As an example, the user might name a forecast run MFP-HMS-ResSim. For this example, the forecast run key might be **R**0**B**0**N**0---- which could reflect **R**adar precip data for MFP, **B**ase data for HEC-HMS, and Normal Operations for HEC-ResSim. In this example, the dashes indicate that HEC-RAS and HEC-FIA are not being run.

Refer to Chapter 20 for additional information on forecast runs.

14.8 Linking Models and Configuring Data Extract List

After a **Forecast Run** has been created the models need to be linked. This is completed using the **Model Linking Editor** shown in Figure 14.7. On this editor, use the **Forecast Run** dropdown list to select the forecast run you wish to configure. Then select each model in the model in the **Model Requiring Input** dropdown list. In the table below, specify which model alternative the input comes from and the HEC-DSS pathname associated with the model results. For example, the precipitation input data for HEC-HMS may be set to come from the MFP precipitation grid.

Refer to Chapter 21 for additional information on model linking.

Once the models have been linked the next step is to configure the **Data Extract List**. The Data Extract List specifies the location of the gridded and time series data required be the different model alternatives. For example, this could be gridded precipitation data or observed flow data from the database. Configuring the **Data Extract List** is completed from the **Extract List Editor** shown in Figure 14.8.

Refer to Chapter 22 for additional information on the extract editor.

| Forecast Run: | Future rain with | h base models | | | | • | | |
|-----------------------------------|-------------------|-------------------|------------------------------|--------------|---------------|--------------|------------------------------|---|
| Nodel Requiring Input: 🔣 RAS-Base | | for Real Time for | or Real Time forecasting 🗸 🗸 | | | | Select Input Model Alternati | |
| | Aodel Input | | 1 | | Source | • | | ſ |
| Locatio | n . | Parameter | Input Fror | n | | Locatio | n/Parameter | - |
| SA: 365 | | Flow | HMS-Recession 3 Z | | Lugur | | | |
| SA: 773 | | Flow | HMS-Recession_3_2 | 💏 Select Inp | out Model Alt | ernative | | × |
| SA: 923 | | Flow | HMS-Recession_3_2 | Input Model | Alternative: | 1 | | • |
| SA: 928 | | Flow | HMS-Recession_3_2 | | | MFP-User S | specified Rain - Entire Basi | n |
| SA: 929 | | Flow | HMS-Recession_3_2 | | | HMS-Reces | sion_3_Zones | |
| DryCreek DryCreek RS | 244007.8 | Flow | ResSim-B:calibrate | • | LAKE SONO | ResSim-B: | calibrate | |
| DryCreek DryCreek RS | 228244.5 | Flow | HMS-Recession_3_Z | ones 👻 | YOAKIM BRI | Extract List | | |
| DryCreek DryCreek RS | 206593.1 | Flow | HMS-Recession_3_Z | ones 👻 | LAMBERT B | | W-LOCAL | |
| DryCreek DryCreek RS | 172790 | Flow | HMS-Recession_3_Z | ones 👻 | DRY CK MO | UTH - FLOW | -LOCAL | - |
| Russian CoyoteToDC I | RS 527387.7 | Flow | ResSim-B:calibrate | | LAKE MEND | OCINO OUT | FLOW JCT - FLOW | • |
| Russian CoyoteToDC I | RS 523373.7 | Flow | HMS-Recession_3_Z | ones 👻 | UKIAH SA LO | OCAL - FLOV | V | • |
| Russian CoyoteToDC I | RS 481876.0 | Flow | HMS-Recession_3_Z | ones 👻 | TALMAGE - F | LOW-LOCA | L | • |
| Russian CoyoteToDC I | RS 446561.6 | Flow | HMS-Recession_3_Z | ones 👻 | HOPLAND - | FLOW-LOC/ | AL. | • |
| Russian CoyoteToDC I | RS 418492.2 | Flow | HMS-Recession_3_Z | ones 👻 | HOPLAND F | ELIZ CONF | - FLOW-LOCAL | • |
| Russian CoyoteToDC I | RS 374291.2 | Flow | HMS-Recession_3_Z | ones 👻 | CLOVERDA | LE - FLOW-L | OCAL | - |
| Russian CoyoteToDC I | RS 348180.3 | Flow | HMS-Recession_3_Z | ones 👻 | CLOVERDA | LE PK - FLO | W-LOCAL | • |
| Russian CoyoteToDC I | RS 347412.9 | Flow | HMS-Recession_3_Z | ones 🔻 | BIG SULPHI | JR CK - FLO | W | - |
| Russian CoyoteToDC I | RS 286114.2 | Flow | HMS-Recession_3_Z | ones 👻 | GEYSERVIL | LE - FLOW-L | OCAL | - |
| Russian CoyoteToDC I | RS 259380.6 | Flow | HMS-Recession_3_Z | ones 👻 | JIMTOWN - F | LOW-LOCA | L | • |
| Highlighted text indicat | es duplicate link | ing | Browse | | | | | |

Figure 14.7 Model Linking Editor

| Forecast Run: | Future rain with | base models | | • | |
|-------------------------------------|---------------------|------------------|---------------------------------------|--|---|
| lodel Requiring Input | RAS-Base f | or Real Time for | recasting | Select Input Model Alternati | |
| | lodel Input | | | Source | L |
| Locati | on | Parameter | Input From | Location/Parameter | ۲ |
| SA: 365 | | Flow | Extract List 👻 | //UKIAH/FLOW//15MIN/A0R0/ | 1 |
| SA: 773 | | Flow | Extract List 👻 | //CHALK HILL SA/FLOW//15MIN/A0R0/ | 1 |
| SA: 923 | | Flow | Extract List 👻 | //CAZADERO/FLOW//15MIN/A0R0/ | |
| SA: 928 | | Flow | Extract List 🗸 | //GREEN VALLEY/FLOW//15MIN/A0R0/ | |
| SA: 929 | | Flow | Extract List 👻 | //MIRABEL HEIGHTS/FLOW//15MIN/A0R0/ | |
| DryCreek DryCreek RS | 244007.8 | Flow | Extract List 🔹 | //LAKE SONOMA OUTFLOW JCT/FLOW//1HOUR/A0R0B0/ | |
| DryCreek DryCreek RS 228244.5 Fl | | Flow | Extract List 🗸 | /YOAKIM BRIDGE/FLOW-LOCAL//15MIN/A0R0/ | 8 |
| DryCreek DryCreek RS 206593.1 | | Flow | Extract List 🔹 | //LAMBERT BRIDGE/FLOW-LOCAL//15MIN/A0R0/ | |
| DryCreek DryCreek RS | 172790 | Flow | Extract List 👻 | //DRY CK MOUTH/FLOW-LOCAL//15MIN/A0R0/ | |
| Russian CoyoteToDC I | RS 527387.7 | Flow | Extract List 👻 | //LAKE MENDOCINO OUTFLOW JCT/FLOW//1HOUR/A0R0B0/ | |
| Russian CoyoteToDC I | RS 523373.7 | Flow | Extract List 🗸 🗸 | //UKIAH SA LOCAL/FLOW//15MIN/A0R0/ | |
| Russian CoyoteToDC I | RS 481876.0 | Flow | Extract List 👻 | //TALMAGE/FLOW-LOCAL//15MIN/A0R0/ | |
| Russian CoyoteToDC I | RS 446561.6 | Flow | Extract List 👻 | //HOPLAND/FLOW-LOCAL//15MIN/A0R0/ | |
| Russian CoyoteToDC I | RS 418492.2 | Flow | Extract List 👻 | //HOPLAND FELIZ CONF/FLOW-LOCAL//15MIN/A0R0/ | |
| Russian CoyoteToDC I | RS 374291.2 | Flow | Extract List 👻 | //CLOVERDALE/FLOW-LOCAL//15MIN/A0R0/ | |
| Russian CoyoteToDC I | RS 348180.3 | Flow | Extract List 👻 | //CLOVERDALE PK/FLOW-LOCAL//15MIN/A0R0/ | |
| Russian CoyoteToDC I | RS 347412.9 | Flow | Extract List 🔹 | //BIG SULPHUR CK/FLOW//15MIN/A0R0/ | |
| Russian CoyoteToDC RS 286114.2 Flow | | Extract List 🗸 | //GEYSERVILLE/FLOW-LOCAL//15MIN/A0R0/ | | |
| Russian CoyoteToDC I | RS 259380.6 | Flow | Extract List - | //JIMTOWN/FLOW-LOCAL//15MIN/A0R0/ | |
| Highlighted text indicat | es duplicate linkir | Ig | Browse | | |

Figure 14.8 Model Linking Editor Extract List Model Alternative

CHAPTER 15

Setup Module

In HEC-RTS, a **Watershed** is a set of data, information, models, and images that represent watershed lands and the channels, gages, and water control features within the watershed.

The **Setup Module** in the **Control and Visualization Interface** (**CAVI**) is the grouping of commands for watershed setup. These are commands for configuring inputs, models, and outputs that describe a watershed's behavior. A visual representation of the watershed is developed to display in the **CAVI** that is map-based. This chapter describes the **Setup Module**, including the **Setup Module** interface, how to create a new watershed, and reports on watershed setup.

The **Setup Module** is accessed by clicking the **Setup Tab**. In the **Setup Module**, configure the watershed's physical arrangement, including maps and geo-extents (Chapter 5), the stream alignment (Chapter 17), time series icons (Chapter 18), and other geo-referenced data. Once the watershed is set up, the user will be able to use the data that has been defined within HEC-ResSim, HEC-FIA, and other geo-referenced HEC-RTS applications.

Because the order of program execution (Chapter 16) is a fundamental part of the watershed setup, it should be defined early in the process of constructing data sets for the watershed. The program order is established in the **Setup Module**. This involves determining the set of programs for HEC-RTS to execute, the order of program execution, and the data flow for forecasting. **Supplemental Programs** may also be defined and added to the program order so they are executed from HEC-RTS. A **Supplemental Program** is a program or script that is developed by the user and is not included with HEC-RTS.

15.1 Setup Module Interface

The Setup Module displayed in the CAVI main window is shown in Figure 15.1.

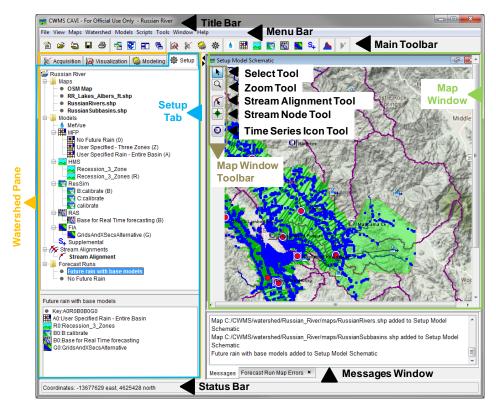


Figure 15.1 Setup Module

The following sections summarize commands in the Setup Module.

15.1.1 Menu Bar

The following is an overview of the **Menu Bar** as it appears in the **Setup Module**. The **Tools**, **Window**, and **Help** menus and their commands are common to all modules and are discussed in Section 2.3.1.

| File | From this menu, the user can create a watershed, open a watershed, close a watershed, save data associated with the watershed, and exit CAVI. In addition, the most-recently-used watersheds are located in the File menu. Available commands are: New Watershed, Open Watershed, Recent Watersheds, Save Watershed, Close Watershed, and Exit . |
|------|--|
| View | This menu is used to add or remove screen items (Toolbar icons, Watershed Pane , Messages Window , Status Bar , and tabs in the Watershed Pane); set the Units and Time Zone for the view in regard to plotting and tabulating; and save, restore and manage Layouts . Available commands are: Zoom To All , Displayed Units , Displayed Time Zone , Toolbars , Messages , Status , Module Tabs , Save Layout , Restore Layout , Layout Manager . |

- MapsThis menu is used to add and remove map layers (including Internet map
layers), specify default map properties, and set viewing options. The available
commands are: Map Layers, Default Map Properties, Add Internet Map,
Display Map Coordinates, Save Map Image, and Print Map.
- Watershed From this menu, the user can view the watershed properties, access a list of the watershed files, add or remove a stream reach alias, view a list of the streams in the watershed, upload or download a watershed, import a HEC-RTS / CWMS 2.1 watershed, and import or export stream alignment files. The available commands are: Watershed Properties, Files, Stream Reach Alias Editor, List of Streams, Upload/Download Watershed, Import 2.1 Watershed, and Stream Alignment.
- Models This menu is used to establish the program order, specify model alternative keys, configure forecast runs, setup model linking, access the extract and post editors, and manage model alternatives. Available commands are: Program Order, Model Alternative Keys, Forecast Runs, Model Linking, Edit Extract, Edit Post, and commands related to models configured in the watershed.
- Scripts From this menu, the user can run, edit and schedule a script, and access the status of a script job. Available commands are: script Editor, Schedule, Script Job Status, and Run.

15.1.2 Map Window Tools

Map window tools allow the user to access and configure elements within your watershed. The following are descriptions of tools in the **Setup Module**. A description of the tools common to all modules is included in Section 2.3.2.



Select Tool – Use this tool to edit, rename, and delete elements. To access commands, select the **Select Tool** and right-click on an element. Commands are available from a shortcut menu.

Q

Zoom Tool – Use this tool to enlarge specific locations in the map window. To enlarge a certain extent, left-click and drag tool over area; to zoom out, right-click.



Time Series Icon Tool – Use this tool to create, delete, and edit **Time Series Icons**. See Chapter 18 for more detail on creating, deleting, renaming, and editing **Time Series Icons**.

15.1.3 Stream Alignment Tools

These tools are available when a **Stream Alignment** is displayed in the **Map window** of the **Setup Module**. See Chapter 17 for more information regarding the **Stream Alignment**.



Stream Alignment Tool – Use this tool to create, delete, and edit stream elements that make up the stream alignment (Chapter 17). A stream alignment is a representation of the stream network in the watershed.

Stream Node Tool – Use this tool to create and edit stream nodes and junctions that make up a stream alignment (Chapter 17). Stream nodes are the beginning and ending points for each stream element. Stream nodes are also points where stream elements meet (stream junctions).

15.2 Creating a New Watershed

The first thing that must be done to configure a new watershed is to give it a name and description, specify its location, and establish the system of units and the time zone for the watershed. Once the new watershed has been configured, HEC-RTS generates a new directory hierarchy in the specified watershed directory. The new watershed becomes active in the main window, and the tools needed to configure watershed elements become available. At this point the user may continue to configure the new watershed by adding layers, setting preferences for the map window, creating time series icons, establishing the database connectivity, and configuring models and model alternatives.

To configure a new watershed:

- 1. On the **File Menu**, click **New Watershed**. The **Create New Watershed** dialog (Figure 15.2) will open.
- 2. Enter a name for the new watershed in the **Watershed Name Field**. The watershed name must be less than thirty-two (32) characters and cannot contain any of the following characters: , |/:*?"<>- \.
- 3. Enter a description for the new watershed in the **Description Field** that clearly explains what it is.
- 4. From the **Watershed Location**, select the watershed location to save the new watershed or add a new location.
- 5. For system units, select either **English** (U.S. customary units) or **SI** (System International) (see Section 15.3) from the drop-down list. This cannot be changed after clicking **OK**.
- 6. The default **Coordinate System** is set to the X-Y system. The default coordinate system can be changed using the **Edit** button. See Appendix C for more information.
- 7. Using the **Add Map Layers** button, map layer files can be selected to add to the watershed. After selecting a map layer, the **Set Watershed Coordinate System** prompt will open. The prompt will ask whether the user would like the watershed coordinate system to match the selected map layer's coordinate system. The coordinate system of all of the watershed's

layers must be consistent. HEC-RTS does not have coordinate system transformation tools. See Appendix C.1 for more information.

- 8. The user can chose to **Import CWMS 2.1 Watershed** by browsing to a specific 2.1 watershed.
- 9. Select a time zone using the radio buttons in the Settings Field. By default, U.S. Time Zones are selected and appear in the list. There are eight choices. Select the time zone appropriate for your watershed. See Section 15.4 for further discussion on time zones. Click OK in the Create New Watershed dialog. The watershed will be created.

| 📻 Create New Watershed | X |
|---------------------------|--------------------------|
| Watershed Name: | |
| Description: | |
| Watershed Location: | NEW |
| Unit System: | English 👻 |
| Map Layers: | Add Map Layers |
| Coordinate System: | Edit |
| Import CWMS 2.1 Watershed | Browse |
| Settings | |
| O.S. Time Zones | International Time Zones |
| | • |
| | |
| Time Zone DOES NOT Use D | aylight Savings |
| | OK Cancel |

Figure 15.2 Create New Watershed Dialog

15.3 Specifying Units

All modeling data and information, time series data, geometric and reservoir information must use the same system units. Therefore, it is crucial that the units are absolutely certain when either **English** or **SI** is specified as the unit system for the watershed when it is set up. The watershed unit system **cannot be changed** once watershed setup is complete.

15.4 Specifying Time Zones

When a new watershed is configured, the appropriate time zone representative of the watershed must be selected. This typically would be the time zone for the outlet or major portion of the watershed. Internally, HEC-RTS will store all-time series data using the fixed "standard time offset from GMT" for the selected watershed time zone. Thus, internally, the data will be held in standard time only. However, when viewing data or model results, local or any other time zone may be selected for display purposes (which provides standard and daylight time labels, as appropriate, throughout the year). **NOTE:** The watershed time zone **cannot be changed** once watershed setup is complete. However, at any time the display of data can be customized using the **View Menu**.

The default time zone setting is **U.S. Time Zones**. If the watershed is outside the U.S., time zone setting can be changed. In the **Create New Watershed** dialog (Figure 15.3) in the **Settings Field**, select the **International Time Zones Radio Button**. The list will now contain time zones for the world.

15.5 Models

Models menu allow the user to modify the **Program Order** (Chapters 14 and 16) and **Import** models. The **Models** menu also allows the user to setup **Model Alternative Keys** (Chapter 20), **Forecast Run**(s) (Chapter 20), and **Model Linking** (Chapter 21) in the **Setup Module** for a watershed.

CHAPTER 16

Program Order

16.1 Overview

HEC-RTS allows for a flexible set of programs, computation order, and data flow for forecasting. The order of execution of programs is a fundamental part of the watershed setup. The order is defined in the **Setup Module**. Supplemental programs can be defined and added to the computation order so that they are executed from HEC-RTS. This chapter describes the steps to do so. (A **Supplemental Program** is a program or script that is developed by the user. Supplemental programs are not included with HEC-RTS.)

16.2 Establishing Order Dialog

Program order must be established early when constructing data sets for the watershed. If the order of programs changes after a forecast has been configured, it may disrupt the orderly flow of data and the results and invalidate any existing work.

16.3 Program Order Dialog

To change, delete, or add programs to the watershed's program order, use the **Program Order** dialog (Figure 16.1). The **Program Order** dialog also establishes computation order and data flow for forecasting. In addition, the **Program Order** dialog provides the mechanism for defining supplemental programs, adding the supplemental programs to the program order, and establishing data flow for supplemental programs. To access the **Program Order** dialog, choose **Program Order** from the **Models** menu in the **Setup Module**.

| 📻 Program O | rder | —X — |
|--------------|---------------------|------------------|
| Program Edit | | |
| Name: | Default | ▼ K 4 1 of 1 ▶ Þ |
| Description: | Default Program Ord | er 🛄 |
| | | Programs |
| | 1 | MFP |
| | 2 | HMS |
| | 3 | ResSim |
| | 4 | RAS |
| | 5 | FIA |
| | | |
| | | OK Cancel Apply |

Figure 16.1 Program Order Dialog

HEC Programs in the Program Order

By default, the program order for a watershed is: **MFP**, **HMS**, **ResSim**, **RAS**, and **FIA**. **HEC-MetVue** may also be inserted into the program order, along with additional HEC programs.

16.4.1 Add an HEC Program

The default program order is displayed in the table on the **Program Order** dialog (Figure 16.1). To add an HEC program:

- 1. Click the row in the table where the program should be added.
- 2. From the **Edit** menu, click either **Insert Before** or **Insert After**. The **Select Program** dialog opens (Figure 16.2).

| 🛓 Select Pro | gram 🗾 |
|--------------|---------------|
| Name: | ResSim |
| Description: | Reservoir Op. |
| | |
| | |
| | |
| | |
| | OK Cancel |

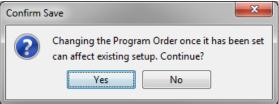
Figure 16.2 Select Program Dialog

3. From the **Name** drop-down list, select the name of the program to insert into the program order and click **OK**. The selected program appears in the table on the **Program Order** dialog.

16.4.2 Program Order Change

To select the **Default Input** for a HEC Program:

- 1. For HEC programs, the Default Input will be selected automatically based on typical model input.
- 2. Click the program row in the table for the program to move.
- 3. From the Edit menu, click Remove. A Confirm Removal dialog box will open. Click Yes.
- 4. Select the row in the table where the removed program should be added.
- 5. From the **Edit** menu, click either **Insert Before** or **Insert After**. The **Select Program** dialog opens (Figure 16.3).
- 6. From the **Name** drop-down list, select the name of the program to insert into the program order and click **OK**. The selected program appears in the table on the **Program Order** dialog.
- 7. Click **Apply**, and a warning message appears, stating that this could affect the existing setup. Click **Yes**.
- 8. Click **OK**, and the **Program Order** dialog closes.



| 💼 Program Order | | | | |
|----------------------------------|---|--------------------------------|--|--|
| Program Edit | | | | |
| Name: Example | | ▼ K 4 2 of 3 b H | | |
| Description: Example Program Ord | | der Change | | |
| | | Programs | | |
| | 1 | MFP | | |
| | 2 | MetVue | | |
| | 3 | HMS | | |
| | 4 | ResSim | | |
| | 5 | RAS | | |
| | 6 | FIA | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | OK Cancel Apply | | |

Figure 16.3 Example of Changed Program Order

16.4.3 Remove an HEC Program

To remove an HEC program from the program order:

- 1. On the **Program Order** dialog, click the row in the table corresponding to the program to be removed.
- 2. From the **Edit Menu**, click **Remove**. A warning message will appear asking if it is OK to remove the program from the program order. Click **Yes**.
- 3. Click **OK** on the **Program Order Dialog**. A warning message will appear, stating that this could affect the existing setup and asking to continue. Click **Yes**, and the **Program Order** dialog closes.

16.5 Supplemental Programs in the Program Order

The **Program Order** dialog (Figure 16.3) allows the user to define supplemental programs into the appropriate position in the program order. A **Supplemental Program** is a program or script that is not included with HEC-RTS. For example, an office might have a locally developed program that is used to model the unsteady flow regime of one or more rivers. This program,

and the river model associated with it, could be used in addition to or in place of HEC-RAS in the program order.

The steps required to utilize a supplemental program in the program order are:

- 1. Create a program or script that implements the supplemental program and adheres to the supplemental program interface (Section 16.5.1).
- 2. Define the supplemental program to RTS (Section 16.5.2).
- 3. Add the supplemental program to the program order (Section 16.5.3).
- 4. Define one or more model alternatives for the supplemental program (Section 16.5.4).
- 5. Create a model alternative for each supplemental program model alternative (Section 23.1).
- 6. Create one or more forecast runs that each includes one of the model alternatives for the supplemental program (Section 23.13).

16.5.1 The Supplemental Program Interface

A program or script that implements a supplemental program must adhere to a specific interface for communicating with CAVI during the execution of a forecast. This interface includes how to receive arguments for the supplemental program from CAVI, how to output messages to the forecast compute log, and how to inform CAVI about the exit status of the supplemental program.

Receiving Arguments

During a forecast computation, HEC-RTS executes a supplemental program by running its executable with a single command line parameter. The parameter is the fully qualified name of a file that contains the arguments for the supplemental program. This arguments file contains standard arguments in *keyword=value* format – one keyword/value pair per line – plus any alternative-specific arguments defined for the supplemental program model alternative being executed (Section 16.5.3).

The standard argument keywords available in the arguments file are listed below:

| ComputeType | Type of computation, "Forecast" for CAVI |
|--------------------|--|
| ProgramName | Supplemental program name (Section 16.5.2) |
| ProgramAlternative | Supplemental program model alternative name (Section 16.5.3) |
| ModelAlternative | Model alternative identifier |

| Alternative | Forecast run identifier |
|-----------------|--|
| RunTimeWindow | Lookback, forecast, and end times of forecast |
| IOTimeStep | Interval of data in forecast HEC-DSS file |
| TimeZoneOffset | Offset in hours from UTC to watershed time zone |
| InputPosition | Number of characters contained in InputFPart name that's provided below |
| ModelPosition | Number of characters contained in OutputFPart name that's provided below |
| ForecastPath | Forecast directory of current forecast |
| ForecastDSSFile | Fully qualified name of forecast HEC-DSS file |
| InputFPart | The F pathname part of data to be read from the forecast HEC-DSS file |
| OutputFPart | The F pathname part of data to be written to the forecast HEC-DSS file |
| User | The name of the user executing the forecast |
| ClientDisplay | The X-Windows server address of the user's display |
| ForceRecompute | "true" or "false" specifying whether the supplemental program must be executed – if "false", the supplemental program can decide whether it should execute |

An example of a **Supplemental Program Arguments File** is shown in Figure 16.4.

| ComputeType=Forecast | | |
|--|--|--|
| ProgramName=SupplementalTest | | |
| ProgramAlternative=NormalTest | | |
| ModelAlternative=20D0N0X0 | | |
| Alternative=20D0N0X0 | | |
| RunTimeWindow=26 August 2006, 24:00; 30 August 2006, 03:00; 3September 2006, 24:00 | | |
| IOTimeStep=1 Hour(s) | | |
| TimeZoneOffset=-5 Hour(s) | | |
| InputPosition=4 | | |
| ModelPosition=6 | | |

Figure 16.4 Example Supplemental Program Arguments File

Outputting Messages to the Forecast Compute Log

The supplemental program architecture allows the executable to output normal messages and error messages to the forecast compute log by writing these messages to a supplemental program log file.

The supplemental program log file:

- Has the same name as the arguments file name (passed as the only command line parameter to the supplemental program executable) with the "**.args**" extension replaced by "**.log**".
- May contain special message type lines that instruct CAVI how to process the following lines:
- [No Message] specifies that the following lines will not be included in the compute log
- **[Log Message]** specifies that the following lines will be treated as a normal compute log message
- [Error Message] specifies that the following lines will be treated as a compute log error message
- The message type lines are case insensitive, but must include the brackets ([and]) without any adjoining whitespace and may not appear on a line with any other text. The message type remains in force until another message type line is encountered. An implicit [No Message] line is processed at the beginning of the log file, so text in the log file before a message type line will not be included in the compute log.

Informing the Exit Status of a Supplemental Program

HEC-RTS uses the exit code returned from the executable to the operating system to determine the status of the supplemental program execution. The exit code is interpreted as follows:

| 0 | The supplemental program completed successfully | |
|-------|---|--|
| 1 | The supplemental program skipped computation — the executable should not return this value if the ForceRecompute argument is set to "true" | |
| other | An error occurred during execution — the executable should output some diagnostic message(s) to the compute log if it returns a value other than 0 or 1 | |

16.5.2 Create a Supplemental Program

To create a supplemental program:

1. Right-click the **Supplemental Icon** S₊ under the **Models Folder** on the **Setup Tab**. Choose **New**, and the **Create New Supplemental Program** dialog opens (Figure 16.5).

| 📻 Create New Supplemental Program | | | | |
|-----------------------------------|----------------|--|--|--|
| Name: | Launch EFM | | | |
| Description: | Starts HEC-EFM | | | |
| | OK Cancel | | | |

Figure 16.5 Create New Supplemental Program Dialog

- 2. In the Name Field, enter the name of the supplemental program.
- 3. Enter a description in the **Description Field** and click **OK**.
- 4. The **Supplemental Program** dialog (Figure 16.6) opens. In the **Supplemental Program** dialog, specify the location of the program or script that implements the supplemental program in the **Executable** field using the "..." browser button.
- 5. If needed, enter command line arguments in the **Arguments** field. Click **OK**, and the **Supplemental Program** dialog closes.

| 📻 Supplemen | tal Program |
|--------------|--|
| Name: | Launch EFM |
| Description: | Starts HEC-EFM |
| Executable: | C:\Program Files (x86)\HEC\HEC-EFM.NET\3.1\EFM.exe |
| Arguments: | "C:\HEC\EFM\Rolling River\Rolling River.efm" |
| | |
| | · · · · · · · · · · · · · · · · · · · |
| | OK Cancel Apply |

Figure 16.6 Supplemental Program Dialog

16.5.3 Add a Supplemental Program

Once a supplemental program has been defined, it can be added to the program order (Figure 16.7). To do this, follow the instructions for adding an HEC program in Section 16.4.1. Instead of selecting an HEC program, select the supplemental program that was created and the appropriate input for the program.

| 😴 Program Order 🧱 🔀 | | | | |
|---------------------|--------------------------------------|-----------------|--|--|
| Program Edit | | | | |
| Name: | Name: Supplemental Program 🗸 🕅 🕄 🕞 🕅 | | | |
| Description: | Add a Supplemental | Program 🛄 | | |
| | | Programs | | |
| | 1 | MetVue | | |
| | 2 | MFP | | |
| | 3 | HMS | | |
| | 4 | ResSim | | |
| | 5 | RAS | | |
| | 6 | FIA | | |
| | 7 | Supplemental | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | OK Cancel Apply | | |

Figure 16.7 Supplemental Program Added to Program Order

16.5.4 Define Model Alternatives

After you have added a supplemental program to your order of programs, you must define one or more model alternatives for that supplemental program before you can use it. The **Program Order Dialog** (Figure 16.1 and Figure 16.7) provides the tools to create model alternatives for the supplemental program.

To define a model alternative for a supplemental program:

- 1. From the **Program Order** dialog (Figure 16.7), select the row that contains the supplemental program to create a model alternative for. On the **Edit** menu, point to **Alternative**, and click **New**.
- 2. The Create a New Alternative for Supplemental Model dialog will open (Figure 16.8).

| 🚰 Create a N | ew Alternative for Snowmelt Model | × |
|----------------------|-----------------------------------|---|
| <u>N</u> ame: | | |
| <u>D</u> escription: | | ^ |
| | | |
| | | ~ |
| | OK Cancel Help | |

Figure 16.8 Create a New Alternative for Supplemental Model Dialog

- 3. In the **Name** box enter a name for the model alternative, and optionally enter a description in the **Description** field. Note that model alternative names must be unique across *all defined supplemental programs* (e.g., two supplemental programs cannot each have a model alternative named "NormalConditions").
- 4. Click **OK**. The **Create a New Alternative for** *Supplemental* **Model** dialog box will close and return the program to the **Program Order** dialog.
- 5. On the **Program** menu, click **Save**. A warning message will appear, stating that this could affect existing setups and asking to continue. Click **Yes**.
- 6. To close the **Program Order** dialog, from the **Program** menu, click **Close**. If changes have not been saved, there will be a prompt to save them.

Note that every model alternative defined for a particular supplemental program will use the same executable; only the arguments will differ. In addition, alternative-specific arguments can also be defined for any model alternative.

To add alternative-specific arguments to a model alternative:

- 1. From the **Program Order** dialog, in the table, select the row of the supplemental program. From the **Edit** menu, point to **Alternative**, and click **Edit**.
- 2. The Supplemental Alt Argument Editor dialog will open (Figure 16.9).

| 🔀 Suppleme | ntal Alt Argument Editor 🛛 🔀 |
|--------------|------------------------------|
| Program: | Snowmelt Model |
| Name | Description |
| Plan1 | |
| | |
| Name: | Plan1 |
| Description: | |
| Arguments: | |
| | <u>^</u> |
| | ≡. |
| | |
| | × |
| | OK Cancel |

Figure 16.9 Supplemental Alt Argument Editor

- 3. The name of the supplemental program will appear in the **Program** field.
- 4. The table on the editor will contain the names of the model alternatives that have been created for the selected supplemental program.
- 5. From the table, select the model alternative to setup arguments for. Once selected, the name of the model alternative will appear in the **Name** field.
- 6. If the description of the model alternative needs to be changed, this can be done in the **Description** field.
- 7. In the **Arguments** box, enter the arguments for the model alternative that will be passed to the executable. Arguments are typically but not required to be entered in *keyword=value* format.
- 8. Click **OK**, and the **Supplemental Alt Argument Editor** (Figure 15.9) will close and return the program to the **Program Order** dialog.

To close the **Program Order** dialog, choose the **OK** button. A warning message will appear, stating that this could affect the existing setup. Click **Yes**.

16.5.5 Remove a Supplemental Program

The steps to remove a supplemental program from the program order are the same as for removing an HEC program (see Section 16.4.2.)

16.6 Multiple Program Orders

By default HEC-RTS allows only a single **Program Order** to be used. If desired, the user can enable use of **Multiple Program Orders**. To enable **Multiple Program Orders**, access the **CWMS CAVI Options** tab via the **Tools > Options** menu, and check the **Advanced Options box**.

Advanced Options - Allows Multiple Program Orders - Puts the Map folder in the Project Tree

Care must be exercised when using **Multiple Programs Orders**. When a model alternative is linked to a program for its input information, it remembers the position of the model it is receiving its data from, not the name or program of the specified **Model Alternative**. This can lead to potential conflicts if a **Model Alternative** is used in two different **Program Orders**. The recommended practice when using **Multiple Programs Orders** is to configure a different **Model Alternative** for use in each different **Program Order**.

CHAPTER 17

Establishing the Stream Alignment

17.1 Overview

A common schematic is used to share effectively common data between HEC software (for example, HEC-HMS and HEC-ResSim) for a watershed. The common schematic consists of a stream alignment, map layers (Chapter 5), and time series icons (Chapter 18). Use of this common schematic ensures consistency of computation nodes, routing reaches, and so on.

In the setup module, tools are used to create the common schematic. Chapter 14 was an overview of the setup module and the tools available in the module. The tools allow the depiction of elements of the common schematic—but not changes to the configuration of the native models. Changes made with the tools are not accounted for in the native models' computations.

The first item to create in the common schematic is the stream alignment. A stream alignment is the backbone for all the other elements that make up a common schematic. This chapter will describe the tools and concepts for creating a stream alignment.

17.2 Definition of a Stream Alignment

Stream alignments represent the stream network in the watershed. The alignment shows flow direction and indicates where confluences and bifurcations occur. It can also provide a sense of distance and scale. Stream alignments are composed of a series of stream elements, stream nodes, and stream junctions (Figure 17.1). A stream element is a segment of the stream alignment. A stream element typically begins or ends at a confluence, bifurcation, or at the boundary of the river system. It is composed of vertex points, with the beginning and ending vertex points being stream nodes. Stream junctions are also stream nodes but are located at points where two stream elements meet.

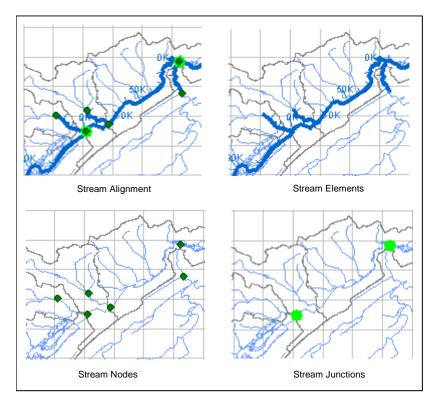


Figure 17.1 Parts of a Stream Alignment

Stream elements are drawn in segments defined by vertex points. Each stream element must have at least two stream nodes, defining the beginning and end of the stream element. Stream elements, stream nodes, and stream junctions, are illustrated in Figure 17.2.

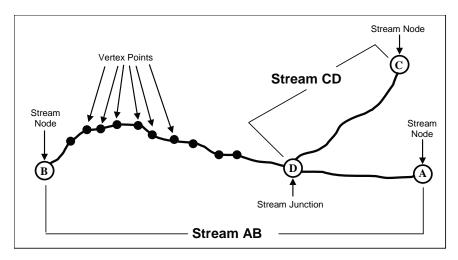


Figure 17.2 Relationships of Stream Elements, Stream Nodes, and Stream Junctions

HEC-RTS creates and labels stream stations (or river stations if the user defines the stationing as such) along each stream element. Stream stationing is a reference system for locating features with distance along a stream. The station at the downstream end of an element is Station 0. The

stationing increases upstream along the element according to the linear distance between vertices on the stream element in the watershed coordinate system. The default stationing can be overridden by editing the station values of the stream nodes at the upstream and downstream ends of the stream element and by adding additional nodes along the stream element.

Stream stationing is based on the geographic extents that are defined when a stream element is drawn. If the geo-extents are based on a map layer, the units for the stream stationing are the same as the map layer (that is, feet or meters). There is no indication of what the units are.

A stream alignment created without an underlying map layer will use the default coordinate system of X-Y. This default system does not have any units associated with it. Appendix C describes how to set up coordinate systems.

The primary tools used to define the stream alignment are the stream alignment tool and stream node tool (Figure 17.3). The zoom tool (Chapter 2) is also useful. Use it to magnify the stream network. This makes defining the vertices along the stream easier. The three tools are located in the map window toolbar of the setup module.

If the stream alignment and stream node tools are not displayed in the map window tool bar, click the **Setup** tab. Expand the **Stream Alignments** layer in the layer tree. Double-click the **Stream Alignment** node.

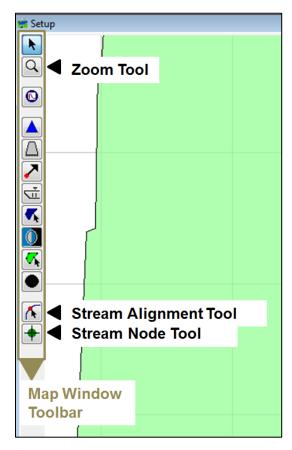


Figure 17.3 Tools Used For Defining a Stream Alignment

17.3 Create a New Stream Alignment

If the stream alignment is going to be based on a map layer, the map layer must first be added to the watershed (Chapter 5). The map layer should contain watershed features, such as channels and reservoirs, so that it can be a guide for creating the stream alignment. The units of the labels on the stream alignment will be the same as the units of the map layer. That is, if the map layer is projected in state plane coordinates (feet), then the labels on the stream alignment will be in feet.

A new stream alignment can either be created by hand or one can be imported from an ArcGIS® shapefile (Section 17.9). The following are steps for creating a new stream alignment.

To create a stream alignment:

- 1. Select the Stream Alignment Tool on the map window toolbar.
- 2. Find a location (typically by viewing a background map that you have added as a map layer) on the map window where a stream element should start. **Important:** Stream elements should be created from *upstream to downstream*. Hold down the **CTRL** key while clicking the mouse button. Each click creates a vertex point (Figure 17.4) on your stream element. The first vertex point is the upstream or beginning stream node of a stream element.

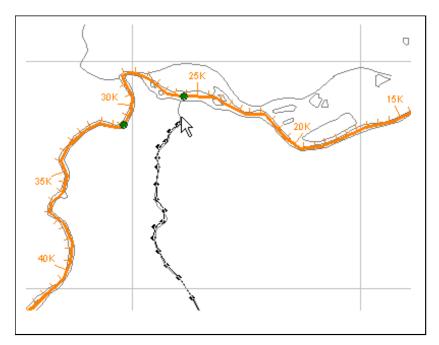


Figure 17.4 Creating a Stream Element

3. For the most downstream or last vertex point, release the **CTRL** key, and then click the mouse button. This creates the ending stream node of the stream element. A single stream element has been created.

4. The **Create New Stream** dialog will open (Figure 17.5). Either accept the default name or enter a new name. An optional description can be entered. Click **OK**.

| 📻 Create New | Stream | x |
|--------------|----------------|---|
| Name: | Stream 21 | |
| Description: | | - |
| | | |
| | | |
| | | Ŧ |
| | OK Cancel Help | |

Figure 17.5 Create New Stream Dialog

- 5. Repeat steps 2 through 4 to add more stream elements to the stream alignment.
- 6. To connect a stream element to an existing stream element, place the first or last click of the new stream element on the existing stream element where the two stream elements should join. After naming the new stream element, a dialog will appear asking to connect the new stream element to the existing stream element. Click **Yes**.
- 7. Once the stream alignment is completed, save the work. On the file menu, click **Save Watershed**.

17.4 Edit an Existing Stream Alignment

After drawing a stream alignment in the map window, a stream element can be renamed, a stream element description can be edited, deleted, directionally reversed, disconnected at both the upstream or downstream end, and the stream stationing and coordinates of the stream nodes on the stream element can be viewed. All of these tasks are accomplished through the stream element shortcut menu (Figure 17.6).

To access the stream element shortcut menu, use the to select a stream element and right click. stream alignment tool (Figure 17.3)

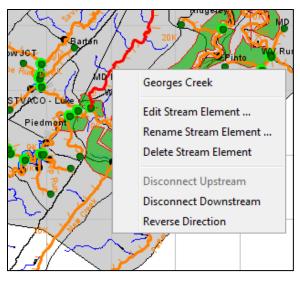


Figure 17.6 Stream Element Shortcut Menu

17.4.1 Rename a Stream Element

To rename a stream element:

- 1. Select the stream alignment tool from the map window toolbar.
- 2. Right-click on the stream element to be renamed, and click **Rename Stream Element** from the shortcut menu.
- 3. The **Rename Stream** dialog (Figure 17.7) opens. Enter the new name in the **Name** field (required) and a description in the **Description** field (optional).

| Rename Stream | n | x |
|---------------|-----------------|---|
| Name: | Piney Swamp Run | |
| Description: | (| |
| | | |
| | OK Cancel Help | |

Figure 17.7 Rename Stream Dialog

4. Click **OK**. A confirmation dialog (Figure 17.8) opens asking the user if they really want to rename the stream.

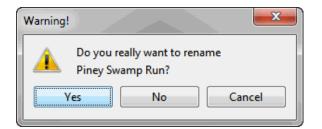


Figure 17.8 Rename Stream Confirmation Dialog

If answering Yes, then an Update Measure Stream References dialog (Figure 17.9) opens.

| ſ | Update N | Measure Stream References |
|---|----------|--|
| | ? | Any Measures that need to remain on on Stream Piney Swamp Run need to have the references updated to reflect the name change. Do you want to update the Measures stream references? |
| | | Yes No |

Figure 17.9 Update Measure Stream References Dialog

If answering **Yes** on the **Update Measure Stream References** dialog, then the stream element references are updated, and the dialog will close. Otherwise, if answering **No**, then the stream element references are not updated, and the dialog will close. In either case, the new name of the stream element will be shown in the map window.

17.4.2 Delete a Stream Element

To delete a stream element:

- 1. Select the stream alignment tool from the map window toolbar.
- 2. Right-click the stream element to be deleted, and click **Delete Stream Element**.
- 3. A warning and confirmation message will appear (Figure 17.10). Click Yes to confirm.

| Confirm [| Delete 2 |
|-----------|--|
| ? | Warning: do not delete a stream that is used by any model configuration. Are you sure you want to delete Stream Stream 21? |
| | Yes No |

Figure 17.10 Confirm Deletion of Stream Element Message

17.4.3 Reverse Direction of a Stream Element

If a stream element is drawn in the wrong direction, from downstream to upstream, the direction can be reversed instead of having to delete and redraw the stream element.

To reverse the direction of a stream element:

- 1. Select the stream alignment tool from the map window toolbar.
- 2. Right-click the stream element to be reverse, and click **Reverse Direction**.
- 3. A warning and confirmation message will appear (Figure 17.11). Click Yes to confirm.

| Confirm | Reverse Direction |
|---------|---|
| ? | Warning: reversing the steam direction will reverse default stationing of the stream, which may cause problems with other model data relying on the Stream Alignment. Are you sure you want to reverse the direction of Stream Stream 21? |
| | Yes No |

Figure 17.11 Confirm Reversing Direction of Stream Element Message

17.4.4 Disconnect a Stream Element

To disconnect a stream element from another stream element, it may be done at either the upstream or downstream end of the stream element.

To disconnect a stream element from another stream element:

- 1. Select the stream alignment tool from the map window toolbar.
- 2. Right-click the stream to be disconnected, and click either **Disconnect Upstream** or **Disconnect Downstream**.
- 3. The stream element will be disconnected from the stream element at the chosen location. In the map window, the upstream or downstream point will physically move away from the connecting stream element, and a stream node will remain on the connecting stream element.

17.4.5 Edit a Stream Element Description

The stream editor, available from the shortcut menu of a stream element, allows editing of the stream element description and viewing of the stream stationing and coordinates of the upstream and downstream stream nodes, as well as any stream nodes in between the two.

To edit the description of a stream element:

- 1. Select the stream alignment tool from the map window toolbar.
- 2. Right-click the stream element to be edited, click **Edit Stream Element**, and the **Stream Editor** (Figure 17.12) opens.

| 📻 Stream Edit | tor | | | × |
|---------------|---------|-----------|--------------|----------------|
| Streams | | | | |
| Name: | Warrior | Run | | ▲ 20 of 21 ► ► |
| Description: | | | | |
| | | | | |
| | | Station | Easting | Northing |
| Upstream N | ode | 8,688.027 | -269,166.094 | 4,110,137.506 |
| DownStream | n Node | 0.000 | -262,679.567 | 4,109,464.940 |
| | | | | |
| | | | OK Cance | el Apply |

Figure 17.12 Stream Editor

- 3. From the name drop-down or the arrow buttons select the name of the stream to be edited.
- 4. Either a new description can be entered the existing description of the stream element can be edited in the **Description** field.
- 5. The table provides the stream stationing and coordinates of the stream nodes that are on the selected stream element.

17.5 Adjusting a Stream Element

After drawing the stream alignment in the map window, there are many options available for adjusting the stream alignment. The zoom tool can be used to help magnify the stream elements. The stream alignment can be refined and reshaped by adding, moving, and deleting vertex points from stream elements. Adjacent vertex points are connected by straight lines. Thus, when a vertex point is deleted, the alignment will adjust so that the two vertex points that had surrounded the deleted vertex point are connected by a straight line. The alignment will adjust so imilarly when vertex points are moved.

17.5.1 Add Vertices to a Stream Element

To add vertex points to an existing stream element:

- 1. Select the stream alignment tool from the map window toolbar.
- 2. Double-click the stream element to add a vertex point to. The stream element will turn red, and vertex points will be displayed in blue.
- 3. Place the pointer where a vertex point should be added. Hold down the **CTRL** key, and click.

17.5.2 Move the Vertices of a Stream Element

To move vertex points on an existing stream element:

- 1. Select the stream alignment tool from the map window toolbar.
- 2. Double-click the stream element where a vertex point should be moved. The selected stream element will turn red. The vertex points will be displayed in blue.
- 3. Click the vertex point you wish to move, and drag it to a new location. This is illustrated in Figure 17.13.

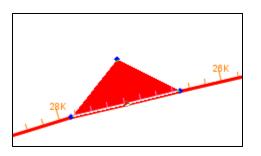


Figure 17.13 Move a Vertex Point

17.6 Stream Nodes

Stream nodes are part of the representation of the stream network in the watershed. The CAVI creates a stream node at the beginning and ending of each stream element and where stream elements meet (stream junctions). Stream nodes are used to establish stationing for a stream. To modify the default stream stationing, the stream nodes must be edited.

Though they appear similar, stream nodes are not the same as computation points. A computation point is a location where time-series data and information is exchanged between analysis software. Stream nodes are useful in placing computation points.

17.6.1 Add a Stream Node

As noted above, two stream nodes are created automatically at the beginning and end of a stream element. Stream nodes can be added to a stream element:

- 1. Select the stream node tool from the map window toolbar.
- 2. Place the pointer on the stream element where a stream node should be added. Hold down the **CTRL** key, and click.

17.6.2 Move a Stream Node

To move a stream node:

1. Select the stream node tool from the map window toolbar.

2. Double-click the stream node that to be moved. It becomes a yellow circle with a black outline and four small black dots (Figure 17.14). Click and drag the stream node along the stream element to its new position.

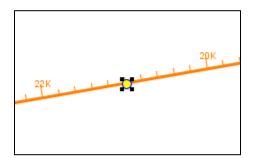


Figure 17.14 Move a Stream Node

17.6.3 Edit Stream Node to Establish Stream Stationing

After placing a stream node on the stream alignment, the stream node can be edited to establish stream stationing for a stream element. To edit a stream node:

- 1. Select the stream node tool from the map window toolbar.
- 2. Right-click on the stream node that you want to edit. A shortcut menu will appear (Figure 17.15).

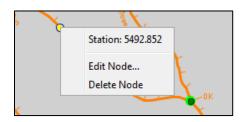


Figure 17.15 Stream Node Shortcut Menu

3. Click Edit Node. The Stream Node Editor (Figure 17.16) opens.

| 📻 Stream Node Editor | | | | | | |
|--------------------------|-------------|--|--|--|--|--|
| Stream Three Forks Run | | | | | | |
| C Location | | | | | | |
| Easting | -298450.402 | | | | | |
| Northing | 4092974.426 | | | | | |
| Station | 6997.858 | | | | | |
| ✓ Use Default Stationing | | | | | | |
| | OK Cancel | | | | | |

Figure 17.16 Stream Node Editor

- 4. The default stream station for the downstream node is 0. The stream station for the upstream node is based on the coordinate system used when digitizing the stream alignment. To change the default stream stationing, clear **Use Default Stationing**. Edit the station in the **Station** field.
- 5. Click **OK**. Based on what station number is entered, the CAVI will automatically adjust the stream stationing for the stream element. This includes the upstream and downstream nodes.

17.6.4 Delete Stream Node

To delete a stream node:

- 1. Select the stream node tool from the map window toolbar.
- 2. Right-click on the stream node that to be deleted. Click **Delete Node**.
- 3. A confirmation message opens. Click Yes to confirm.

17.7 Stream Junctions

When two stream elements are connected, a stream junction is created. A stream junction is where multiple stream nodes exist at one location. A stream junction is represented by a dark green circle with a light green halo around the circle. A stream junction can be moved and edited to adjust its stream stationing.

17.7.1 Move a Stream Junction

To move a stream junction:

1. Select the stream node tool from the map window toolbar.

2. Double-click the stream junction to be moved. It becomes a green circle with a black outline and four small black dots (Figure 17.17). Click and drag the stream junction along the stream element to its new position.

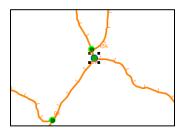


Figure 17.17 Move a Stream Junction

17.7.2 Edit a Stream Junction

To edit a stream junction:

- 1. Select the stream node tool from the map window toolbar.
- 2. Right-click the stream junction to be edited. A shortcut menu (Figure 17.18) will appear.

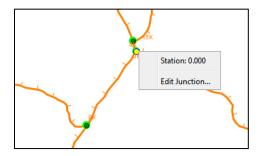


Figure 17.18 Stream Junction Shortcut Menu

3. Click Edit Junction. The Stream Junction Editor will open (Figure 17.19).

| Easting: | -2955 | 62.12 North | ing: | 4090285.20 | |
|-----------------|-----------------|-------------|-------|------------|--|
| | | Stream Node | s | | |
| Use Default | | | | | |
| | Stream | Station | | Stationing | |
| Three Forl | ks Run | 2, | 628.2 | V | |
| Left Prong | Three Forks Run | | 0.0 | V | |
| OK Cancel Apply | | | | | |

Figure 17.19 Stream Junction Editor

4. The editor displays information about the stream nodes associated with the stream junction. To change the stream stationing for a stream node, clear the checkbox for the stream node in the **Use Default Stationing** column of the table. The cell in the **Station** column will become active. Based on what is entered, the CAVI will adjust the stream stationing for the stream associated with the stream node automatically. Click **OK**.

17.8 Change Stream Alignment Properties

Stream alignment properties that can be changed include the color and width of stream elements, stream nodes, and stream junctions, font for the stream name, tic mark properties, and visualization scaling for the stream alignment.

To change stream alignment properties:

- 1. In the setup module, click Map Layers on the maps menu.
- 2. The Map Layers dialog will open (Figure 17.20).

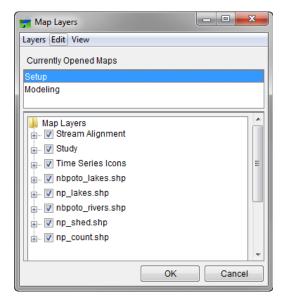


Figure 17.20 Map Layers Dialog

- 3. Right-click the **Stream Alignment** layer in the tree. Click **Properties**.
- 4. The Stream Alignment Properties dialog will open (Figure 17.21).

| 📻 Stream Alignment Properti | es | |
|-----------------------------|---------------|--------------|
| Scale | | |
| Current Scale 1:13583 | | |
| Default | | |
| Edit Properties | | |
| Stream Width: | Stream Color: | |
| 6 🗸 | Custom 👻 | |
| Show Stream Name | Choose Font | |
| Draw Station Tics | | |
| Tic Length: | 7 🗸 | |
| Major Tic Length: | 14 🔻 | |
| 🛛 Draw Tic Labels | Choose Font | |
| | | Stream Name |
| Draw Stream Nodes | | |
| Node Color: | Custom 👻 | |
| Node Outline Color: | Custom 🚽 | |
| Node Width: | 7 🗸 | |
| Draw Junctions | | |
| Junction Color: | green 👻 | |
| Junction Width: | 12 🔻 | |
| | ОК | Cancel Apply |

Figure 17.21 Stream Alignment Properties Dialog

- 5. To change the color of the stream alignment layer, select a color from the **Stream Color** list. The preview panel to the right of the **Edit Properties** panel will preview the selected color.
- 6. Click **OK**, and the color change will appear in the map window.
- 7. Repeat steps 5 and 6 for any other changes to be made to the stream alignment properties.
- 8. To set the visualization scale, click the **Scale** menu.

17.9 Import a Stream Alignment

To import a stream alignment an ArcGIS® shapefile (Section 5.2.1) map layer (Section 5.3) that represents the stream network of the watershed must be added. This shapefile must have an attribute that is the name of each stream, and each stream must form a contiguous line with one upstream point and one downstream point.

To import a stream alignment:

- 1. In the Setup module, on the Maps menu, select Import and then Stream Alignment.
- 2. The Import Stream Alignment dialog (Figure 17.22) will open

| 📻 Import Stream Alignment | | | 23 | |
|-----------------------------------|--------|----------------------|-------|--|
| File Edit | | | | |
| Shapefile Name: nbpoto_river | s.shp | • |] | |
| Shapefile Information: | | | | |
| Database Field Name: | | | • | |
| | Import | Reverse Direction | | |
| | | | | |
| | | | | |
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| | | | | |
| | | | | |
| | | | | |
| | Impo | rt All Reverse Direc | ction | |
| Con Teleronos: | 0 | | | |
| Gap Tolerance: | | | | |
| Replace Existing Stream Alignment | | | | |
| | Import | | | |

Figure 17.22 Import Stream Alignment Dialog

- 3. In the **Shapefile Name** drop-down list, the name of the ArcGIS® shapefile that the CAVI has chosen is displayed. The CAVI automatically selects the first shapefile that contains polylines. If this is not the correct shapefile, on the **File** menu, click **Choose Shapefile**.
- 4. A browser **Choose Shapefile** dialog will open (Figure 17.23). Use the dialog to select the shapefile to be imported (typically located in the **maps** folder of the watershed). Click **Open**.

| 📻 Choose Shapet | Choose Shapefile | | | | |
|-----------------|--|------------------------|--|--|--|
| Look in: | \mu maps 🔹 👻 | 🦻 📂 🛄 • | | | |
| | 🛃 Depth (Max).russiandemft_albers.tif 📄 RR_Lakes_Albers_ft.sbn | 🖻 RussianSubbasins.gd | | | |
| 21 | Depth (Max).vrt RR_Lakes_Albers_ft.sbx | 📄 RussianSubbasins.prj | | | |
| Recent Items | Headsburg.img RR_Lakes_Albers_ft.shp | 📄 RussianSubbasins.sb | | | |
| | Raingages_Albers_ft.dbf 🛛 RR_Lakes_Albers_ft.shp.xml | RussianSubbasins.sb | | | |
| | Raingages_Albers_ft.gdr RR_Lakes_Albers_ft.shx | RussianSubbasins.sh | | | |
| | Raingages_Albers_ft.prj RussianRivers.dbf | 📄 RussianSubbasins.sh | | | |
| Desktop | Raingages_Albers_ft.sbn RussianRivers.gdr | Streamgages_Albers_ | | | |
| | Raingages_Albers_ft.sbx 🛛 RussianRivers.gdr.bak | Streamgages_Albers_ | | | |
| R | Raingages_Albers_ft.shp | Streamgages_Albers_ | | | |
| | Raingages_Albers_ft.shp.xml | Streamgages_Albers_ | | | |
| My Docume | Raingages_Albers_ft.shx RussianRivers.sbx | Streamgages_Albers_ | | | |
| | RR_Lakes_Albers_ft.dbf RussianRivers.shp | Streamgages_Albers_ | | | |
| | RR_Lakes_Albers_ft.gdr RussianRivers.shx | Streamgages_Albers_ | | | |
| | RR_Lakes_Albers_ft.gdr.bak | Streamgages_Albers_ | | | |
| Computer | RR_Lakes_Albers_ft.prj 📄 RussianSubbasins.gdr | streetmaps.osm | | | |
| | • | • | | | |
| | File name: RussianRivers.shp | Open | | | |
| Network | Files of type: All Files | - Cancel | | | |

Figure 17.23 File Browser to Select a Shapefile to Import a Stream Alignment

5. Once the correct shapefile has been chosen, the program automatically searches for a database field name of Stream_ID. If there is no Stream_ID in the shapefile chosen, the database field name that contains the names of each stream from the Database Field Name drop-down list must be selected. In the example shown in Figure 17.24, for the shapefile nbpoto_rivers.shp, the database field name is NAME.

| 🚰 Import Stream Alignment | | | | |
|-----------------------------------|----------------------|--|--|--|
| File Edit | | | | |
| Shapefile Name: nbpoto | _rivers.shp | | | |
| Shapefile Information: | | | | |
| Database Field Name: | | | | |
| | COM_ID | | | |
| | GNIS_ID | | | |
| | LEVEL METERS E | | | |
| | NAME | | | |
| | RCH_ | | | |
| | RCH_CODE RCH_DATE | | | |
| | | | | |
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| | | | | |
| | | | | |
| | | | | |
| L | | | | |
| Import All Reverse Direction | | | | |
| Gap Tolerance: | 0 | | | |
| Replace Existing Stream Alignment | | | | |
| | | | | |
| | Import | | | |

Figure 17.24 Selecting a Database Field Name when Importing a Stream Alignment

6. When the correct database field name has been selected, the table will list the stream names (Figure 17.25). HEC-RTS requires a stream to be a contiguous line with one upstream point and one downstream point. If a stream is a contiguous line, the checkbox in the **Import** column of the table will be set. If the line that represents a stream is non-contiguous, the checkbox will not be set, and a **Warning** message (Figure 17.26) will appear indicating that the lines are not continuous and that the streams cannot be imported. Click **OK** to close the message and to continue defining the import options.

| Import Stream Alignment | | | | |
|---------------------------------------|-------------|------------------------|--------|--|
| File Edit | | | | |
| Ohanafila Marray | | | | |
| Shapefile Name: nbpoto_rivers.shp 🔹 🛄 | | | | |
| Shapefile Information: | | | | |
| Database Field Name: N | | | | |
| Database Field Marine. | AME | | ▼. | |
| NAME | Import | Reverse Direction | | |
| Aaron Run | V | | | |
| Abram Creek | V | | | |
| Ash Spring Run | V | | | |
| Ashcabin Run | | | = | |
| Bluelick Run | V | | | |
| Braddock Run | V | | | |
| Brush Creek | V | | | |
| Buffalo Creek | V | | | |
| Butcher Run | V | | | |
| Cabin Run | V | | | |
| Collier Run | | | | |
| Crabtree Creek | | | | |
| Deep Run | | | | |
| Difficult Creek | | | | |
| Dry Run | | | | |
| Elk Run | V | | | |
| Elklick Run | | | | |
| Emory Creek | V | | | |
| Evitts Creek | | | | |
| Georges Creek | | | | |
| Glade Run | V | | - | |
| | | Import All Reverse Dir | ection | |
| Gap Tolerance: | 0 | | | |
| Replace Existing Stream | m Alignment | | | |
| | Import | | | |

Figure 17.25 Import Stream Alignment Dialog

| Warning | Σ | X |
|---------|---|-----|
| 1 | Some streams formed by this grouping of features are not continuous lines. These streams cannot be imported | ed. |
| | ОК | |

Figure 17.26 Warning Message Indicating Streams Not Continuous Lines and Cannot be Imported

- 7. The **Import All** and **Reverse Direction** buttons can be used to select each of the checkboxes in the **Import** and **Reverse Direction** columns, respectively.
- 8. Gap tolerance is used to connect stream elements that have a gap between the end point and the junction with another stream. By default, the gap tolerance is set to zero, so the CAVI can connect streams to other streams. To allow gap tolerance, check the **Gap**

Tolerance checkbox. Enter a value larger than zero in the **Gap Tolerance** field. The CAVI will connect streams that have a gap between them that is equal to or less than this value.

- 9. The **Replace Existing Stream Alignment** check box allows replacement of the existing stream alignment with one being importing.
- 10. Once everything is set, click **Import**. The stream alignment will be automatically drawn in the map window.
- 11. Click **OK** on the confirmation dialog.

17.10 Export a Stream Alignment

If a stream alignment has been digitized, that stream alignment can be saved as an ArcGIS® shapefile. To export a stream alignment as a shapefile, a stream alignment must be displayed in the map window.

To export a stream alignment as an ArcGIS® shapefile:

- 1. In the **Setup** module, on the **Maps** menu, select **Export** and then **Stream Alignment**.
- 2. A browser will open to choose where the shapefile should be saved (Figure 17.27). Navigate to the appropriate folder. The default stream alignment is stored in the watershed's main folder, but it is possible to export to a different folder (e.g., the watershed's **maps** folder). Enter a name in the **File name** field. Click **Save**.

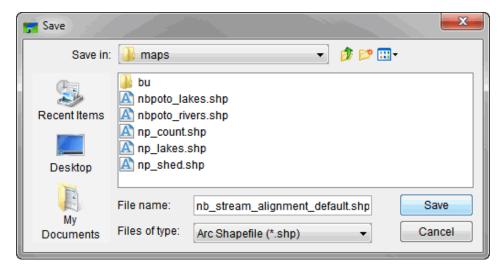


Figure 17.27 Browser for Exporting Stream Alignment

17.11 Save Stream Alignment

To save your stream alignment, on the **File** menu click **Save Watershed**. This command will save all of the stream alignment revisions and all other revisions that have been made to the watershed.

17.12 List of Streams

Once stream alignment has been defined, the streams included can be reviewed.

To view the **List of Streams** report:

1. In the **Setup** module, on the **Watershed** menu, choose **List of Streams**. The **List of Streams** report will open (Figure 17.28). The report provides a list of streams that have been input for the stream alignment, along with the stream's description.

| 📻 North Branch v572 - List of Streams 💷 💷 🗮 其 | | | | |
|---|-------------|----------|--|--|
| File | | | | |
| North Branch v572 | | | | |
| List of Streams | | | | |
| Stream | | | | |
| Name | Description | | | |
| Aaron Run | | | | |
| Abram Creek | | | | |
| Ash Spring Run | | E | | |
| Ashcabin Run | | | | |
| Bluelick Run | | | | |
| Braddock Run | | | | |
| Brush Creek | | | | |
| Buffalo Creek | | | | |
| Butcher Run | | | | |
| Cabin Run | | | | |
| Collier Run | | | | |
| Crabtree Creek | | | | |
| Deep Run | | | | |
| Difficult Creek | | T | | |
| | Close | • | | |

Figure 17.28 List of Streams Report

2. Using the File menu, the report can be printed or exported to an ASCII tab delimited file.

CHAPTER 18

Time Series Icons

Time Series Icons, shown in the **Map window** of the **Control and Visualization Interface** (**CAVI**), indicate sites for which data and information are available. The information can be time series data, images, web pages, webcams, scripts, spreadsheets, or other files. Time series data for the icons can be linked to data from a HEC-DSS file. Time series data can appear as thumbnail plots or color bars. The icons provide easy access for analyzing data and providing location-specific information (e.g., frequently updated pictures of gages, reports on the location).

In the **Setup Module**, the **Time Series Icon Tool** will be used to create and manipulate time series icons. Section 2.3.2 provides a description of the **Time Series Icon Tool**.

18.1 Create a Time Series Icon

To create a time series icon:

1. In the **Setup Module**, click the **Time Series Icon Tool** on the **Map window Toolbar** (Figure 18.1).

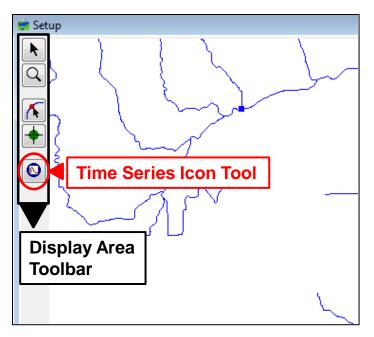


Figure 18.1 Time Series Icon Tool in the Map window Toolbar of the Setup Module

2. Find the location on the **Map window** where a time series icon (Figure 18.2) should be placed. Hold down the **CTRL** key, and click the left mouse button. An icon with a default name will appear on the **Map window**.

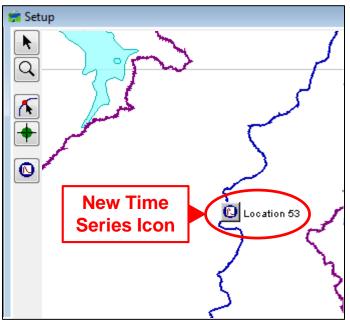


Figure 18.2 New Time Series Icon with Default Name

18.2 Edit Existing Time Series Icons

Data sets can be moved, deleted, renamed, and added to **Time Series Icons**. **Time Series Icons** can also be organized for display purposes. All of these tasks are accomplished through the **Time Series Shortcut Menu** (Figure 18.3), accessed by right-clicking the **Time Series Icon** using the **Time Series Icon Tool**.

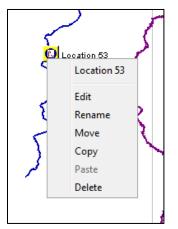


Figure 18.3 Time Series Icon Shortcut Menu

18.2.1 Move a Time Series Icon

To move a **Time Series Icon**:

- 1. Using the **Time Series Icon Tool**, right-click the **Time Series Icon** to be moved, and click **Move** on the shortcut menu.
- 2. The time series icon now has four little black dots (handles) at each corner. Click and drag the icon to its new position.

18.2.2 Copy/Paste Data from Icon to Icon

All of the information associated with a time series icon can be copied to another time series icon. This is useful for setting up similar time series icons where only the location name is different.

- 1. Using the **Time Series Icon Tool**, right-click the **Time Series Icon** to be copied from, and click **Copy** on the shortcut menu.
- 2. Right-click the **Time Series Icon** to copy the information to, and click **Paste** on the shortcut menu.
- 3. The **Paste Icon** dialog (Figure 18.4) will open. In the **To Column** change the location name for the new **Time Series Icon**. Click **Yes**. The **Time Series Icon** will appear on the **Map window** with the new name.

| Paste Icor | n | |
|------------|---|--|
| ? | Copy data names in ico and change the locatior | North Branch Location 2 to icon North Branch Location 1 name(s) as follows? |
| | From | То |
| | BARTON HW | BARTON HW |
| | | Yes No |

Figure 18.4 Paste Icon Dialog

4. This copies the contents of the original icon into the new one, changing the location name at the same time. The icon can be changed and changes can be made to any other properties in the **Associated Data Sets Table** of the **Time Series Icon Editor** dialog (Figure 18.5) of the **Time Series Icon** that was copied to.

| 📻 Time Series Icon Editor | X |
|--|------------------------------|
| Data Edit | |
| Name: Digger Bend Russian | ▼ H 4 11 of 45 ► H |
| Description: | |
| General Icon Types and Layers Photo/Images Scripts/HTML | |
| Label Position and Icon Symbol | |
| Icon: O Time Series | • |
| Label Position: EAST - | |
| Associated Data Sets | |
| Data Set Name | Source |
| /RUSSIAN R A DIGGER BEND/HEALDSBURG CA/FLOW/01DEC2013/15MIN/USGS/ | C:/CWMS/Database/Russian.dss |
| //DIGGER BEND/FLOW-SIM//15MIN/%%/ /RUSSIAN R A DIGGER BEND/HEALDSBURG CA/FLOW/01DEC2013/15MIN/USGS/ | forecast.dss forecast.dss |
| | |
| | |
| | |
| | |
| Browse | |
| | Cancel Apply |

Figure 18.5 Time Series Icon Editor Dialog

18.2.3 Delete a Time Series Icon

To delete a time series icon:

- 1. Using the **Time Series Icon Tool**, right-click the time series icon to be deleted. Click **Delete** from the shortcut menu.
- 2. A warning message will appear asking if the user really wants to delete the time series icon. Click **Yes**.

18.3 Configuring Time Series Icon Properties

After defining **Time Series Icons**, the properties of each **Time Series Icon** must be configured individually in the **Time Series Icon Editor** dialog (Figure 18.5). Properties include the name of the icon, the location of the data, and the appearance of the time series icon in the different modules. Here, the user also sets up images, web pages, webcams, documents, and scripting information associated the time series icon.

18.3.1 Name a Time Series Icon

To give a time series icon a name, description, and icon symbol:

- 1. Using the **Time Series Icon Tool**, right-click the time series icon to be named. Click **Rename** from the shortcut menu. The **Rename** dialog opens.
- 2. Enter the new name in the Name field, and click OK.

18.3.2 Associate Data with a Time Series Icon

Within the CAVI, time series data can be accessed from an HEC-DSS file. Either type in the Time Series Identifiers or pathnames associated with the data, or use the data browser available from the **Time Series Icon Editor** dialog (Figure 18.5).

To associate data from an HEC-DSS file:

- 1. Before associating data from an HEC-DSS file, a HEC-DSS file must be available. A good choice is the HEC-DSS file from a forecast run (**forecast.dss**).
- 2. On the **Time Series Icon Editor** dialog, click **Browse** on the **Data Menu**. The **DSS-Vue** dialog opens. On the **File Menu**, select **Open...**. The **Open HEC-DSS File** dialog opens.
- 3. Use the **Open HEC-DSS File** dialog to select and open the appropriate DSS file. Once the file has been opened, the table in the **DSS-Vue** dialog displays the pathnames available.
- Find the pathname(s) to be added to the time series icon, and select it (them) using the Select button. The pathname displays in the selection area below the table (Figure 18.6). Repeat this step until all of the pathnames that are needed have been selected.

| aumames | Shown: 956 Pa | thnames Selected: 2 Pathn | ames in File: 1496 File | Size: 7.94 MB File Version: 6-UD Librar | y Version: 6-SH | |
|----------|---------------|---------------------------|-------------------------|---|-----------------|--------------------|
| Search | A: | | • C: | ▼ E | £: [| |
| y Parts: | B: | | ▼ D: | ▼ F | 2 | |
| Number | Part A | Part B | Part C | Part D / range | Part E | Part F |
| | 1 | BARTO-SAVAG | FLOW | 01Apr2000 - 08Apr2000 | 1HOUR | APRIL05TEST |
| | 2 | BARTO-SAVAG | FLOW | 28Jul2001 - 01Aug2001 | 1HOUR | EX 2.3 |
| | 3 | BARTO-SAVAG | FLOW | 27Dec2002 - 05Jan2003 | 1HOUR | NY2003 |
| | 4 | BARTO-SAVAG | FLOW | 28Jul2001 - 01Aug2001 | 1HOUR | RUN:GAGEINTERP TES |
| | 5 | BARTO-SAVAG | FLOW | 03Sep1996 - 11Sep1996 | 1HOUR | RUN:PRECIP TEST |
| | 6 | BARTO-SAVAG | FLOW-IN | 28Jul2001 - 01Aug2001 | 1HOUR | RUN:GAGEINTERP TES |
| | 7 | BARTO-SAVAG | FLOW-IN | 03Sep1996 - 11Sep1996 | 1HOUR | RUN:PRECIP TEST |
| | 8 | BARTON HW | ET-CANOPY | 28Jul2001 - 01Aug2001 | 1HOUR | RUN:GAGEINTERP TES |
| | 9 | BARTON HW | ET-CANOPY | 03Sep1996 - 11Sep1996 | 1HOUR | RUN:PRECIP TEST |
| 1 | 10 | BARTON HW | ET-POTENTIAL | 28Jul2001 - 01Aug2001 | 1HOUR | RUN:GAGEINTERP TES |
| 1 | 11 | BARTON HW | ET-POTENTIAL | 03Sep1996 - 11Sep1996 | 1HOUR | RUN:PRECIP TEST |
| 1 | 12 | BARTON HW | ET-SOIL | 28Jul2001 - 01Aug2001 | 1HOUR | RUN:GAGEINTERP TES |
| 1 | 13 | BARTON HW | ET-SOIL | 03Sep1996 - 11Sep1996 | 1HOUR | RUN:PRECIP TEST |
| 1 | 14 | BARTON HW | EXCESS-CANOPY | 28Jul2001 - 01Aug2001 | 1HOUR | RUN:GAGEINTERP TES |
| | 15 | BARTON HW | EXCESS-CANOPY | 03Sep1996 - 11Sep1996 | 1HOUR | RUN:PRECIP TEST |
| | 16 | BARTON HW | FLOW | 01Apr2000 - 08Apr2000 | 1HOUR | APRIL05TEST |
| | 17 | BARTON HW | FLOW | 28Jul2001 - 01Aug2001 | 1HOUR | EX 2.3 |
| | 18 | BARTON HW | FLOW | 27Dec2002 - 05Jan2003 | 1HOUR | NY2003 |

Figure 18.6 HEC-DSS-Vue Dialog with DSS File Pathname Selected

5. Once finished selecting pathnames, click **Set Selected Identifiers**. If the pathnames are from modeling output, a message box will appear asking "*Do you want model F parts set to %'s (to correspond to the alternatives selected)?*". Click **Yes**. This will replace the F

parts with percent sign wild characters that will be substituted with the forecast key when displaying modeling results. A single percent sign represents one model output in sequence, so "%%" will correspond to HEC-HMS output, and "%%%" will correspond to output from HEC-ResSim. Pathnames with an F part of **OBS** will not have their F parts replaced with percent signs.

6. On the **File Menu**, click **Close**. The selected pathnames will appear in the **Associated Data Sets Table** of the **Time Series Icon Editor** dialog. Click **OK**.

18.3.3 Remove Data from a Time Series Icon

To remove data from a time series icon:

- 1. On the **Time Series Icon Editor** dialog, select a row(s) on the **Associated Data Sets Table** that contains the data that should no longer be associated with the time series icon.
- 2. From the **Edit** menu (Figure 18.7), click **Delete Rows**. The selected rows will be deleted from the **Associated Data Sets** table, and the data will no longer be associated with the time series icon.

| Edit | |
|------|---------------|
| | Rename |
| | Insert Row |
| | Delete Rows |
| | Move Row Up |
| | Move Row Down |

Figure 18.7 Edit Menu

18.3.4 Map Window Attributes for Data

To organize the display of time series icons, before proceeding with the next steps, define **Time Series Icon Layers**. The procedure to create layers is described in Chapter 19. **Time Series Icon Layers** provide the ability to choose which time series icons appear in the **Map window**. Layers make refining the display data faster by allowing selection of the displayed layers by their data types. For example, a gage may report stage, precipitation, and compute flow from stage. If time series layers are created for each one, "Stage", "Flow", and "Precipitation", then the appropriate data sets for that location can be placed in the corresponding layer.

The following steps describe how to assign data sets to a time series layer and associate the data sets to CAVI modules:

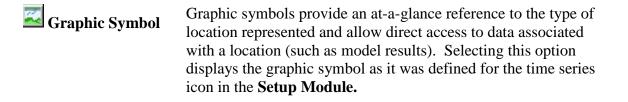
1. From the **Time Series Icon Editor** dialog, click the **Icon Types and Layers Tab** (Figure 18.8).

- 2. From the **Data Set** drop-down list, select the data set to be assigned to a time series icon sub-layer.
- 3. From the Layers field, select or clear the appropriate sub-layers for the selected data set.
- 4. Once the layers for the data set have been established, the display attributes of the time series icon for the individual CAVI modules need to be set.

| 📻 Time Series Icon Editor | | × | | | |
|---|-----------------------|---------------------|--|--|--|
| Name: Venado - K 4 41 of 45 b H | | | | | |
| Description: | Description: | | | | |
| General Icon Types and Layers Photo/Images Scripts/HTML | | | | | |
| Symbol: 🖸 TimeSeries | | | | | |
| Data Set: /RUSSIAN/VEN | /PRECIP-CUM/01Jan2015 | /30MIN/CDEC/ | | | |
| Layers | Module | Icon Type | | | |
| Computed | Setup | Graphic Symbol 👻 | | | |
| Flow Precip-Cum | Acquisition | Quality Color Bar 👻 | | | |
| Precip-Inc Reservoir | Visualization | Thumbnail Plot 👻 | | | |
| Stage | Modeling | None 👻 | | | |
| USGS-Extracted | | | | | |
| | | | | | |
| | | Threshold Colors | | | |
| Add Remove | Thumbnail Scale | Max | | | |
| | ОК | Cancel Apply | | | |

Figure 18.8 Time Series Icon Editor Dialog Icon Types and Layer tab.

5. There are six icon types to choose from or the option of none. Following is a description of each of the available types:



| 🔎 Dot | Dots allow you to mark gages and time series locations without cluttering the Map window . Selecting this option displays a small red dot • along with the icon label in the map window. | | |
|-----------------------------------|--|--|--|
| A Thumbnail Plot | ot Thumbnail plots are miniature versions of the full-size plots, showing data for the duration of the time window. As the time window updates, the CAVI refreshes the data and updates the plot. Thumbnail plots offer a quick overview of current data for the selected time window. | | |
| Quality Color Bar | Quality color bars are linear histograms that offer a quick view of the quality of incoming data within the time window you have set. A database process (DATCHK) evaluates incoming data and assigns a flag to the data. Color bars reflect this quality check by displaying bands of color that display quality information for data sets that are configured for the icon. Color schemes can be configured for the quality colors in the Data Acquisition Module . Refer to Section 18.7 for additional information regarding quality color bar configuration. | | |
| Threshold Color Bar | Threshold color bars are linear histograms that compare incoming data against threshold values set for a location. For example, at a FLOW location, green might be assigned to flow values less than 5,000, which represent normal flow conditions. Yellow may represent values greater than 5,000, but less than 7,000 to indicate flows in a flood warning level, and red may represent values greater than 7,000 to indicate flows above flood stage. Because threshold color bars are location dependent, you must set the values for each time series icon individually. See Section 18.5 on how to configure the threshold color bars. | | |
| Cumulative Threshold Color Bar | Cumulative threshold color bars are color bars that display accumulated values. For example, displayed precipitation over time or the sum of inflow volumes to a lake are accumulated values. | | |
| None | By selecting None , it is possible to configure the icon not to display in a specific module. This is useful when only using an icon in a specific module, as it keeps the Map window uncluttered with unnecessary icons. | | |
| 6 To assign a data set | to a module and give it an icon type from the Icon Type down | | |

- 6. To assign a data set to a module and give it an icon type, from the Icon Type drop-down list for each individual module, select an icon type for the data set. Choose the icon type None to have the data set not appear in a specific module. The selected data set will appear in the Data Acquisition Module as a quality color bar, in the Data Visualization Module as a thumbnail plot, and will not appear in the Modeling Module.
- 7. For example, Figure 18.8 indicates that the selected data set will appear in the **Setup Module** as a graphic symbol, in the **Acquisition Module** as a quality color bar, in the **Visualization Module** as a thumbnail plot, and will not appear in the **Modeling Module**.

8. Once finished with the setup of the time series icon, click **OK**, which closes the **Time Series Icon Editor** dialog (Figure 18.8). To save the changes to the watershed, from the **File** menu, click **Save Watershed**.

18.4 Configuring Thumbnail Plots

A thumbnail plot (Figure 18.9) is a miniature version of the full-size plots, showing data for the duration of the time window. The thumbnail plots the data. The color of the curve that represents the data can be set.

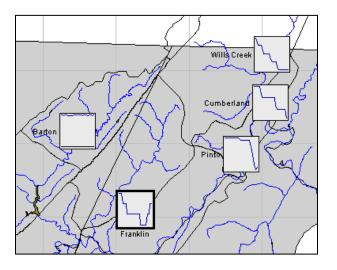


Figure 18.9 Thumbnail Plots - Visualization Module

Assigning thumbnail plots to specific modules:

- 1. The user must be in the **Setup Tab** in the **Watershed Pane**.
- 2. From the **Map window Toolbar**, click the **Time Series Icon Tool**.
- 3. Right-click a time series icon and select **Edit** from the shortcut menu and the **Time Series Icon Editor** dialog (Figure 18.5) opens.
- 4. Click Icon Types and Layers Tab (Figure 18.8).
- 5. From the **Data Set** drop-down list, select the data set that a thumbnail plot should be displayed for in modules.
- 6. For each module that should have a thumbnail plot displayed in the **Map window**, from the **Icon Type** list for each module, select *ThumbnailPlot*. For example, in (Figure 18.8) the **Visualization Module** for the selected data set will display a thumbnail plot.
- 7. Click **OK**, the **Icon Data Set Editor** dialog closes, and the assignment will be saved. Each data set assigned as a thumbnail plot will be assigned a color each of its displayed



curves. However, these colors can be changed, which is described in the following section.

To set the scale of a thumbnail plot:

- 1. From the **Time Series Icon Editor** dialog, click the **Icon Types and Layers Tab** (Figure 18.8).
- 2. The **Thumbnail Scale** group box represents the minimum and maximum values displayed with in a plot. To set these values, first check the checkbox next to **Min** or **Max**, and the fields next to the labels will become enabled. Once the fields are enabled, enter the numeric values for the items you selected.
- 3. Click **OK**, the **Time Series Icon Editor** dialog closes. To save the changes to the watershed, from the **File** menu, click **Save Watershed**.

A curve is created for each data set assigned as **Thumbnail Plot**. In the example in Figure 18.5, three data sets are assigned as thumbnail plots, so three curves are listed. However, depending on what parameter set to display in plot, all curves may not display at once. The colors are assigned to the curves in the order they were associated with the **Thumbnail Plot**.

To set the color of the curve on thumbnail plots:

1. From the **Time Series Icon Editor** dialog (Figure 18.5), from the **Data** menu, click **Icon Plot Colors**. The **Plot Icon Color Editor** opens (Figure 18.10).

| 📻 Plot Icon Color Editor | | | | |
|--------------------------|------------|------------|---|--|
| | Curve | Color | | |
| | 1 | DarkBlue | | |
| | 2 | DarkGreen | | |
| | 3 | DarkRed | - | |
| | Insert Row | Delete Row | | |
| | ОК | Cancel | | |

Figure 18.10 Plot Icon Color Editor

- 2. Under the **Curve** column, a number is assigned to each data set that has been defined for the time series icon.
- 3. To change the color of a curve, click in a cell under the **Color** column and a list of available colors appears.

4. Click the color to be changed, and the color will now appear in the cell of the **Color** column. Click **OK**, and the **Plot Icon Color Editor** closes. A change will not be seen in the **Setup Module**, but in any of the other modules where the time series icon appears as a thumbnail plot, the color change will appear.

18.5 Configuring Threshold Color Bars

Threshold color bars (Figure 18.11) are linear histograms that compare incoming data against threshold values set for a location. Because threshold color bars are usually location dependent, you typically set the values for each time series icon individually. The name of the location appears adjacent to the threshold color bar, and the length of the threshold color bar represents a time line equal to the duration of the time window. Segments along the color bar reflect time intervals, with colors corresponding to the data quality legend you have defined. The threshold color bars are updated dynamically at the time interval that you entered in the **Set Time Window** dialog.

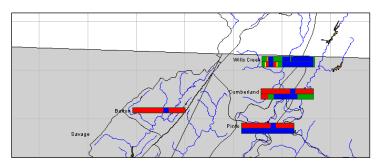


Figure 18.11 Threshold Color Bars

Assigning threshold color bars to specific modules:

- 1. The user must be in the **Setup** tab in the **Watershed Pane**.
- 2. On the Map window Toolbar, click the Time Series Icon Tool.



- 3. Right-click a time series icon and select **Edit** from the shortcut menu. The **Time Series Icon Editor** dialog (Figure 18.5) opens.
- 4. Choose the **Icon Types and Layers** tab (Figure 18.11).
- 5. From the **Data Set** drop-down list, select the data set that should display a threshold color bar in a module.
- 6. For each module that should display a threshold color bar in the map window, from the **Icon Type** list for each module, select *ThresholdColorBar*.
- 7. Click **OK**, the **Time Series Icon Editor** dialog closes, and the assignment will be saved. Each data set assigned as a threshold color bar will be assigned a color. However, these colors can be set, which is described in the following section.

To set the threshold values for a threshold color bar:

- 1. From the **Time Series Icon Editor** dialog (Figure 18.8), click **Threshold Colors**.
- 2. The **Threshold Color Bar Editor for Time Series** (Figure 18.12) opens. For a regular threshold color bar, in the **Color Bar Type** box, select **Regular Threshold**.
- 3. To edit threshold values, from the table click in the cells under the columns **Lower Limit** and **Upper Limit**. Enter values as need, to add rows to the table, from the **Edit** menu click **Insert Row**.
- 4. To associate a color with that threshold value, click in a cell under the **Color** column, a list of available colors appears. Click the color you wish to change, and the color will now appear in the cell of the **Color** column.
- 5. The **Applies to** group box sets the properties for all similar threshold color bars in the watershed. **This Data Set Only** is selected by default and sets the properties to only be used by the current data. **Parameter** (Figure 18.12) sets the property settings to all time series icons using the same selected parameter. **Group** assigns a name to the properties, which can then be used and assigned to additional time series icon properties. **Global Default** sets the properties for all time series icons.
- 6. Click **OK**, and the **Threshold Color Bar Editor for Time Series** closes. Changes will not be seen in the **Setup Module**, but they will be seen in any of the other modules where the time series icon appears as a threshold color bar.

| Threshold Color Bar Editor for Time | e Series | <u> </u> |
|--|--------------------------------|---------------------------|
| e Edit | | |
| Data Set: C:/CWMS/Database/Rus Color Bar Type Regular Threshold | ssian.dss:/RUSSIAN/VEN/PRECII | |
| Lower Limit (excluding) | Upper Limit (including) | Color |
| < | 550 | Blue |
| 550 | 560 | Cyan |
| 560 | 620 | DarkGreen |
| 620 | 640 | Yellow |
| 640 | > | Red |
| Applies to: This Data Set Only - C:/CWMS Parameter PRECIP-CUM Group | S/Database/Russian.dss:/RUSSI/ | AN/VEN/PRECIP-CUM/01Jan20 |
| | | V |
| Global Default (all other unas | signed icons) | New Delete |
| | | OK Cancel |

Figure 18.12 Threshold Color Bar Editor for Time Series

18.6 Configuring Cumulative Threshold Color Bars

Cumulative threshold color bars (Figure 18.13) are commonly used to display cumulative precipitation over time. The following information describes how to assign cumulative threshold color bars to specific modules:

Assigning threshold color bars to specific modules:

1. The user must be in the **Setup** tab in the **Watershed Pane**.



- 2. On the Map window Toolbar, and click the Time Series Icon Tool.
- 3. Right-click a time series icon, select **Edit** from the shortcut menu and the **Time Series Icon Editor** dialog (Figure 18.5) opens.

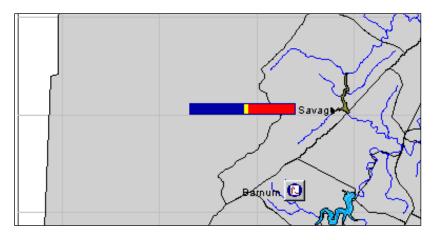


Figure 18.13 Cumulative Threshold Color Bars

- 4. Click Icon Types and Layers Tab.
- 5. From the **Data Set** drop-down list, select the data set that should display a cumulative threshold color bar in a module.
- 6. For each module that should display a cumulative threshold color bar in the **Map window**, from the **Icon Type** drop-down list for each module, select *CumulativeThreshold*.
- 7. Click **OK**, and the **Time Series Icon Editor** dialog closes.

To set the cumulative threshold values for a threshold color bar:

- 1. From the **Icon Types and Layers** tab (Figure 18.8), click Threshold Colors, and the **Threshold Color Bar Editor for Time Series** (Figure 18.12) opens.
- 2. From the Color Bar Type group box, select Cumulative Threshold.
- 3. To edit threshold values, from the table click in the cells under the columns **Lower Limit** and **Upper Limit**. Enter values as needed. To add rows to the table, from the **Edit** menu click **Insert Row**.
- 4. To associate a color with that threshold value, click in a cell under the Color column, and a list of available colors appears. Click the color to be changed, and the color will now appear in the cell of the Color column.
- 5. The **Applies to** box sets the properties for all similar cumulative threshold color bars in the watershed. **This Data Set Only** is selected by default and sets the properties to only be used by the current data. **Parameter** sets the property settings to all time series icons using the same selected parameter. **Group** assigns a name to the properties, which can then be used and assigned to additional time series icon properties. **Global Default** sets the properties for all time series icons.

6. Click **OK**, and the **Threshold Color Bar Editor for Time Series** closes. Changes will not be seen in the Setup Module, but they will be seen in the other modules where the time series icon appears as a cumulative threshold color bar.

18.7 Configuring Quality Color Bars

Quality color bars (Figure 18.14) allow the user to view the quality of incoming data. Quality is defined as being one of the following: valid, questionable, rejected, missing, no report, or not checked. Quality flags must be associated with the data sets. The following information describes how to configure a Time Series Icon as a Quality Color Bar.

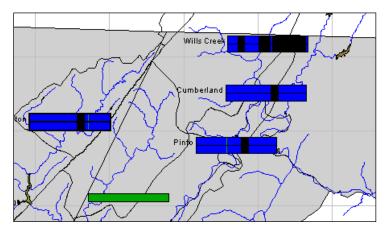


Figure 18.14 Quality Color Bars

Assigning quality color bars to specific modules:

- 1. The user must be in the **Setup** tab in the **Watershed Pane**.
- 2. On the Map window Toolbar, and click the Time Series Icon Tool.
- 3. Right-click a time series icon, select **Edit** from the shortcut menu and the **Time Series Icon Editor** dialog (Figure 18.5) opens.
- 4. Click Icon Types and Layers tab.
- 5. From the **Data Set** drop-down list, select the data set that should display a quality color bar in a module.
- 6. For each module that should display a quality color bar in the map window, from the **Icon Type** list for each module, select *QualityColorBar*.
- 7. Click **OK**, and the **Icon Data Set Editor** dialog closes, and the assignment will be saved. Each data set assigned as a quality color bar will be assigned a color. However, these colors can be changed, which is described in the following section.



18.8 Configuring Photo/Web Images Icon, Documents and Scripts

Photos, web pages, and webcam images (Figure 18.15) can be assigned to the time series icons. Documents, such as reports or spreadsheets, can also be assigned. Once assigned, they can be accessed through the icon's shortcut menu in the selected modules and will appear as the icon's image. The following steps describe how to configure photo, images, and webcams or a script, web pages, and documents:



Figure 18.15 Photo from a Time Series Icon

To configure a photo, image, or webcam .jpg file:

- 1. The user must be in the **Setup Tab** in the **Watershed Pane**.
- 2. Click the **Time Series Icon Tool** from the **Map window Toolbar**.
- 3. Right-click the time series icon you want to modify. Click **Edit** from the shortcut menu and the **Time Series Icon Editor** dialog (Figure 18.5) opens.
- 4. Click **Photos/Images** tab (Figure 18.6).

| 🛜 Time Series Icon Editor | | | | | | | | | | |
|---|-------------------------|-------------------------|----------|------------|------------|----------|----------|-------------|---------------|----------|
| Edit | Edit | | | | | | | | | |
| Name: Venado Venado | | | | | | | | | | |
| Description: | | | | | | | | | | |
| General Ico | on Types and Layers Pho | oto/Images Scripts/HTML | | | | | | | | |
| | Display | URL or | Separate | Width | Height | Refresh | Fade | Acquisition | Visualization | Modeling |
| | Name | File Name | Frame | (or Ratio) | (or Ratio) | Interval | | | | |
| Depth (Max).russiandemft_albers.tif C:\CWMS\watershed\Russian_River\maps\ | | V | 1.0 | 1.0 | -1 | | V | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Show Pl | hoto Icon | | | | | | | | | ~ |
| View | | | | | | | | | | |
| | | | | | | | | ок | Cancel | Apply |

Figure 18.16. Photo/Image Settings Dialog

- From the Edit menu, click Browse and an Enter Image file browser opens. Select an image file, click Open, and the selected file will be added to table. Alternatively, image files can be stored and retrieved from DSS. If this is the case for your image, click Browse DSS from the menu and select the image from the DSSVue pathname selector.
- 6. Select the image file through the browser.
- 7. The image files name will appear in the **Display Name** column and the full path to the file will appear in the **URL or File Name** column.
- 8. Alternatively an image file may be available through a website, as in the case of a webcam. If so, type in the URL of the website in the URL or File Name column.
- 9. To modify the **Display Name** an image, click the cell under the **Display Name** column that corresponding to the image file to be modified and enter the new name. The **Display Name** will be the text of the menu option in the time series icon's shortcut menu, which will trigger the image to display.
- 10. Select **Separate Frame** if you would like the image to display in a new window when it is triggered.
- 11. Specify the **Width (or Ratio)** and **Height (or Ratio)** of the displayed image. By default the image will display as the image file size.
- 12. The **Refresh Interval** is specific to webcam images. The webcam image is refreshed with a new webcam image at a rate of seconds. The rate starts at 0 seconds. For example, if the **Refresh Rate** is set to 10, the image will be retrieved every 10 seconds. To only have the image loaded once, set the rate to -1.
- 13. **Fade** is an on/off switch specific to webcam images. It transitions each image into the next one by showing 10% or more of the next .jpg every 0.05 seconds, until the full picture is shown. This gives a smooth motion like flow to the image.
- 14. When all the information is configured, click **View** to preview the image.

- 15. To add another image to the table, first select **Add Row** or **Insert Row** from the **Edit** menu. Then follow the same steps as outlined above.
- 16. To remove an image from the table, select the image in the table and choose **Delete Row** from the **Edit** menu.
- 17. To change the order of image in the table, first select the image in the table then select **Move Row Up** or **Move Row Down** from the **Edit** menu.

To configure a script, web page, or other supported file:

- 1. The user must be in the **Setup** tab in the **Watershed Pane**.
- 2. Click the Time Series Icon Tool from the Map window Toolbar.
- 3. Right-click the time series icon to be modified. Click **Edit** from the shortcut menu and the **Time Series Icon Editor** dialog (Figure 18.5) opens.
- 4. Click Scripts/HTML tab (Figure 18.17).

| 📻 Time Series I | con Editor | | | | × |
|-----------------|---|-----------|-------------|---------------|-------------|
| Edit | | | | | |
| Name: | /enado | | | • H 4 4 | 1 of 45 🕨 🗎 |
| Description: | | | | | |
| General Icon | Types and Layers Photo/Images Scripts/HTML | | | | |
| Display | Script File | Arguments | Acquisition | Visualization | Modeling |
| Name | or Other (e.g., %name) | | | | |
| 1-USGS | C:\CWMS\watershed\Russian_River\scripts\1-USGS.py | | V | | V |
| 3_Grid_RR | C:\CWMS\watershed\Russian_River\scripts\3_Grid_Russia 🛛 🖉 🕼 | | | | V |
| | | | | | |
| • | III | | | | 4 |
| Run | | | | | |
| | | | ОК | Cancel | Apply |

Figure 18.17. Assign Scripts to Time Series Icons

- 5. Select Script Editor/Selector from the Edit menu. The Script Editor will appear. In the Script Editor, highlight the script to be assigned to the time series icon and click OK. The Script Editor closes. The selected script's name will fill the Display Name column and its path on disk will fill the Script File or Other column.
- 6. To add a file to the table, select **Browse Other** from the **Edit** menu. A file browser will appear. In the **Open** file browser select the file you would like to assign to the time series icon, and click **Open**. The file browser will close and the selected file's name will fill the **Display Name** column and its path on disk will fill the **Script File or Other** column.
- 7. To assign a web page, type in the URL of the website in the **Script File or Other** column.

- 8. To modify the **Display Name** an image, click the cell under the **Display Name** column that corresponding to the image file you want to modify and enter the new name. The **Display Name** will be the text of the menu option in the time series icon's shortcut menu, which will trigger the image to display.
- 9. Place a check in the module columns (**Acquisition**, **Visualization**, or **Modeling**) the script file or other should be available in.
- 10. When all the information is configured, click **Run** to preview the file or script.
- 11. To remove a script or other from the table, select script or other in the table, and choose **Delete Row** from the **Edit** menu.
- 12. To change the order of image in the table, select the script or other in the table then select **Move Row Up** or **Move Row Down** from the **Edit** menu.

CHAPTER 19

Time Series Icons Layers

19.1 Overview

This chapter describes the creation, configuration, and management of time series icons layers. When a new watershed is created, a default layer called **Time Series Icons** (Figure 19.1) is created. This layer includes all of the time series icons that are defined for the watershed.

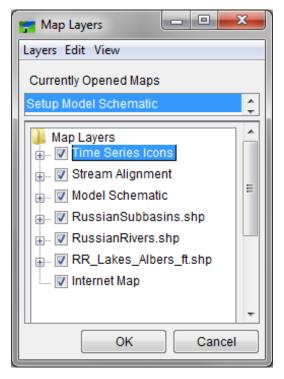


Figure 19.1 Time Series Icons Layer in the Map Layers Dialog

Additional time series icons layers can be created to separate time series icons by data type. For example, a gage may report stage and precipitation (and compute flow from stage). Layers can be for each of these data types can be created and named, for example, **Stage**, **Flow**, and **Precip**. Creating additional layers allows the user to focus on the specific data type they wish to see.

19.2 Creating Time Series Icons Layers

To create additional time series icon layers:

 In the Setup module, click the Maps menu. Select Map Layers. The Map Layers dialog will open (Figure 19.2). From the Map Layers tree, right-click Time Series Icons. From the shortcut menu, click Add Icon Layer, and the New Time Series Icon Layer dialog opens (Figure 19.3).

| 📻 Map Layers | - • × | |
|------------------|--------------------|---|
| Layers Edit View | V | |
| Currently Opene | ed Maps | |
| Setup | × | |
| Map Layers | eries Icons | |
| 🛓 🗐 Strea | Move To Top | H |
| 🛓 🚛 📝 Mode | Move Up | |
| 🔒 🖶 🔽 🔽 Russ | Move Down | Ш |
| 🕂 🐨 🔽 Rus: | Move To Bottom | 1 |
| | Properties | |
| | Add Icon Layer 🔓 📮 | - |
| | OK Cancel | |

Figure 19.2 Map Layers Dialog with Time Series Icons Layer shortcut menu open

| | 📻 New Time S | Series Icon Layer | x | J |
|---|---------------|--|---|---|
| ſ | Name: | Flow | | |
| i | Description: | USGS and Corps flow gages | * | |
| | | | Ŧ | |
| l | 🔲 Add all Tin | ne Series Icons' Data Sets to this Layer | | |
| | | OK Cancel Help | | |

Figure 19.3 New Time Series Icon Layer Dialog

- 2. In the Name field, type a name for the sub-layer. For example *Flow*, *Stage*, or *Precip*.
- 3. In the **Description** field, type an optional description for the sub-layer.

- 4. To add all of the time series icons that you defined for the watershed to the layer, check Add all Time Series Icons' Data Sets to this Layer. To add individual time series icons to the sub-layer, clear Add all Time Series Icons' Data Sets to this Layer. For more detail on how to add individual time series icons to sub-layers, see Chapter 18.
- 5. Click **OK**, and the **New Time Series Icon Layer** dialog will close.

Another way to access the **New Time Series Icon Layer** dialog is from the **Icons Types and Layers** tab of the **Time Series Icon Editor** dialog shown in Figure 19.4. To access it, use either the **Select Tool** or the **Time Series Icons Tool** to right-click on a time series icon in the Map window of the Setup Module. Then, select **Edit**, and click the **Icons Types and Layers** tab. Click the **Add** button at the lower left, which will open the **New Time Series Icon Layer** dialog (Figure 19.3).

| 📻 Time Series Icon Editor | | × |
|------------------------------|------------------------|---------------------|
| Name: Venado Description: | | • H 41 of 45 H H |
| General Icon Types and La | yers Photo/Images Scri | pts/HTML |
| Symbol: 💽 TimeSeries | | |
| Data Set: /RUSSIAN/VEN | /PRECIP-CUM/01Jan2015 | /30MIN/CDEC/ |
| Layers | Module | Icon Type |
| CDEC | Setup | Graphic Symbol 👻 |
| Flow Precip-Cum | Acquisition | Quality Color Bar 🔹 |
| Precip-Inc | Visualization | Thumbnail Plot 🔹 |
| Stage | Modeling | None 👻 |
| USGS-Extracted | | |
| | | Threshold Colors |
| Add | Thumbnail Scale | Max |
| | ОК | Cancel Apply |

Figure 19.4 Time Series Icon Editor Dialog – Icon Types and Layers

The new time series layer will appear in the **Map Layers** tree (Figure 19.5) and in the **Layers** list on the **Icons Types and Layers** tab (Figure 19.4). Repeat this process for all layers that require separate control. When finished creating **Time Series Icons Layers**, specify datasets for

individual time series icons layers (for more details on how to configure time series icons see Chapter 18).

| 📻 Map Layers | |
|--|--------|
| Layers Edit View | |
| Currently Opened Maps | |
| Setup | |
| Acquisition | |
| Modeling | |
| Visualization | |
| Map Layers Study Study Map Layers Map Layers Map Layers Map Layers Map Layers Name Precip Map Layers Precip Map Layers Stage Map Layers Precip Map Layers Stage Map Layers Name Na | Cancel |

Figure 19.5 Map Layers Dialog Showing the New "Flow" Time Series Icons Layer

19.2.1 Removing Time Series Layers

To remove layers:

- 1. From the **Layers** list on **Icons Types and Layers** tab (Figure 19.4), select the layer to be removed, and click the **Remove** button at the lower left.
- 2. A warning message dialog will open. Click **Yes**, and the layer will disappear from the **Layers** list on the **Icons Types and Layers** tab.

19.3 Time Series Icon Layer Properties

The user can configure the appearance of a layer's time series icons and their labels (**Global Properties**), set the visualization scale (**Scale**), and associate a template (**Template**) with the **Time Series Icon Layer Properties** dialog. To access the **Time Series Icon Layer Properties** shortcut menu, either the **Map Layers** dialog (Figure 19.1) or the **Icon Types and Layers** tab must be open (Figure 19.4).

To configure Time Series Icons Layer properties:

- 1. From the **Map Layers** tree, right-click **Time Series Icons**. From the shortcut menu, click **Properties**. Alternatively, right-click on a layer in the **Layers** list of the **Icon Types and Layers** tab and select **Properties**. The **Time Series Icon Layer Properties** dialog will open (Figure 19.6).
- 2. The **Layer** drop-down list contains the name *Time Series Icons* (if no sub-layers have been defined) or the name of each defined time series icon layer. A layer can be defined to include all time series icons. Here, for example, the layer *All* includes all time series icon layers.

| Small Graphic Small Icon Medium Icon | X |
|---|---|
| Icons ICons Small Graphic Image: Construction of the second s | K 1 of 6 D H |
| Small Graphic Small Icon Medium Icon Large Icon Custom (W x H) Graphic 15 15 | |
| | oreground Color ckground ackground Color erlapping Names |
| Colorbar 70 8 | |

Figure 19.6 Time Series Icon Layer Properties Dialog—Global Properties Tab

19.3.1 Global Properties

The **Global Properties Tab** in the **Time Series Icon Layer Properties** dialog (Figure 19.6) allows changes to the appearance of all time series icons and their labels for the time series icons layer (specified in the **Layer** drop-down box) shown in the map windows of the **Visualization** and **Acquisition** modules. (The icons shown on the **Modeling** and **Setup** module map windows are not affected by changes to the **Global Properties**.) There are several ways to control the appearance of all time series icon labels from the **Global Properties Tab**:

- 1. By default, the time series icons appear in the **Visualization** and **Acquisition** modules' Map Windows using the **Medium Icon** format. From the **Icons** field, the CAVI allows you five options for displaying time series icons **Small Graphic**, **Small Icon**, **Medium Icon**, **Large Icon**, and **Custom**.
- 2. By default, the labels for time series icons appear in the **Visualization** and **Acquisition** modules' **Map Window**. If it is undesired for the labels for a specific layer to appear in the **Map Windows**, clear **Draw Names**, click **Apply**, and the layer's time series icon labels no longer appear in the **Map Window**.
- 3. To change the color of a time series icon layer's labels, click Foreground Color. A Color Chooser opens (Figure 19.7), where the color the labels should display in can be selected. Click OK, and the Color Chooser closes. From the Time Series Icon Layer Properties dialog (Figure 19.6), click Apply. The time series icon labels will now appear in the chosen color. For more information on the Color Chooser, see Appendix E.

| 📻 Color Cho | ser | | |
|-------------|------------------|-------------------------|---------|
| Swatches | SB R <u>G</u> BA | | |
| | | | Recent: |
| Preview | | Sample Text Sample Text | |
| | ОК | Cancel Reset | |

Figure 19.7 Color Chooser

4. By default, all time series icon labels do not have a background color in the map window. If you want a time series icon layer's labels to have a background color, click Draw Background, and click Apply. The specified layer's time series icon labels will now have the default background color (light gray). The background color can be changed by clicking Background Color. A Color Chooser opens. Select the color you want the background of the labels to display in, and click OK. The Color Chooser closes. From the Time Series Icon Layer Properties dialog, click Apply. The background color of the layer's time series icon labels will now appear in the chosen color.

- 5. When a module's **Map Window** shows the whole watershed, some time series icon labels will not appear when they overlap other elements. To display a time series icon layer's labels, click **Draw Overlapping Names**, and click **Apply**. Now all of the layer's time series icon labels will appear in the **Map Window** when viewing the whole watershed.
- 6. To change the font of a time series icon layer's labels, click Name Font. A Font Chooser opens (Figure 19.8), where you can select the font type from the Font list, and you can select a size using the Size slider. Click OK, and the Font Chooser closes. From the Time Series Icon Layer Properties dialog (Figure 19.6), click Apply. Now all of the time series icon layer's labels will appear in the selected font and size.

| 📻 Font Chooser 📃 💌 | |
|--------------------|--|
| АаВвСс 123 | |
| Font Forte | |
| Bold Sample text | |
| Italic AaBbCc 123 | |
| Size | |
| 15 | |
| OK Cancel | |

Figure 19.8 Font Chooser

19.3.2 Scale

The Scale Tab (Figure 19.9) of the Time Series Icon Layer Properties dialog allows the user to specify the map scale, or zoom level, at which a time series icon sub-layer becomes visible. If the Always show layer radio button is selected, the specified time series icon layer (shown in the Layer drop-down) will always be displayed in the Map Window, regardless of zoom level. However, the Only show layer in the following scale range options can be used to display a time series icon layer only when the Map Window scale is zoomed to the specified scale. The user can specify scales at which the time series icon layer is displayed below, above, or both. The scale can either bedirectly into the field, or use the Set to Current button to set the scale equal the current display.

| 📻 Time Series Icon Layer Pro | operties | | | × |
|------------------------------|----------------------|-------|-------------------|-----|
| Layer: Precip | | • | ₩ 4 3 of 6 | |
| Global Properties Scale | Template | | | |
| Always show layer | | | | |
| Only show layer in the f | ollowing scale range | | | |
| Only visible below 1: | | 58527 | Set to Curr | ent |
| Only visible above 1: | | | Set to Curr | ent |
| Current Scale 1 : 58527 | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | ОК | Canc | el Ap | ply |

Figure 19.9 Time Series Icon Layer Properties Dialog — Scale Tab

19.3.3 Template

Templates are created to save customized plot settings that can be used by other plots and the **Time Series Icons Layer**. From the **Template Tab** (Figure 19.10) of the **Time Series Icon Layer Properties** dialog, a template can be associated with the **Time Series Icons Layer** by selecting a template from the **Template** drop-down list.

| 📻 Time Series Icon Layer Properties 🧮 🌉 |
|---|
| Layer: All |
| Global Properties Scale Template |
| Template: C:\Users\srahimi\Desktop\14_Buffalo_Bayou_2 Browse |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| |
| OK Cancel Apply |

Figure 19.10 Time Series Icon Layer Properties Dialog — Template Tab

CHAPTER 20

Model Alternatives and Forecast Runs

A **Model Alternative** is a single model configuration with a specific set of input and parameters. A second model alternative would be defined by a different configuration or different input or parameters. A **Forecast Run** is a single forecast scenario defined by a specific set of data, information, and model alternatives. A second forecast run would be defined by different data, information, or model alternatives. Model alternatives run sequentially during a forecast.

Model alternatives and forecast runs are described in this chapter. The model alternatives and forecast runs are manipulated primarily in the **Setup Module**. Chapter 15 provides a detailed description of the **Setup Module** and its interface.

20.1 Model Alternatives

Model Alternatives consist of input data sets and configurations for each model. **Model Alternatives** configurations do not include time-specific data. Therefore, the **Model Alternatives** can be used in conjunction with any time window.

In general, models and their alternatives are created using the software of the native model, for example, HEC-HMS, HEC-ResSim, HEC-RAS, HEC-FIA, and so on. Once models and their alternatives are created and configured initially, they are imported into the watershed using the import commands in the **File** menu of the **Setup Module**. The model alternative import process is detailed in in Section 20.2. Once imported, the CAVI can then be used to configure and edit specific model alternatives.

HEC-RTS uses plug-ins that allow the CAVI to interface with the software programs of the native model. This means that all aspects of model alternatives are configurable using the CAVI native model interface. For example, HEC-HMS base model parameters can be edited directly.

MFP deals with observed meteorological data and future precipitation. **Model Alternatives** can be configured for use in conjunction with HEC-HMS to compute a variety of future precipitation scenarios. HEC-MetVue deals with observed meteorological data and future precipitation. **Model Alternatives** can be configured for use in conjunction with HEC-HMS to compute a variety of observed precipitation scenarios. HEC-HMS model alternatives simulate watershed response to precipitation. HEC-HMS **Model Alternatives** are used to forecast future flows. HEC-ResSim **Model Alternatives** assist with reservoir operations, consisting of the physical data representing a river-reservoir system and operating rules for all controllable elements in the system. HEC-RAS **Model Alternatives** describe water surface profile and stages at gage locations, geometry information for a river, and defined flow data sets. HEC-FIA **Model Alternatives** allow for analysis of flood consequences. Its model forecast alternatives are a combination of impact area and hydrograph time series sets. The parameters within each **Model Alternative** can be edited to reflect changing conditions.

20.2 Importing Watersheds and Model Alternatives

There are two ways to import models and their alternatives into a watershed: (1) the import **CWMS 2.x Watershed** command found in the **Watershed** menu, or (2) choose commands from the **Import** menu option (Figure 20.1) found in the **Models** menu.

| Mode | Models | | | | | | | |
|------|------------------------|----|--------|--|--|--|--|--|
| HHH | Program Order | | | | | | | |
| | Import P | ٩ | MetVue | | | | | |
| | Model Alternative Keys | | MFP | | | | | |
| | Forecast Runs | ~ | HMS | | | | | |
| | Model Linking | W | ResSim | | | | | |
| | Edit Extract | | RAS | | | | | |
| | Edit Post | 20 | FIA | | | | | |
| | HMS | | | | | | | |
| | FIA P | | | | | | | |

Figure 20.1 Import Menu

To use the import **CWMS 2.x Watershed** command, a watershed must be configured in Version 2.0 or 2.1. The individual model import commands do not require a configured watershed.

20.2.1 Importing an Entire Watershed

There are two ways to import an entire watershed. The first way uses the **Create New Watershed** dialog by completing the following steps:

- 1. Create a **New Watershed** as detailed in Section 15.2.
- 2. On the **Create New Watershed** dialog, navigate to the **Import CWMS 2.1 Watershed** option.
- 3. Click the **Browse** button to the right of the **Import CWMS 2.1 Watershed** option to open the **Select Workspace File** browser dialog.
- 4. In the file browser dialog, navigate to and select the CWMS 2.1 workspace file (files with **.wksp** extensions) you want to import.
- 5. Click **Open**, and the **Select Workspace File** dialog closes.
- In the Create New Watershed dialog click Ok, and CWMS imports the selected CWMS 2.1 Watershed in to the current watershed. The results of the import are shown in the Import CWMS 2.1 Watershed dialog shown in Figure 20.2.
- 7. Click Close, and the Import CWMS 2.x Watershed dialog closes.

| 📻 Import CWMS | 2.1 Watershed | × |
|-----------------|------------------------------|-------------------------------|
| CWMS 2.1 Water | shed File: C:\CWMS_2x\BaldEa | gle2.0.wksp |
| Import Progress | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Status | Watershed Component | # Model Alternatives Imported |
| | ResSim | |
| | HMS | |
| | MFP | |
| | RAS | |
| | Time Series Icons | |
| | Maps | |
| | | |
| | | |
| | | |
| | | |
| | | Close |

Figure 20.2 Import CWMS 2.1 Watershed Dialog

20.2.2 Importing Individual Models and Model Alternatives

Individual models and their associated model alternatives can be imported into a watershed. A model can be imported regardless of whether the model is part of the watershed or exists as a stand-alone model.

To create a new watershed from scratch, complete the following steps:

- 1. Create a New Watershed as detailed in Section 15.2.
- 2. Import an MFP alternative as detailed in Section 20.4.1.
- 3. Import a HEC-MetVue alternative as detailed in Section 20.5
- 4. Import an HEC-HMS alternative as detailed in Section 20.6.1.
- 5. Import a HEC-ResSim watershed as detailed in Section 20.7.1.
- 6. Import a HEC-RAS alternative as detailed in Section 20.8.1.
- 7. Import an HEC-FIA alternative as detailed in Section 20.9.1.
- 8. Create and configure other models alternatives as desired. Model alternative creation and configuration are detailed below.

9. Save the watershed.

20.3 Interacting with Model Alternatives

20.3.1 Setup Module

Model alternatives are manipulated primarily in the **Setup Module.** The individual model editors can be accessed by right-clicking on a specific model alternative in the Watershed Pane and using the shortcut menu (Figure 20.3) that appears.

The short menu contains options associated with that model and alternative. Click on an option, the associated model editor will open with the data for the model alternative associated with the selected model.

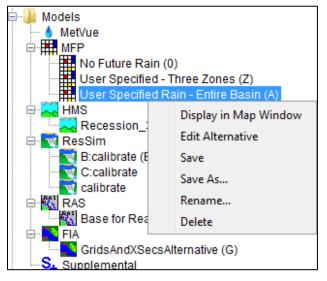


Figure 20.3 Individual Model Editors

20.3.2 Modeling Module

A specific forecast run's model alternatives can be interacted with in the **Modeling Module**. With a forecast alternative active, from the **Models panel** of the **Modeling Module**, the individual model editors can be accessed (Figure 20.4). From the control panel in the **Modeling Module**, right-click on the active model and a shortcut menu will appear.

The short menu contains options associated with that model and alternative. Click on an option, the associated model editor will open with the data for the model alternative associated with the selected model.



Figure 20.4 Individual model editors

20.3.3 Schematic Elements

From the map window, certain model editors can be accessed from schematic elements on the display area. For example, if the active forecast run has a HEC-ResSim model, on the display area there will be HEC-ResSim model elements, such as junctions. Right click on a junction, a shortcut menu (Figure 20.5) will appear, under junction, click on **Edit Properties** and the model alternative and the **Junction** editor will open.

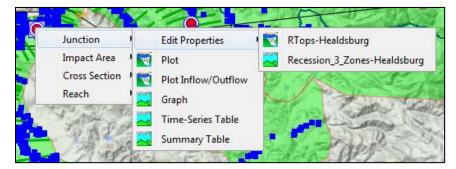


Figure 20.5 Schematic Shortcut

20.4 MFP Model Alternative

An MFP alternative consists of an HEC-HMS meteorologic model, a zone configuration (based on an HEC-HMS basin model) and a set of precipitation forecast data. The HEC-HMS project can contain more than one meteorological model with gridded precipitation from different sources, such as NEXRAD radar, interpolation from gage reports, or results from a grid-based snow model. A separate MFP alternative will need to be created for each source of lookback precipitation grids that are intended to be used in the forecast models.

20.4.1 Import an MFP Alternative

To import an **MFP** alternative:

1. In the **Setup Module** in the **Model** menu, select **Import** > **MFP**, and the **Choose MFP Version** dialog (Figure 20.6) opens.

| Choose M | 1FP Version |
|----------|--|
| 1 | Choose MFP version to import from Version 2.1 |
| | OK Cancel |

Figure 20.6 Chose MFP Version Dialog

- 2. Choose the MFP version to import from in the drop-down box. Available import version choices for MFP alternatives are Versions 2.1 and 3.x.
- 3. Click **OK**, and the file browser dialog opens.
- 4. For MFP Version 2.1, navigate to and select the **MFP** project file (.conf extension) to be imported, and click the **Open**.
- 5. For MFP Version 3.x, navigate to and select the folder containing the **MFP** project files to be imported, and click **Open**.
- 6. The MFP model alternative is imported into the watershed.
- 7. Save the watershed.

20.4.2 Create an MFP Alternative

To create an **MFP** alternative:

- 1. In the **Setup** tab in the **Watershed Pane**, from the **Model** folder right-click **MFP**, and select **New**.
- 2. The Create a New MFP Alternative dialog (Figure 20.7) opens.
- 3. Enter a name in the **Name** field and enter a description in the **Description** field (Figure 20.7).
- 4. Select a basin model from the **Basin Model** drop-down list. The choice of basin model will determine which precipitation zone configurations will be available for the **MFP** alternative. Make sure to select a basin model that covers the same area covered by any basin models used in **MFP** alternatives that will combine with this **MFP** alternative.
- 5. Select a meteorologic model from the **Meteorologic Model** drop-down list. The meteorologic model determines the grids used in the lookback portion of the forecast.
- 6. Select a precipitation zone configuration from the **Precipitation Zone Configuration** drop-down list. See Section 7.2.1 on how to create a new precipitation zone configuration.

7. Click **OK**, and the **Create New MFP Alternative** dialog closes. To open the **MFP Alternative** editor, right-click on the newly created MFP alternative and select **Edit Alternative**, and the **MFP Alternative** editor opens (Figure 20.8).

Figure 20.7 Create New MFP Alternative Dialog

By default, the **MFP Alternative Editor** dialog is set for manual entry of forecast precipitation data by precipitation zone. If QPF data is available, (extracted from the database into the *forecast.dss* file for the forecast) the data can be entered by choosing one of the QPF options. See Section 20.4.4 for an example of using QPF data.

To add precipitation data for the selected precipitation zone configuration:

- 1. From the **MFP** Alternative editor (Figure 20.8), select the precipitation zone configuration to configure precipitation data for from the **Zone Configuration** drop-down list.
- 2. Setup the time window. By default **Relative Start Time** is selected.
- 3. Select the duration for future precipitation from the **Duration of Future Precipitation** drop-down list. This choice sets the number of rows in the table where values will be entered for each precipitation zone of the selected precipitation zone configuration.
- 4. Enter precipitation data in the table. Values are entered by time step, with each cell representing one time step for the zone. A running total of the forecast precipitation is kept at the bottom of the table. A set of forecast values may be prepared with a spreadsheet program and then copied from the spreadsheet to the **MFP Alternative** editor. Once precipitation data has been entered, click **OK**, the **MFP Alternative** editor (Figure 20.8) closes.
- 5. From the File menu, click Save Watershed.

| MFP Alternative | Editor | | | | | | x |
|--|--|------------------|---------|------|----------------|-----------|-----|
| Edit | | | | | | | |
| Precip Alt: | User Specifie | ed Rain - Entire | Basin | Zone | Configuration: | All | • |
| Description: | | | | | | | |
| Grid Cell File: | Russian_River.mod Meteorologic Model: Interpolated | | | | | | |
| Specific Start Time Start Date: 210ct2015 Relative Start Time Start Time: 0900 | | | | | | | |
| | Time Interval: 1 Hour Duration of Future Precip: 1 V Hours V | | | | | | |
| Fcst Precip Obs | Precip | | | | | | |
| Manu | ual 🔘 Tin | ne Series | Gridded | | | Pathname. | |
| Tim | | Zone | | | | | |
| | - | All | | | | | |
| Time o | of Forecast +1 hr. | | | | | | |
| | T1 IIF. | | | | | | |
| Total Futur | e Precip: | 0.000 | | | | | |
| Graphical Edi | t | | | | | | |
| | | | | ОК | Cancel | Ap | ply |

Figure 20.8 MFP Alternative Editor Dialog

20.4.3 MFP Precipitation Zone Configurations

A **Precipitation Zone Configuration** is required to create a **MFP** alternative. A **Zone Configuration** is a set of zones, and a **Zone** is a set of subbasins in the watershed. In MFP, precipitation forecasts are assigned by zone, with all subbasins in the zone receiving the same precipitation increments. Subbasins should be grouped into zones based on similarity of expected precipitation.

20.4.3.1 Create a Zone Configuration

To create a precipitation zone configuration:

- 1. In the **MFP** Alternative editor (Figure 20.8), choose **Zone Configuration** from the **Edit** menu. The **Zone Configuration Manager** dialog (Figure 20.9) opens.
- 2. Select **New** to create a new zone configuration. The **Create a New Zone Configuration** dialog window opens.
- 3. From the **Create a New Zone Configuration** window, enter a name into the **Name** field and a description into the **Description** field.
- 4. From **Element Type** drop-down list, select either **Subbasins** or **Reaches**. Click **Create**, and the **Create A New Zone Configuration** dialog closes.

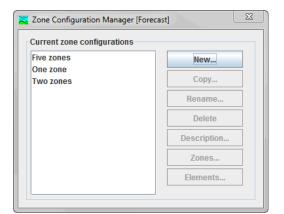


Figure 20.9 Zone Configuration Manager

20.4.3.2 Create Zones

For each zone configuration, you will need to create at least one zone. To create a zone:

- 1. From the Zone Configuration Manager, select the newly created zone configuration.
- 2. Click the **Zones** button from the manager window. The **Zones** dialog (Figure 20.10) opens.

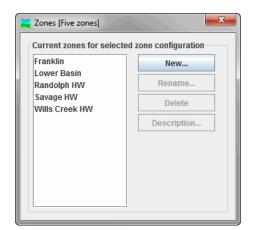


Figure 20.10 Zones Dialog

- 3. Select **New** and a **Create A New Zone** dialog opens. Enter a name into the **Name** field and description into the **Description** field.
- 4. Select **Create**, and the name of zone just created appears in the **Current zones for** selected zone configuration list on the **Zones** dialog.

20.4.3.3 Add Subbasins to a Zone

Once precipitation zones have been created, elements can be assigned (subbasins or reaches) to the zones.

- 1. From the **Zone Configuration Manager** (Figure 20.9) select the zone configuration to be configured.
- 2. Click the **Elements** button and the **Elements** dialog (Figure 20.11) opens. From the **Zones** drop-down list, select which **Zone** to add elements to.

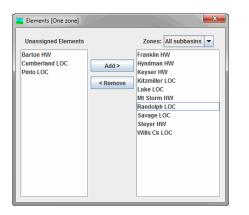


Figure 20.11 Elements Dialog

- 3. Select the elements (subbasins or reaches) to add to the zone from the elements (subbasins or reaches) listed in the **Unassigned Elements** list (Figure 20.11). Select one element by clicking; select ranges of subbasins by shift-clicking; select discontinuous groups of subbasins by control-clicking.
- 4. Click **Add** and the selected subbasin names will now appear in the list under the **Zone** list. An element can also be moved into a zone by double-clicking on the element in the **Unassigned Elements** list.
- 5. Elements can be moved out of a zone by selecting an element in the box under the **Zone** list and then click **Remove** or by double-clicking on that element.
- 6. When all elements have been assigned to zones, close the **Zone Configuration Manager**.

20.4.4 Define a QPF Disaggregation Set

In place of manually entered precipitation forecasts, MFP permits incorporation of a sequence of QPF (quantitative precipitation forecast) values into an MFP alternative from an external source.

Two types of QPF data are available from the National Weather Service or from other sources: point QPFs, which consist of a time series of forecasted precipitation depths at a single location, or gridded QPFs, which represent a spatially distributed forecast of precipitation depths. MFP can assign point QPF time series to precipitation forecast zones, or assign a sequence of QPF

grids to cover the entire watershed. In either case, QPFs are typically given in six-hour increments covering the next twenty-four hours, and a single twenty-four hour total following the four six-hour increments. It is necessary to disaggregate these totals into increments that match your modeling time step.

To use QPFs in your forecast model, select either **Time Series** or **Gridded** by clicking the corresponding radio button on the **MFP Alternative** editor (Figure 20.8). Each option (**Manual**, **Time Series**, or **Grid**) presents a different form of the forecast precipitation table.

If **Time Series** is selected, the table appears as shown in Figure 20.12, and once QPF data and a set of disaggregating weights have been defined, the table will be filled with precipitation increments for the zone.

| 🔘 Manual | Time Series | Gridded | | | | | Pathname |
|----------------|-------------|----------------|------------|--------------|-------------|-----------|----------------|
| Disaggregation | Set: | | ▼ Edit | Mult Factor: | 1 | | |
| | | Disaggregation | | | Zone | | |
| Date | Time | Weight | Franklin | Lower Basin | Randolph HW | Savage HW | Wills Creek HW |
| | TS ID: | | /FRANKLIN/ | /LOWERBASIN/ | /RANDOLPH/ | /SAVAGE/ | /WILLSCREEK/ |
| | | | | | | | |
| | Total | Future Precip: | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Figure 20.12 Time Series Table - MFP Alternative Editor

To assign a HEC-DSS pathname for time series, click the **Pathname** button. If **Gridded** is selected, the table appears as shown in Figure 20.13 and once QPF data has been defined, the table will be filled with the disaggregating weights (not the precipitation values themselves). To assign a HEC-DSS pathname for time series, click **Pathname**.

| 🔘 Manual 🛛 🔘 Tin | ne Series 💿 Gridded | Pathname |
|---------------------|-----------------------|------------------------|
| Disaggregation Set: | ▼ Edit Mult F | actor: 1 |
| | Disaggregat | ion |
| Time | Weight | |
| TS ID: | /SHG/MARFC/PRECIP//01 | AUG2001:0100/STAGEIII/ |
| | | |
| | | |

Figure 20.13 Grid QPF Table - MFP Alternative Editor

For either type of QPF data, to define QPF data:

- 1. The user must be in the **MFP** Alternative editor (Figure 20.8). Select Edit > Disaggregation Set > New.
- 2. The **Create a New Disaggregation Set** dialog opens (Figure 20.14). In the **Name** field, enter a name for the QPF distribution set. Optionally enter a description in the **Description** field.

| Create a New Di | saggregation Se | t | | × | |
|----------------------------------|----------------------------------|-------------|---|--------|---|
| MFP Alternative Existing Disa | e: gageInterp ggregation Sets | | | | |
| Name | | Description | | | |
| | | | | | · |
| New Disaggr | egation Set | | | | |
| Name: | Mid2 | | | | |
| Description: | Example | |) | | |
| | | New | | Cancel | |

Figure 20.14 Create a New Disaggregation Set Dialog

- 3. Click New, and the Disaggregation Editor dialog (Figure 20.15) opens.
- 4. In the **Disaggregation Editor** you can specify the **Output Time Interval** and the **Input Time Interval**. The **Disaggregation Editor** allows the user to specify weights for two adjacent blocks of one, six, or twenty-four hours each (based off the Input Time Interval). The weights will be normalized for each block, so the two six hour blocks shown in the example will put half of the six-hour QPF in the third and fourth hours of the six-hour blocks. QPF are referenced to UTC so the blocks will shift according to the watershed's time zone.
- 5. Once the disaggregation set is defined, a QPF time series record can be associated with a zone defined in the precipitation zone configurations associated with the MFP alternative. Click **OK**, the **Disaggregation Editor** closes.
- 6. To associate a QPF time series record with a zone, from the **MFP Alternative Editor** dialog (Figure 20.8), click **Time Series**, select a row in the table, and click **Pathname**.
- 7. The **Set Locations for HEC-DSS Connections** dialog (Figure 20.16) opens. To open a HEC-DSS file, click the open folder icon *■*.

| 🛃 Disaggregation Edit | or X | | | | | | | |
|------------------------------|------------|--|--|--|--|--|--|--|
| Disaggregation Set: | Mid2 | | | | | | | |
| Output Time Interval: 1 Hour | | | | | | | | |
| Patterns | | | | | | | | |
| Input Time Interval | | | | | | | | |
| 🔘 1 Hr 🛛 🔍 6 H | lr 💿 24 Hr | | | | | | | |
| Time | Weight | | | | | | | |
| 1 hr. | 0.167 | | | | | | | |
| 2 hrs. | 0.167 | | | | | | | |
| 3 hrs. | 0.167 | | | | | | | |
| 4 hrs. | 0.167 | | | | | | | |
| 5 hrs. | 0.167 | | | | | | | |
| 6 hrs. | 0.167 | | | | | | | |
| | | | | | | | | |
| 7 hrs. | | | | | | | | |
| 8 hrs. | 0.167 | | | | | | | |
| 9 hrs. | | | | | | | | |
| 10 hrs. | | | | | | | | |
| 11 hrs. | 0.167 | | | | | | | |
| 12 hrs. | 0.167 | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| ОК | Cancel | | | | | | | |

Figure 20.15 Disaggregation Editor Dialog

- 8. Using the file browser, locate and open the HEC-DSS file. The lower table will fill be filled with the HEC-DSS catalog information. The top table has the list of precipitation zones for the selected MFP zone configuration. Select a precipitation zone in the top table by clicking on a row. Select a QPF HEC-DSS pathname by clicking on a row in the bottom table. Once a row from each table is highlighted, the HEC-DSS pathname will be assigned to the precipitation zone by clicking **Select HEC-DSS Pathname**.
- 9. After clicking **OK**, the **MFP Alternative** editor (Figure 20.8) will read the HEC-DSS file and try to find the QPF data.

| Location | Param | DSS File | Part A | Part B | Part C | Part E | Part F | |
|------------------------------------|--|----------------|-------------------------|---|-------------------------------------|--|----------------------------------|-------|
| Grid QPF | PRECIP | C:/CWMS/Rt. | SHG | MARFC | PRECIP | 01AUG2 | 2001: STAGEI | |
| OSS File: | C:/CWMS/Rts | Example_v1.2 | 2/database/dl | b/grid/precip.2001. | 08.dss | • | Update ca | talog |
| Filter A | | Filter C | | | Filter E | | | |
| SHG | - | PRECIP | | | - | | | • |
| Filter B | | Filter D | | | Filter F | | | |
| MARFC | - | | | | STAGEIII | | | - |
| | | | | | | | | |
| Part A | Part B | P | art C | Part D | Part E | | Part F | |
| Part A | | | art C RECIP | Part D 01AUG2001:0 | | | Part F STAGEIII | |
| | Part B | PF | | | 000 01AU | G2001:0100 | | |
| Part A SHG SHG | Part B MARFC | PF PF | RECIP | 01AUG2001:0 | 000 01AU0 | G2001:0100 | STAGEIII | |
| Part A SHG SHG SHG SHG | Part B MARFC MARFC MARFC MARFC | PF PF PF | RECIP | 01AUG2001:0 01AUG2001:0 | 000 01AU0 200 01AU0 400 01AU0 | G2001:0100 G2001:0300 | STAGEIII STAGEIII | |
| Part A SHG SHG SHG | Part B MARFC MARFC MARFC | PF PF PF | RECIP RECIP RECIP | 01AUG2001:0 01AUG2001:0 01AUG2001:0 | 000 01AU0 200 01AU0 400 01AU0 | G2001:0100 G2001:0300 G2001:0500 | STAGEIII STAGEIII STAGEIII | _ |

Figure 20.16 Set Locations for HEC-DSS Connections Dialog

20.4.5 Edit an MFP Alternative

To edit an MFP alternative:

- 1. In the **Watershed Pane**, select the MFP alternative to be edited.
- 2. Right-click the selected alternative and the **MFP** Alternative Menu (Figure 20.17) is displayed.
- 3. Select Edit Alternative, and the MFP Alternative editor (Figure 20.8) opens.
- 4. Use the **MFP** Alternative editor to make changes to the MPF alternative.
- 5. Click the **OK**, and the **MFP** Alternative editor closes.

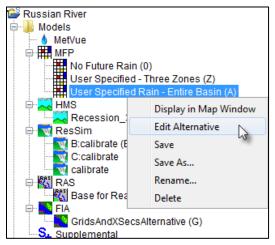


Figure 20.17 MFP Alternative Shortcut Menu

20.4.6 Copy an MFP Alternative

To copy an MFP alternate:

- 1. In the **Watershed Pane** select the MFP alternative to be edited.
- 2. From the **MFP Alternative Menu** (Figure 20.17), select **Save As**, and the **Save MFP As** dialog (Figure 20.18).
- 3. Enter the new name in the **Name** field and fill out the **Description** field. (It is possible to specify the directory where the watershed will be saved in order to to save a copy of the alternative to a directory outside of the watershed.)
- 4. Click **OK**, and the **Save MFP As** dialog closes.

| Save MFP As | |
|-------------|-------------------------------|
| Old Name: | Radar |
| Name: | MARFC |
| Description | MARFC Radar data |
| Directory: | C:/CWMS/North_Branch_v638/mfp |
| | OK Cancel |

Figure 20.18 Save MFP As Dialog

20.4.7 Delete an MFP Alternative

To delete an MFP alternative:

- 1. In the watershed pane, select the MFP alternative to be deleted.
- 2. From the **MFP Alternative Menu** (Figure 20.17), select **Delete**, and the **Confirm Delete** of the MFP alternative dialog appears (Figure 20.19).
- 3. Click **Yes** to delete the MFP alternative.

| Confirm [| elete | |
|-----------|---------------------------------|--|
| ? | OK to delete alternative MARFC? | |
| | Yes No | |

Figure 20.19 Confirm Delete MFP Alternative Dialog

20.5 HEC-MetVue Model Alternative

HEC-MetVue can act as a data provider for the CAVI client as an alternative to using MFP. HEC-MetVue can process three different types of data for the CAVI.

- Radar data from HEC-DSS files in either SHG or HRAP format.
- Gage data stored as TIN surfaces in files.
- Gage data translated to TIN surfaces (GageInterp method). Within HEC-MetVue, when using the GageInterp method, this is a two-step process. One step generates the gage TINS (grids) from HEC-DSS hyetograph data and stores the data back into a HEC-DSS file. That data is then utilized within the application like any other TIN surface data. When using the GageInterp method from the CAVI, once the process of creating the surface TINS is completed, a secondary task of associating the correct TIN surfaces for the correct time window and displaying them in the correct forecast alternative window is done automatically. These two steps appear as one to the forecaster.

Within HEC-MetVue there are sessions. Sessions are a convenient way to group a set of map panels in a logical way. This grouping is unconstrained. A user can choose to group map panels for a specific geographic area, a specific storm or possibly even a different set of display attributes for different purposes. It is really analogous to having files in a folder on a computer. How those folders and files are organized is up to the individual.

When operating as a client for the CAVI there are constraints. Any single forecast can refer only to a single session within HEC-MetVue. Within this session there can be any number of map panels. Each map panel can support a CAVI forecast alternative. There is a 1:1 relation between a map panel and a forecast alternative. If a forecast alternative is created in the CAVI and there is no associated map panel to support it, HEC-MetVue will create a map panel.

20.5.1 Create a HEC-MetVue Alternative

To create and edit a HEC-MetVue alternative in the **Setup Module**, right-click on the **HEC**-**MetVue** item under the **Models** folder in the **Watershed Pane** and select **Import**. This opens the **HEC-MetVue** dialog shown in Figure 20.20 This dialog contains a **Session** dropdown, three option checkboxes, and the **Map Panel** selection table. Remember that each **Map Panel** supports a single **HEC-MetVue Alternative** for the purposes of configuring a forecast. Each of these elements is detailed below.

The **Session** dropdown by default it is filled with all the sessions that are defined within HEC-MetVue, including hidden sessions. Remember, each project must associate all its forecast alternatives with a single session. (Therefore, more than one session may be defined if there are multiple watersheds.) If not choosing to use one of the pre-existing sessions, double-click the **Session** dropdown to make the name editable, and specify a new HEC-MetVue session name. Then, move to a different control within the dialog. The HEC-MetVue client will automatically create the session as necessary within HEC-MetVue.

| 5 | | | X | |
|--|--------------|---------------------|---------------------|--|
| Session: | North Branch | | • | |
| Close other sessions | | | | |
| Hide closed sessions Close session map panels that are not alternatives | | | | |
| Map Panel | | Use for alternative | Alternative options | |
| MARFC | | | Edit | |
| L | | | [Edit] | |
| | | | | |
| OK Cancel | | | | |

Figure 20.20 HEC-MetVue Import Dialog

The three option check boxes are:

- Close other sessions. Select to force other HEC-MetVue sessions (other than the one selected) to close when a project is opened. Multiple sessions with multiple map panels open use memory, and this is just an easy way to help minimize memory usage and increase performance.
- **Hide closed sessions**. Select to prevent closed sessions from appearing in the HEC-MetVue explorer tree view, thus reducing "clutter" of unused sessions when using the CAVI.
- Close session map panels that are not alternatives. Select to close unused session map panels and reduce memory usage.

The **Map Panel** selection table is located in the lower half of the dialog. In the first column, **Map Panel**, all the map panels that are defined for a session are displayed in this table. The second column, **Use for alternative**, contains checkboxes that enable the map panel. Once checked, the **Edit...** button in the third column, **Alternative options**, becomes selectable.

The values in the **Map Panel** selection table change as the session selection changes. Similar to the editable session dropdown selector, the map panels in the table can be edited to add new map panels to associate with alternatives. The HEC-MetVue client will automatically create the map panels for a session as necessary within HEC-MetVue. There is always a blank line at the end of the table where additional map panels/alternatives can be configured. To create a new **Map Panel**, double-click the blank Map Panel cell, and specify a new Map Panel name.

20.5.2 Edit a HEC-MetVue Alternative

To edit a **Map Panel** (**HEC-MetVue Alternative**), click the **Edit...** button in the **Alternative options** column, which will bring up the **Map Panel** editor dialog. The **Map Panel** editor input

and output tabs are shown in **Figure 20.21** and Figure 20.22. Configure the HEC-MetVue input and output as detailed in the following subsections, specifying as many **Map Panels** as needed for the **HEC-MetVue Alternatives**. Then click the **OK** button to save the changes and close the dialog.

20.5.2.1 HEC-MetVue Alternative Input

The Map Panel editor Input tab (Figure 20.21), contains three main areas that require input:

- **Maps** are the lines, shapes, and points that HEC-MetVue uses as feedback for a geographic location. Maps are not used for any computations.
- Sub-Areas are the defined polygons that HEC-MetVue uses for sub-area computations.
- **TIN/Grid Input** defines the input for acquiring the data.

Under **Maps**, choose which option to use for specifying the desired information. The three options are:

- Use List. Use this option to explicitly specify the map files (.shp) to use. When selected, the **Copy to forecast directory** option and the **Browse** button are enabled. All the files selected appear in the list box. If the **Copy to forecast directory** checkbox is selected, all the files are copied into the project directory structure when forecasting to aid in archiving.
- **Sync with CAVI**. Use this option to keep the maps displayed in HEC-MetVue in sync with the maps in the CAVI. HEC-MetVue has its own display attributes for the maps. It does not inherit colors, line styles, and so on from the CAVI map window. When this option is selected, the sub-options for the **Use List** option are disabled.
- **Sync with HEC-HMS**. Use this option to have the HEC-MetVue client inspect the directory structure looking in the *hms/maps* subdirectory within the project folders. When it finds the *maps* subdirectory, it uses all of the shapefiles that are available.

| F MARFC | × | | | |
|---|--------|--|--|--|
| Input Output | | | | |
| Maps | | | | |
| ◎ Use List O Sync with CAVI O Sync with HMS | | | | |
| Copy to forecast directory | | | | |
| | Browse | | | |
| Sub-Areas | | | | |
| | | | | |
| Copy to forecast directory | | | | |
| | Browse | | | |
| | | | | |
| TIN/Grid Input | | | | |
| TIN/Grid input DSS | | | | |
| DSS File: C:\Projects\CWMS\NorthBranch\North_Branch_v638\forecast.dss | Browse | | | |
| Path Mask: //RFC/PRECIP///RADAR/ | | | | |
| Log File: C:\Projects\CWMS\NorthBranch\North_Branch_v638\Met/ue\North Branch v638.log | Browse | | | |
| Log Level: INFO - | | | | |
| Interval: O Dynamic O Fixed | • | | | |
| OK Cancel | | | | |

Figure 20.21 Map Panel Editor Dialog: Input Tab

Under **Sub-Areas**, choose which option to use for defining the polygons used in the computations. The three options are:

- Use List. Use this option to specify the polygon files (.shp) to use. They can be the same as the map files, if desired. When selected, the **Copy to forecast directory** option and the **Browse** button are enabled. All the files selected appear in the list box. If the **Copy to forecast directory** checkbox is selected, all the files are copied into the project directory structure when forecasting to aid in archiving and de-archiving.
- Sync with CAVI. Use this option to keep the polygon files used by HEC-MetVue in sync with the ones specified in the CAVI. The HEC-MetVue client filters out non-polygon shape files for the sub-area list before using the results. When this option is selected, the sub-options for the Use List option are disabled.
- Sync with HEC-HMS. Use this option to have the HEC-MetVue client inspect the directory structure looking in the *hms/maps* subdirectory within the project folders. When it finds the *maps* subdirectory, it uses all of the shapefiles that match the general pattern *_*subbasins.shp*, consistent with HEC-HMS specifications. Other shapefiles that don't end with the pattern shown are ignored.

Under **TIN/Grid Input**, use the dropdown to specify the input data type. As the selection in the dropdown selection changes, so do the fields below, because each type of input has different

specification requirements. The **Log File** and **Log Level** are common to all three options and are initially populated by default settings. The three options in the **TIN/Grid Input** dropdown list are:

- File. Use this input type to define a triangular irregular network (TIN) as input. To define the File Mask, click the Browse button and navigate to the HEC-DSS file containing the gridded input data.
- **DSS**. Use this input type for input stored in HEC-DSS grids. To define the **HEC-DSS File**, click the **Browse** button and navigate to the HEC-DSS file containing the gridded input data. Use the **Path Mask** field to specify a filter for the desired input data. The convention is /A/B/C/D/E/F/, where A, B, C, D, E, and F, are the pathname parts of the gridded data record. (For example, in **Figure 20.21**, we use a Path Mask specifying any A part, a B part equal RFC, a C part equal PRECIP, any D and E parts, and an F part equal RADAR.)
- Gage Interp. Use this input type to define point gage information as the input. The GageInterp File, HEC-DSS Input File, and HEC-DSS Output File must be specified here. To specify these files, use the Browse buttons (to the right of each field) and navigate to the required file.

20.5.2.2 HEC-MetVue Alternative Output

The **Map Panel** editor **Output** tab (Figure 20.22), contains three main areas. At this time, only the third, **Hyetograph Generation for Sub-Areas** requires configuration. To configure the MFP Alternative output:

- 1. Define the output interval using the **Interval** and time increment dropdowns.
- 2. Confirm that the **Write to HEC-DSS** (written to forecast HEC-DSS file) option is enabled. If not, click the check box to enable it.
- 3. Confirm that the **Tabulate to File** option is enabled. If not, click the check box to enable it. This field should populate automatically.
- 4. Confirm the **Output Format** dropdown is set to **legacy**.
- 5. Click the **OK** button to confirm your Input and Output configurations.
- 6. Click the **OK** button to close the HEC-MetVue Alternative editor.

| T MARFC |
|--|
| Input Output |
| Edited TINs/Grids Stored Back to Files |
| Directory: C:\Projects\CWMS\NorthBranch\North_Branch_v638\MetVue Browse |
| File Extension: .modified Append replace |
| Edited TINs/Grids Stored Back to DSS |
| DSS Output File: C:\Projects\CWMS\NorthBranch\North_Branch_v638\MetVue\tin.dss Browse |
| Path Mask: /*/*-REVISED/*///*/ |
| Hyetograph Generation for Sub-Areas |
| Interval: 1 + Hours |
| ✓ Write to DSS (written to forecast DSS file) |
| Tabulate to File C:\Projects\CWMS\NorthBranch\North_Branch_v638\MetVue\North Branch v638.hyet Browse |
| |
| Output Format. legacy 🔻 |
| |
| |
| |
| |
| |
| |
| OK Cancel |

Figure 20.22 Map Panel Editor Dialog: Output Tab

20.5.3 Remove a HEC-MetVue Alternative

To remove a HEC-MetVue alternative from the watershed:

- 1. In the watershed pane, right-click the HEC-MetVue node and select **Import**. This opens the **HEC-MetVue Alternative** dialog shown in Figure 20.19.
- 2. Uncheck the box in the **Use for alternative** column associated with the HEC-MetVue alternative to be removed. This does not delete the HEC-MetVue alternative from disk, just removes if from use in the CAVI.
- 3. Click the OK button to close the HEC-MetVue Alternative dialog.
- 4. Save the watershed.

20.6 Create an HEC-HMS Alternative

An HEC-HMS alternative consists of a basin model, loss parameter, transform parameter, baseflow zone configurations, and a set of parameter adjustments for each zone. Within an HEC-HMS alternative, the parameters in the HEC-HMS basin model can be adjusted to try to match observed flows at the time of forecast. Blending of model results to observed flows can be controlled where they are available. If the HEC-HMS project contains more than one basin model (for summer and winter conditions, for instance), HEC-HMS alternatives can be built around each of them.

20.6.1 Import HEC-HMS Model Alternative

To import HEC-HMS model alternatives:

1. From the **Watershed Panel** in the **Setup Module**, right-click the **HEC-HMS** icon and select **Import** (Figure 20.23). The HEC-HMS program and a **Select Project File** dialog open.

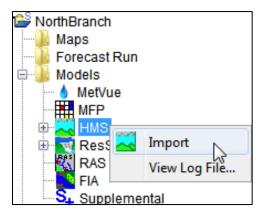


Figure 20.23 Import HEC-HMS model

- 2. In the file browsing dialog, navigate to and select the HEC-HMS project file (**.hms** extension) you wish to import.
- 3. Click **Select**, and the import process begins.
- 4. If importing an HEC-HMS model alternative created in a previous version of HEC-HMS, then the **Convert HEC-HMS Project** dialog (Figure 20.24) opens prompting conversion of the project. Click **Convert Project**, and the **Convert HEC-HMS Project** dialog closes.

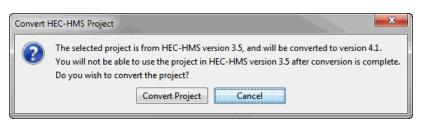


Figure 20.24 Convert HEC-HMS Project Dialog

- 5. Once the import is complete the CAVI message window will show "HMS: NOTE 16161: Import finished."
- 6. **Save** the watershed.

20.6.2 HMS Loss and Baseflow Zone Configurations

After importing the HEC-HMS model alternatives, zone configurations must be created for loss parameter, transform parameter, and baseflow parameter adjustments. A **zone configuration** is a set of zones, and a **zone** is a set of elements (subbasins or reaches) in the watershed. Elements should be grouped into zones based on similarity of hydrologic properties and the availability of observed flows against which to calibrate zone parameters. For example, the subbasins in a headwaters area might be grouped above a reservoir together into a zone. At forecast time, the baseflow and loss parameters for the subbasins in that zone will be adjusted together so that the hydrograph calculated by HEC-HMS for the inflow to the reservoir fits the observed inflows to the reservoir as well as possible.

20.6.2.1 Create a Zone Configuration

To create a zone configuration:

- 1. From the **Watershed Panel** in the **Setup Module**, select **HEC-HMS**, and click the HEC-HMS model alternative.
- 2. Right-click the HEC-HMS model alternative and choose **Zone Configurations**.
- 3. The Zone Configuration Manager dialog (Figure 20.25) opens.

| | Current zone configurations | |
|--|-----------------------------|-------------|
| wo zones Copy Rename Delete Description | Five zones | New |
| Rename Delete Description | One zone | Conv |
| Delete Description | I wo zones | сору |
| Description | | Rename |
| | | Delete |
| | | |
| Zones | | Description |
| | | Zones |
| Elements | | Elements |

Figure 20.25 Zone Configuration Manager Dialog

- 4. Select **New** to create a new zone configuration. The **Create a New Zone Configuration** dialog (Figure 20.26) opens.
- 5. From the **Create A New Zone Configuration** dialog, enter a name into the Name field and description into the Description field.
- 6. For element type, select either Subbasins or Reaches. Click **Create**, the **Create A New Zone Configuration** dialog closes and the new zone configuration is added to the list of current zone configurations.

7. Close the **Zone Configuration Manager** dialog and **Save** the watershed.

| Create A New Zone Configuration |
|--|
| Name : All Zones Description : Zone configuration with all zones |
| Element Type : Subbasins |
| Create Cancel |

Figure 20.26 Create a New Zone Configuration Dialog

20.6.2.2 Create Zones

For each loss or baseflow zone configuration, at least one loss/baseflow zone will need to be created. The zones should be based on similarity of hydrologic properties and the availability of observed flows to calibrate zone parameters against.

To create a zone:

- 1. From the Zone Configuration Manager, select the newly created zone configuration.
- 2. Click the **Zones** button from the manager window. The **Zones** dialog opens (Figure 20.27).

| Current zones for selected | zone configuration |
|-----------------------------|--------------------|
| Franklin | New |
| Lower Basin Randolph HW | Rename |
| Savage HW Wills Creek HW | Delete |
| | Description |

Figure 20.27 Zone Dialog

3. Select New and Create A New Zone dialog (Figure 20.28) opens. Enter a name into the Name field (required) and description into the Description field (optional).

| 🔀 Create A New 2 | Zone | | × |
|------------------|------------------|--------|--------|
| Name : | Wills Creek | | |
| Description : | Wills Creek zone | | E |
| | | | |
| | | Create | Cancel |
| | | | |

Figure 20.28 Create A New Zone Dialog

- 4. Select **Create.** The name of created zone appears in the **Current zones for selected zone configuration** list on the **Zones** dialog.
- 5. Close the **Zones** dialog and **Save** the watershed.

20.6.2.3 Add Elements to a Loss Parameter Zone

Once loss parameter zones have been created, elements can be assigned to the zones.

To assign elements to zones:

1. From the **Zone Configuration Manager** dialog (Figure 20.25) select the zone configuration to be configured.

| 🔀 Elements [All Zone | es] | | | |
|---|----------|----------------------|----|--|
| Unassigned Elements Barton HW | I | Zones: Franklin I | , | |
| Luke LOC Keyser HW | Add > | Franklin | vv | |
| Pinto LOC Hyndman HW Wills Ck LOC | < Remove | | | |
| Cumberland LOC Savage LOC Steyer HW | | | | |
| Mt Storm HW Randolph LOC | | | | |
| Kitzmiller LOC | | | | |
| | | | | |
| | | | | |

Figure 20.29 Elements Dialog

- 2. Click **Elements**, and the **Elements** dialog (Figure 20.29) opens.
- 3. From the **Zones** drop-down list, select the zone to add elements to.

- 4. Select the elements (subbasins or reaches) to add to the zone from the elements (subbasins or reaches) listed in the **Unassigned Elements** list. Select one element by clicking; select ranges of subbasins by shift-clicking; select discontinuous groups of subbasins by control-clicking.
- 5. Click **Add** and the selected element names appear in the list under the **Zones** drop-down list. An element can also be moved into a zone by double-clicking on the element in the **Unassigned Elements** list.
- 6. Elements can also be moved out of a zone by selecting an element in the list under the **Zones** drop-down list and then click **Remove** or by double-clicking on that element.
- 7. Close the **Elements** dialog.
- 8. Close the **Zone Configuration Manager** dialog and **Save** the watershed.

20.6.3 Forecast for an HEC-HMS Alternative

From **Forecast Alternative** editor (Figure 20.30), it is possible to select the zone configuration for the loss rate, transform, baseflow and routing configuration parameters.

To set the forecast configuration and zone configuration parameters:

- 1. From the **Watershed Pane** in the **Setup Module**, select the HEC-HMS model alternative.
- 2. Right-click on the HEC-HMS model alternative and select Forecast Configuration.
- 3. The Forecast Alternative editor (Figure 20.30) opens.
- 4. Enter a description in the in the **Description** field. Enter date and time values in for the **Start Date**, **Forecast Date**, and **End Date**.
- 5. From the drop-down lists for Loss Rate Config, Transform Config, Baseflow Config, and Routing Config choose the appropriate zone configuration.
- 6. Click **OK**, and the **Forecast Alternative** editor closes. **Save** the watershed.

| 🔀 Forecast [Base] | | X |
|----------------------------|--|---|
| | | |
| Name: | Base | |
| Description: | Base forecast configuration | ÷ |
| DSS File: | C:\CWMS\ImportNorthBranch\NorthBranch\hms\NPotomac.dss | 2 |
| Basin Model: | Forecast | ${ } { } { } { } { } { } { } { } { } { }$ |
| Meteorologic Model: | Hourly gageInterp | % |
| *Start Date (ddMMMYYYY) | 27Jul2001 | |
| *Start Time (HH:mm) | 0700 | |
| *Forecast Date (ddMMMYYYY) | 30Jul2001 | |
| *Forecast Time (HH:mm) | 1800 | |
| *End Date (ddMMMYYYY) | 01Aug2001 | |
| *End Time (HH:mm) | 2400 | |
| Time Interval: | 1 Minute | |
| Loss Rate Config: | Five zones 💌 | |
| Transform Config: | All Zones 💌 | |
| Baseflow Config: | Five zones 💌 | |
| Routing Config: | None Selected | |
| | | |
| | | |
| | | |
| | Apply | lose |

Figure 20.30 Forecast Alternative Editor

20.6.4 Adjust Parameters Using the Combined Parameter Editor

The **Combined Parameter** editor (Figure 20.31) allows adjustment of loss rate, transform, and baseflow parameters to calibrate your HEC-HMS model to the forecasted event. It also controls **blending** (the substitution of observed flows for calculated flows in the model) for the HEC-HMS model. An HEC-HMS alternative consists of an HEC-HMS basin model, which sets initial values for parameters, and a set of adjustments to those initial parameter values. The methods for the parameters are based on what was specified in the HEC-HMS model.

| ending Deficit C | onstant Loss ModClark Transform | Recession Baseflow |
|------------------|-----------------------------------|--------------------|
| Elements | Blending Method | Taper (hr) |
| Calpella | None | • |
| Potter Valley | None | |
| Coyote | None | |
| Ukiah | None | |
| Talmage | None | |
| Hopland | None | |
| Cloverdale | None | |
| AG Resort | None | |
| Big Sulphur Ck | None | |
| Geyserville | None | |
| Jimtown | None | |
| Maacama Ck | None | |

Figure 20.31 Combined Parameter Editor

To open the **Combined Parameter** editor:

- 1. From the **Watershed Pane** in the **Setup Module**, select the HEC-HMS model alternative.
- 2. Right-click on the HEC-HMS model alternative, select **Combined Parameter** editor and the **Combined Parameter** editor opens.
- 3. Adjusted the loss rate, transform, and baseflow parameters as needed.
- 4. Click Apply, the Combined Parameter editor closes. Save the watershed.

20.6.4.1 Loss Parameters

To adjust loss parameters, select the *Loss tab (Figure 20.32) on the Combined Parameter editor. For this example model, the loss method used was **Deficit** and **Constant**.

The upper panel shows a list of the loss zones in the watershed and the zone-average values for the initial soil-moisture deficit, the maximum deficit, and the constant loss rates in the HEC-HMS alternative. In the upper panel, for each parameter, there is a **Zone Average** column and an **Adjustment** column. The leftmost column displays the area-weighted average value of the parameter over the subbasins in the zone as read from the HEC-HMS basin model. To override a zone value, enter the new value in the Adjustment column.

In the lower panel of the editor are the parameters for the individual subbasins in the zone. For each parameter there are two columns, the **Base Value** and **Final Value**. To edit a loss parameter, select the override box next to the zone subbasin. The **Final Value** cell becomes editable and the new value can be entered. The list in the lower panel will contain the subbasins in that zone.

| | Zone | Initial Deficit (IN) Zone Average | Initial Deficit (IN) Adjustment | Maximum Deficit (IN) Zone Average | Maximum Deficit (IN) Adjustment | Constant Rate (IN/HR) Zone Average | Constant Rate (IN/HR) Adjustment | |
|----------|----------------------------|---|---------------------------------------|---|---------------------------------------|--|--|--|
| Jpper | | 1 | *1.00 | 3.5 | | 0.19 | *1.00 | |
| Mid | | 1.02 | *1.00 | 4.0 | | 0.106 | *1.00 | |
| ower | | 1.290 | *1.00 | 4.0 | | 0.138 | *1.00 | |
| | | | | | | | | |
| Override | Zone Subbasins | Initial Deficit | Initial Deficit | Maximum Deficit | Maximum Deficit | Constant Rate | Constant Rate | |
| Override | Zone Subbasins | Initial Deficit (IN) | Initial Deficit (IN) | Maximum Deficit (IN) | Maximum Deficit (IN) | Constant Rate (IN/HR) | Constant Rate (IN/HR) | |
| Override | Zone Subbasins | | | | | | | |
| | Zone Subbasins Calpella | (IN) | (IN) | (IN) | (IN) | (IN/HR) | (IN/HR) | |

Figure 20.32 Combined Parameter Editor – Loss Parameters Tab

20.6.4.2 Baseflow Parameters

To edit the baseflow parameters, select the ***Baseflow** tab (Figure 20.31) on the **Combined Parameter** editor. For this example model, the baseflow method used was **Bounded Recession**. The baseflow panel uses the same parameter adjustment method as the loss tab to adjust the baseflow at the time of forecast (this is not the initial baseflow, but the initial baseflow minus the recession that occurs between the lookback time and the time of forecast) and the recession ratio.

20.6.4.3 Transform Parameters Tab

To edit the transform parameters, select the ***Transform** tab (Figure 20.31) on the **Combined Parameter** editor. For this example model, the transform method used was **ModClark**. The transform panel uses the same parameter adjustment method as the loss tab to adjust the transform at the time of forecast.

20.6.4.4 Blending Tab

To edit blending parameters, select the **Blending** tab on the **Combined Parameter** editor (Figure 20.31). This contains a list of all locations in the HEC-HMS model where observed flows are available for blending. It is possible to select blending methods (**Step** or **Taper**), set the taper interval, or turn blending off at each location.

20.6.4.5 Slider Adjustments

The **Forecast Slider Adjustments** dialog (Figure 20.33) from the **Combined Parameter** editor allows adjustment for zonal, subbasin, and reach element parameters for calibration.

| 🞽 Forecast [Base] | × |
|--|---------------------------------|
| | Compute with each slider change |
| Deficit Constant Loss Bounded Recession Baseflow | |
| Zone: Savage HW 🔹 | |
| Slider adjustments for selected zone | |
| | |
| | |
| | Apply Reset Close |

Figure 20.33 Forecast Slider Adjustments Dialog

20.6.5 Adjust Parameters Using Slider Adjustments

Sliders in HEC-HMS (Figure 20.34) allow the user to adjust loss rate, transform, baseflow, and routing parameters easily. These parameters are adjusted so that the simulated watershed response matches observed values (for example stream gages and reservoir stages) more closely during the lookback period of the event. An HEC-HMS alternative consists of an HEC-HMS basin model, which sets initial values for parameters, a set of adjustments to those initial parameter values, and a metrological model that defines the precipitation input. The methods associated with the basin model parameters are based on what was specified in the HEC-HMS model.

The following sections describe setting up and using slider adjustments. Sliders depict a range of values, increments, or factors on a line and a selector that you can drag across the line to select a value, increment, or factor to adjust the parameter by.

Sliders allow for quick, small adjustments of parameters and allow HEC-HMS to recompute runoff for a subset of basin elements instead of the entire watershed. This allows for faster computation when adjustments are made.

| 🏹 Forecast [Base] | | | 22 |
|----------------------------|--------------------|----------------------------|-------------------------|
| | | Compute | with each slider change |
| Deficit Constant Loss | ModClark Transform | Bounded Recession Baseflow | Muskingum Routing |
| Zone: Savage HW | • | | |
| Slider adjustments fo | or selected zone | | |
| Initial Deficit 0.000 | 1.00 2.00 | 3.00 4.00 5.00 | *1.00 |
| 1 | | Apply | Reset Close |

Figure 20.34 A Slider Configured to Adjust Loss Parameters

20.6.5.1 Configuring Slider Adjustments

Before slider adjustments can be used, they must first be configured. This is a two-step process: First, it must be specified by zone and/or subbasin/reach which parameters should be adjusted. Second, the adjustment type (how the sliders will adjust the parameters) and limits (the maximum and minimum adjustments) of each slider must be set.

20.6.5.1.1 Slider Adjustment Specifications

To specify the parameters to be adjusted:

- 1. From the main toolbar, launch HEC-HMS.
- 2. In the Watershed Explorer in HEC-HMS (set of tabs on the upper left), click the **Compute** tab.
- 3. On the **Compute** tab, expand the **Forecast Alternatives** folder, and right-click the forecast alternative for which slider adjustments should be configured.
- 4. On the shortcut menu (Figure 20.35), select **Slider Adjustments** to open the **Forecast Slider Adjustments** dialog (Figure 20.36). On each tab, the zone or subbasin/reach and the associated parameters are listed. The tabs in this dialog are named with the loss rate, transform, baseflow, and routing methods used in the basin. (To be able to edit each type of parameter, the Loss Rate Config, Transform Config, Baseflow Config, and Routing Config zones must be defined in the HEC-HMS forecast alternative as detailed in Section 20.4.3.)

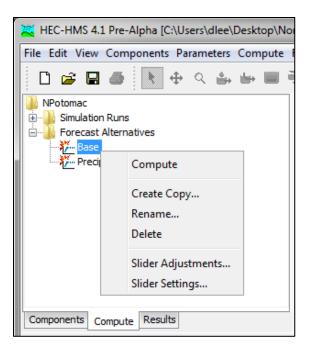


Figure 20.35 Forecast Alternative Shortcut Menu Used for Configuring Slider Adjustments

| Bounded Re Deficit Con | cession Baseflow Muskingum Rou tant Loss ModClark Transform | |
|----------------------------|--|--|
| arameter slider adj | ustments selected for this Forecast | |
| Zone | Parameters | |
| Savage HW | Initial Deficit | |
| | Constant Data | |
| Savage HW | Constant Rate | |
| Savage HW Basin Element | Parameters | |
| | | |
| Basin Element | Parameters | |

Figure 20.36 Forecast Slider Adjustments Dialog

5. Click Select to open the Select Forecast Slider Adjustments dialog (Figure 20.37).

| | ModClark Transform | Bounded Recession Baseflow Muskingum Routing | | |
|----------------------|--------------------|--|--|--|
| Parameters for zones | | | | |
| | Zones | Parameters | | |
| Franklin | | Deficit and Constant - Initial Deficit | | |
| Lower Basin | | Deficit and Constant - Maximum Deficit | | |
| Randolph HW | | Deficit and Constant - Constant Rate | | |
| Savage HW | | | | |
| Wills Creek HW | | | | |
| | | | | |
| | | | | |
| | | | | |
| Parameters for subba | | | | |
| | ubbasins | Parameters | | |
| Barton HW | | Deficit and Constant - Initial Deficit | | |
| Savage LOC | | Deficit and Constant - Maximum Deficit | | |
| - | | Deficit and Constant - Constant Rate | | |
| _ | | | | |
| _ | | | | |
| - | | | | |
| - | | | | |
| - | | | | |

Figure 20.37 Select Forecast Slider Adjustments Dialog

- 6. Select the tab with the parameters to be adjusted. For example, click the loss tab (shown as the **Deficit Constant Loss** tab here) to select loss rate parameters for adjustment.
- 7. To select zonal adjustment sliders, select a zone in the **Zones** window. This will populate the available **Parameters** (on the right) that can be assigned to sliders.
- In the Parameters window, choose one or more items to be adjusted using sliders (multiple parameters can be chosen by using the CTRL or SHIFT keys), and click Select. After hitting Select, the parameter will move from the Select Forecast Slider Adjustments dialog to the Forecast Slider Adjustments dialog.
- 9. Repeat steps 7 and 8 to select all desired zonal adjustment sliders.
- Next, to select subbasin or reach adjustment sliders (for adjusting parameters for individual elements instead of zones), select a subbasin or reach in the Subbasins or Reaches window. This will populate the available Parameters (on the right) that can be assigned to sliders.
- 11. In the **Parameters** window, choose one or more items you wish to adjust using sliders (you can choose multiple parameters using the **CTRL** or **SHIFT** keys), and click **Select**. After clicking **Select**, the parameter will move from the **Select Forecast Slider Adjustments** dialog to the **Forecast Slider Adjustments** dialog.
- 12. Repeat steps 10 and 11 to select all desired subbasin/reach adjustment sliders.

- 13. Repeat steps 6 through 12 for each of the parameters to be adjusted (loss rate, transform, baseflow, and routing methods). When finished selecting slider adjustments, click **Close**.
- 14. Review the selections in the **Forecast Slider Adjustments** dialog. If one has been selected in error, it can be removed by selecting it in the **Parameters** column and clicking **Remove**. When satisfied with the selections, click **Close**.

20.6.5.1.2 Slider Settings

In HEC-HMS parameters have minimum and maximum allowable values. These values are used to initialize the limits of the sliders. To setup the type of adjustment and limits of each slider:

- 1. On the HEC-HMS **Compute** tab, expand the **Forecast Alternatives** folder, and rightclick the forecast alternative for which slider adjustment parameters have been selected.
- 2. On the shortcut menu (Figure 20.35), select **Slider Settings** to open the **Forecast Slider Adjustments Settings** dialog (Figure 20.38).

Each tab has two tables. The upper table shows zonal parameters, and the lower table shows parameters for individual elements. The **Zone** and **Subbasin/Reach** columns list the zone and subbasin/reach name. The **Parameter** column lists the parameter name of the slider. The **Adjustment Type** column lists the adjustment type. The **Units** column lists the units for the adjustment. The last two columns list the **Minimum** and **Maximum** values for the parameter adjustment.

(To be able to configure loss rate, transform, baseflow, and routing slider settings, they must first be configured as detailed in section 20.6.5.1.1.)

| | Loss | ModClark | Transform | Bounded | Recession Ba | seflow | Muskin | gum Routing | |
|---|--|--|--|--------------------------|------------------------------|--------|----------------------|-----------------------------|--|
| Slider Adjustme | nt Sef | ttings for : | Zones | | | | | | |
| Zone | | Paran | neter | Adjustr | ment Type | Units | s N | 1inimum | Maximum |
| Savage HW | Init | tial Deficit | | Fa | actor | | | 0.0001 | 5.0000 |
| Savage HW | Co | nstant Ra | te | Fa | actor | | | 0.0001 | 5.0000 |
| Wills Creek HW | Init | tial Deficit | | Incr | ement | IN | | -1000.0000 | 1000.0000 |
| Wills Creek HW | reek HW Constant Rate | | Increment | | IN/HF | | -300.0000 | 300.0000 | |
| | | | | | ement | | | -300.0000 | 300.0000 |
| Slider Adjustme Zone | ent Set | | | its | Adjustment | | Units | Minimum | Maximum |
| Slider Adjustme Zone | ent Set | ttings for I | Basin Elemen | its | , | | | | Maximum |
| Slider Adjustme Zone Savage HW | ent Set Par Barto | ttings for I rameter | Basin Elemen | its neter t | Adjustment | | Units | Minimum | Maximum 39.3701 |
| Slider Adjustme Zone Savage HW | ent Set Par Barto Barto | ttings for f rameter on HW on HW | Basin Elemen Paran Initial Defici | its neter t ate | Adjustment Value | | Units IN | Minimum 0.0000 | Maximum 39.3701 11.8110 |
| Slider Adjustme Zone Savage HW Savage HW | ent Sel Par Barto Barto Hynd | ttings for f rameter on HW on HW Iman HW | Basin Elemen Paran Initial Defici Constant Ra | nts neter t ate | Adjustment Value Value | | Units IN IN/HR | Minimum 0.0000 0.0000 | Maximum 39.3701 11.8110 39.3701 |

Figure 20.38 Select Forecast Slider Adjustments Settings Dialog (Default Values Shown)

Specify an adjustment type using the dropdown in the Adjustment Type column (Figure 20.39). An Adjustment Type can be a new Value, an Increment to be added or subtracted from the parameter value, or a Factor to be applied to the parameter value. By default, the zonal adjustment type is Factor, and the subbasin/reach adjustment type is Value. If the adjustment type is Factor, the units entry will be blank.

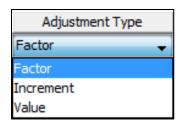


Figure 20.39 Select Forecast Slider Adjustments Settings Adjustment Type dropdown

- 4. Specify the minimum and maximum values for each parameter. These columns are populated by default. However, for practical use of the slider adjustments, the limits should be set to a smaller range.
- 5. Review the selections in the **Forecast Slider Adjustments Settings** dialog. When satisfied, click **Apply**, and then click **Close**.
- 6. Save the HEC-HMS watershed.

20.6.5.2 Adjusting Parameters Using the Sliders

To access sliders adjustments, first open the combined parameter editor by right-clicking the HEC-HMS forecast alternative in the Setup tab of the CAVI and clicking **Combined Parameter** editor (detailed in section 20.6.4). Click **Slider Adjustments**. The slider adjustments will display (Figure 20.40).

| 🏹 Forecast [Base] | | | | | | | 23 |
|-----------------------------------|--------------|-----------|-----------|--------------|-------------|----------|-------------------------|
| | | | | | V (| Compute | with each slider change |
| Deficit Constant Loss | ModClark Tra | ansform | Bounded R | ecession Bas | seflow Musk | ingum Re | outing |
| Zone: Savage HW | • | | | | | | |
| Slider adjustments for | selected zor | e | | | | | |
| Initial Deficit | -0 | | | | | | *1.00 |
| 0.000 | 1.00 | : | 2.00 | 3.00 | 4.00 | 5.00 | |
| Constant Rate 0.000 | 1.00 | : | 2.00 | 3.00 | 4.00 | 5.00 | *1.00 |
| Slider adjustments for | subbasin pa | rameter o | verrides | | | | |
| Barton HW Initial Deficit (IN) | 0.000 | 7.87 | 15.7 | | 31.5 | 39.4 | 0.2 |
| Barton HW Constant Rate (IN/HR | ۵) 0.000 | 2.36 | 4.72 | 7.09 | 9.45 | 11.8 | 0.06 |
| | | | | | Ap | ply | Reset Close |

Figure 20.40 Slider Adjustments

The dialog consists of multiple tabs, each containing sliders by zone. (Again, the tabs in this dialog are named with the loss rate, transform, baseflow, and routing methods used in the basin.) The zone is selected using the dropdown menu located just under the tabs. The upper part of the dialog shows parameter adjustments for the selected zone. The lower part of the dialog shows parameter adjustments for the individual subbasin or reach within the selected zone (if these were configured, Section 20.6.5.1).

Parameter values can be adjusted by moving a slider or by entering a value in the text box to the right of the slider. If a value is entered in the text box, it should be consistent with the adjustment type. A factor must begin with an asterisk (*), an increment must begin with a plus (+) or a minus (-), and a value adjustment needs no initial symbol. The slider will move to the value entered in the text box. If the value in the text box is outside the slider's range, the slider is disabled.

In the upper right of the dialog there is a check box labeled **Compute with each slider change**. If this box is checked, any change in a slider will cause the parameter adjustment to be applied, and the forecast alternative will be computed.

If the box is not checked, the parameter adjustment will not be applied until **Apply** is clicked, and the results will not be updated until the forecast alternative is computed. If preferred, HEC-HMS can be configured to compute automatically after clicking **Apply**. In HEC-HMS, select **Program Settings** from the **Tools** menu. In the **General** tab, check the box next to **Compute after apply in editors**, and click **OK**. This setting applies to both the slider adjustments and combined parameter editor.

Clicking **Reset** will reset the parameter adjustments to their value when the dialog was opened. **Close** closes the dialog.

Right-clicking a slider (in the CAVI) brings up a menu with two options. The first option **Reset to Original Value** will reset the parameter adjustment to the original value when the dialog was opened. The second option **Modify Slider Limits** opens the **Forecast Slider Adjustments Settings** dialog, so the **Adjustment Type** and slider **Minimum** and **Maximum** limits can be changed.

20.6.6 Edit an HEC-HMS Alternative

To edit an HEC-HMS model alternative:

- 1. From the **Watershed Pane** in the **Setup Module**, select the HEC-HMS model alternative.
- 2. Right-click on the HEC-HMS model alternative, select **Forecast Configuration** (Figure 20.41) and the **Forecast Configuration** editor (Figure 20.30) opens.
- 3. Edit the HEC-HMS model alternative as desired, and then click the **Apply** button to save you changes.
- 4. Click **Close**, and **Forecast Configuration** editor closes.
- 5. Save the watershed.

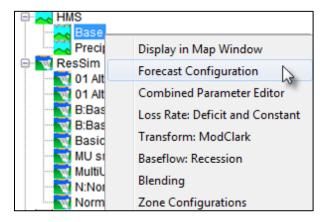


Figure 20.41 HEC-HMS Model Alternative Shortcut

20.6.7 Copy an HEC-HMS Alternative

To copy an HEC-HMS model alternative:

1. From the **Models** menu in the **Setup Module**, select **HEC-HMS** > **Forecast Alternative Manager**, and the **Forecast Alternative Manager** dialog (Figure 20.42) opens.

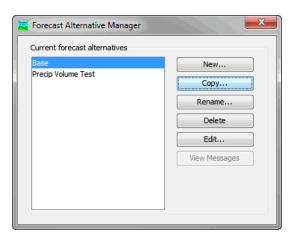


Figure 20.42 Forecast Alternative Manager Dialog

- 2. From the **Current forecast alternatives** list, select the forecast alternative to be copied and click **Copy**.
- 3. The **Copy Forecast Alternative** dialog (Figure 20.43) opens. Enter a new alternative name in the **Name** field (required) fill out the **Description** field (optional).
- 4. Click **Copy** to complete the process. The copied alternative will now be shown in the **Current forecast alternatives** list.
- 5. Close the Forecast Alternative Manager dialog.

| 🔀 Copy Forecast | Alternative "Base" |
|-----------------|------------------------------------|
| Name : | Base2 |
| Description : | This is a copy of Base alternative |
| | Copy Cancel |

Figure 20.43 Copy Forecast Alternative Dialog

20.6.8 Delete an HEC-HMS Alternative

To delete an HEC-HMS alternative:

- 1. From the **Models** menu in the **Setup Module**, select **HEC-HMS** > **Forecast Alternative Manager**, and the **Forecast Alternative Manager** dialog (Figure 20.42) opens.
- 2. From the **Current forecast alternatives list**, select the forecast alternative to be deleted and click **Delete**.
- 3. The **Delete Confirmation** dialog (Figure 20.44) opens. Click **OK** to delete the forecast alternative.

4. The deleted alternative is removed from Current forecast alternatives list.

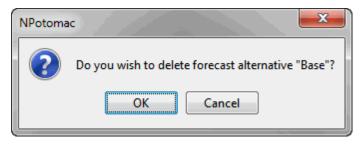


Figure 20.44 Delete Confirmation Dialog

20.7 Create a HEC-ResSim Alternative

A HEC-ResSim model alternative consists of a watershed schematic, stream and reservoir network, and a set of operations for each reservoir. Within a HEC-ResSim alternative, simulated forecasted releases can be overridden to mimic desired operation during the forecast period. If the HEC-ResSim project contains more than one network alternative (for summer and winter conditions, for instance), HEC-ResSim model alternatives can be built around each of them.

20.7.1 Import a HEC-ResSim Watershed

To import HEC-ResSim watershed:

1. On the **File** menu, select **Import** > **HEC-ResSim** and the **Import Type** dialog (Figure 20.45) opens.

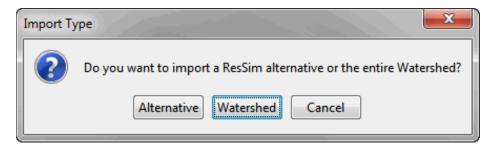


Figure 20.45 Import Type Dialog for Importing HEC-ResSim Watershed

- 2. Click **Watershed** to import the HEC-ResSim watershed (stream alignment, network, configurations, and alternatives), this will open a file browsing dialog.
- 3. From the file browsing dialog, navigate to and select the HEC-ResSim watershed (files with .wksp extensions) to be imported, and click **Open**. The import will automatically begin and an **Import Progress** dialog opens indicating that the import is occurring.
- 4. The **Import Progress** dialog closes automatically once the import is complete and the **Message** window will show, "**ResSim Import Complete**."
- 5. **Save** the watershed.

20.7.2 Import a HEC-ResSim Alternative

To import HEC-ResSim alternative:

- 1. On the **File** menu, select **Import** > **HEC-ResSim** and the **Import Type** dialog (Figure 20.45) opens.
- 2. Click Alternative and the Import Alternative Wizard (Figure 20.46) opens.
- 3. Select "…" and the file browsing dialog opens. Navigate to and select the HEC-ResSim watershed (files with **.wksp** extensions) to be imported, and click the **OK** button.
- 4. Select **Next**, and choose an alternative from the **Available Alternatives** table.
- 5. Choose **Next**, enter a name in the **Name** field and a description in the **Description** field for the new alternative.
- 6. Select **Next**, enter a name in the **Name** field and a description in the **Description** field for the new reservoir network.
- 7. Select Next, and assign the stream names in the To Stream column in the table.
- 8. Select **Next**, and if needed, resolve network computation points by selecting watershed computation points from the **Watershed Computation Point** column of the table.
- 9. Select **Next**, and view the **Import Summary**. If needed, the summary can be copied or printed.
- 10. Click Finish, choose Yes on the Continue with Import dialog and Save the watershed.

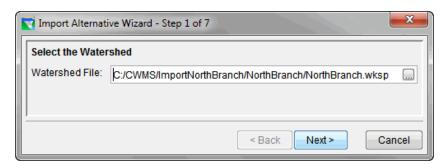


Figure 20.46 Import Alternative Wizard for Importing HEC-ResSim Alternative

20.7.3 Edit a HEC-ResSim Alternative

To edit a HEC-ResSim alternative:

1. From the **Watershed Pane** in the **Setup Module**, select the HEC-ResSim model alternative.

2. Right-click on the HEC-ResSim alternative, select **Edit Alternatives** (Figure 20.47), and the **Resim Alternative Editor** (Figure 20.48) opens.

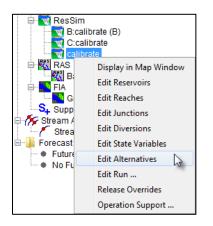


Figure 20.47 HEC-ResSim Shortcut Menu

| ResSim Alternative Editor | J |
|--|---|
| Alternative | |
| Name: calibrate | 1 |
| Description: | |
| Reservoir Network Base v2 Calibration | |
| Time-Series Observed Data Hotstart Yield Analysis DSS Output Run Control Operations Lookhack | |
| | |
| Time Step: 1 Hour Alternative Type | |
| Flow Computation Method | |
| Program Determined Image: Second system Image: Second system< | |
| Period Average | |
| ○ Instantaneous | |
| Compute Unregulated Flows | |
| Compute Holdouts | |
| Log Level: 3 - | |
| | |
| | |
| | |
| | |
| | |
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| | |

Figure 20.48 HEC-ResSim Alternative Editor

- 3. **Edit** the HEC-ResSim alternative as desired. For further information on how to modify HEC-ResSim alternatives, see the HEC-ResSim User's Manual.
- 4. Select **Save** from the **Alternative** menu.

5. Click Close from the Alternative menu and Resim Alternative Editor closes.

20.7.4 Copy a HEC-ResSimAlternative

To copy a HEC-ResSim alternative:

- 1. From the **Watershed Pane** in the **Setup Module**, select the HEC-ResSim model alternative.
- 2. Right-click on the HEC-ResSim alternative, select **Edit Alternatives** (Figure 20.47), and the **Resim Alternative Editor** (Figure 20.48) opens.
- 3. Select Save As from the Alternative menu and the Save As dialog (Figure 20.49) opens.
- 4. In the **Save As** dialog, enter alternative name in the **Name** field (required) and a description in **Description** field (optional).
- 5. Click **OK**, and the **Save As** dialog closes. The copied alternative is shown in the **HEC**-**ResSim Alternative Editor**.
- 6. Click Close from the Alternative menu, and the HEC-Resim Alternative Editor closes.

| 🗙 Save 01 Alt As | | | |
|------------------|---------------------------------------|--|--|
| Name: | 01 AltCopy | | |
| Description: | Copy of Basic Guide Curve Operation 🛄 | | |
| Network: | 01 Standard 2 👻 | | |
| | | | |
| | OK Cancel | | |

Figure 20.49 Save As Dialog

20.7.5 Delete an HEC-ResSIm Alternative

To delete a HEC-ResSim alternative, launch HEC-ResSim from the CAVI and delete the network alternative from the HEC-ResSim network module. For further information on how to delete alternatives in HEC-ResSim, see the HEC-ResSim User's Manual.

20.8 Create a HEC-RAS Alternative

A HEC-RAS alternative consists of model geometry, set of boundary conditions, and a plan file linking the two. If the HEC-RAS project contains more than one plan (for steady flow and unsteady flow conditions, for instance), you can build HEC-RAS model alternatives around each of them.

20.8.1 Import a HEC-RAS Alternative

To import a HEC-RAS model alternative:

- 1. On the **File** menu, select **Import** > **HEC-RAS**, and a file browser dialog called **Select HEC-RAS** project to import from (Figure 20.50) opens.
- In the file browsing dialog, navigate to and select the HEC-RAS project file (.prj extension) to be imported, and click the Open button. The import begins and an Import Progress dialog opens displaying the import progress. The Import Progress dialog closes when the import is complete and the Message window will show "RAS Import Complete".
- 3. Save your watershed.

| Select RAS project to import from | | | | |
|-----------------------------------|--|--|--|--|
| Look in: | 🌗 ras 🔹 🍷 🏂 📰 🗸 | | | |
| Recent Items | NPotomac.prj | | | |
| Desktop | | | | |
| My Documents | File name: NPotomac.prj Open Files of type: RAS Project Files Cancel | | | |

Figure 20.50 Select HEC-RAS project to import Dialog

20.8.2 Edit a HEC-RAS Alternative

To edit a HEC-RAS alternative:

- 1. From the **Watershed Pane** in the **Setup Module**, select the HEC-RAS alternative to be edited.
- 2. Right-click the selected HEC-RAS alternative and the **HEC-RAS Shortcut Menu** (Figure 20.51) appears.
- 3. From the **HEC-RAS Shortcut Menu** select the HEC-RAS component to be modified. Edit the HEC-RAS alternative as desired. For further information on how to modify HEC-RAS alternatives, see the HEC-RAS User's Manual.

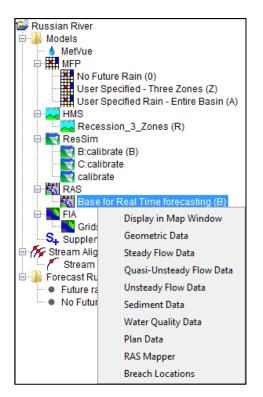


Figure 20.51 HEC-RAS Shortcut Menu

20.8.3 Copy a HEC-RAS Alternative

To copy a HEC-RAS alternative:

- 1. From the **Watershed Pane** in the **Setup Module**, select the HEC-RAS alternative to be copied.
- 2. Right-click the selected HEC-RAS alternative and the HEC-RAS **Shortcut Menu** (Figure 20.51) expands.
- 3. Click **Plan Data**, and the **HEC-RAS Plan** editor opens.
- 4. From the **File** menu, select **Save Plan As**, and the **Save Plan Data As** dialog (Figure 20.52) opens.

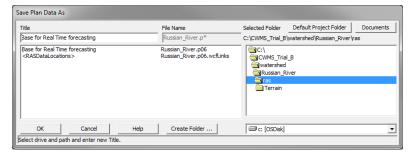


Figure 20.52 Save Plan Data As

- 5. From the Save Plan Data As dialog, specify a new plan name in the Title field.
- 6. Click **OK**, and the **Plan Identifier** dialog (Figure 20.53) opens.
- 7. Enter an identifier in the **Plan Identifier** dialog. Click **OK** to complete the copy process.

| HEC- | RAS | |
|------|--|---|
| | nter the short plan Identifier (16 har recommended 64 char max) | |
| | Calibrate | 3 |
| | OK Cancel | |

Figure 20.53 Plan Identifier Dialog

20.8.4 Delete a HEC-RAS Alternative

To delete a HEC-RAS alternative:

- 1. From the **Watershed Pane** in the **Setup Module**, select the HEC-RAS alternative to be deleted.
- 2. Right-click the selected HEC-RAS alternative and the HEC-RAS **Shortcut Menu** (Figure 20.51) expands.
- 3. Click **Plan Data**, and the **HEC-RAS Plan** editor opens.
- 4. From the **File** menu, select **Delete Plan**, and the **Delete Plan File** dialog (Figure 20.54) opens.
- 5. From the **Delete Plan File** dialog, select the plan to delete, and click **OK**.
- 6. A **Delete Plan File** confirmation dialog opens. Click **OK** to complete the deletion process.

| Delete Plan File | |
|---------------------|---|
| Selected File Title | Filename |
| Calibration Plan 2 | C:\CWMS\Test_import\ras\Test_import.p02 |
| Calibration Plan | C:\CWMS\Test_import\ras\Test_import.p01 |
| Calibration Plan 2 | C:\CWMS\Test import\ras\Test import.p02 |
| | |
| ок | Cancel |
| | |

Figure 20.54 Delete Plan File Dialog

20.9 Create an HEC-FIA Alternative

An HEC-FIA alternative consists of information on consequences for a given hazard. An HEC-FIA alternative is a combination of an Inundation Configuration, Impact Areas, Structure Inventory, Critical Infrastructure, Impact Response Curves, Agricultural Data, and computation settings. If the HEC-FIA project contains more than one alternative (for summer and winter crop conditions, for instance), you can build HEC-FIA model alternatives around each of them.

For further information on how to develop the information required in defining an alternative in HEC-FIA, see the HEC-FIA User's Manual.

20.9.1 Import an HEC-FIA Alternative

To import an HEC-FIA alternative:

- 1. On the **File** menu, select **Import** > **HEC-FIA**, and **Import Alternatives** dialog (Figure 20.55) opens.
- 2. Click Select Project, and a file browsing dialog opens.
- 3. From the file browsing dialog, navigate to and select the HEC-FIA 3.0 project file (**.prj** extension) you wish to import.
- 4. Click **Open**, and the file browsing dialog closes.
- 5. From the **Import Alternatives** dialog, click **Import**, the HEC-FIA alternative is imported, and a confirmation dialog opens.
- 6. Click **OK**, and the close confirmation dialog closes.
- 7. Click **Close**, and **Save** the watershed.

| 有 In | nport Alternatives | | — × | | | |
|------|---------------------|------------------------------|----------------------|--|--|--|
| | Select/Add Project | | | | | |
| P | lease Select Your / | Alternative For Each Project | | | | |
| | Project | Alternative | Progress | | | |
| | Russian River | GridsAndXSecsAlternative 👻 | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | Edit Alterna | ative Specifications | | | |
| | | Import Alternatives | Close | | | |

Figure 20.55 Import Alternative Dialog

20.9.2 Edit an HEC-FIA Alternative

To edit an HEC-FIA alternative:

- 1. From the **Watershed Pane** in the **Setup Module**, select the HEC-FIA alternative to be edited.
- 2. Right-click the selected HEC-RAS alternative and the **HEC-FIA Shortcut Menu** (Figure 20.56) appears.
- 3. Click Alternative, and the HEC-FIA Alternative editor (Figure 20.57) appears.
- 4. **Edit** the HEC-FIA alternative as desired. For further information on how to modify HEC-FIA alternatives, see the HEC-FIA User's Manual.
- 5. Click **OK**, and **HEC-FIA Alternative** editor closes.
- 6. Save the watershed.

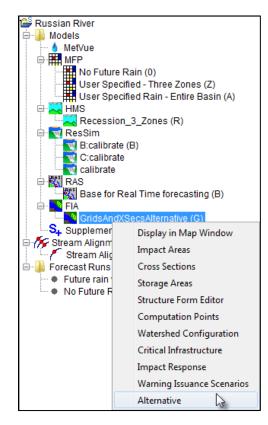


Figure 20.56 HEC-FIA Shortcut Menu

It is recommended to only make changes from the **Impact Area Editor** (Figure 20.58), for the price index values. To access the **Impact Area Editor**, right-click a HEC-FIA model alternative from either the table in the **Modeling Module** or from the **Watershed Pane** in the **Setup Module**, and select **Impact Areas**.

For further information on how to edit HEC-FIA alternatives and impact areas, see the HEC-FIA User's Manual.

| Ga Edit Alternati | Edit Alternative | | | | | |
|-------------------|------------------|-----------------------------------|-------|--|--|--|
| Name: | GridsAndX | SecsAlternative | | | | |
| Description: | Description: | | | | | |
| Impact Area S | et: | TheStudyImpactArea | • | | | |
| Inundation Co | nfiguration: | GridsAndXSecs | • | | | |
| Structure Inver | ntory: | StraightFromNSI | • | | | |
| Critical Infrastr | ucture: | | • | | | |
| Impact Respo | nse: | | • | | | |
| Agriculture Inve | entory: | theAgData | - | | | |
| Warning Issua | ince: | | • | | | |
| Life Loss A | griculture l | Incertainty ECAM Output | | | | |
| Compute | e Life Loss | | | | | |
| Comp | ute Life Loss | s for Relative Times Choose Times | | | | |
| Evacuation | on Informati | on | | | | |
| Define | Time By: A | Il Structures - | | | | |
| Evacua | tionTime (m | ninutes): 0 | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | ОКС | ancel | | | |

Figure 20.57 HEC-FIA Alternative Editor

| Impact Area Editor | |
|---|---|
| Impact Area Name: Russian River Impact Area Description: | |
| Life Loss Parameters Population Adjustment Adjusted Price Index | |
| Warning System: Sirens k: 0.2 30 Min Limit: 0.75 a1: 0.2 Release Rate: 0.3 a2: 0.3 Imme 0.000 (minut % War % War 0 (Day) (Night) Imme 0 0 0 0.00 0 0 0 0 1 1.97 1.88 Imme Minutes 2 4.15 3.88 Imme Day Night Effectiveness by Activity Type Imme More Mathematical Mathmatematical Mathematical Mathmatematical Math | Mobilization: Default Error Distribution Type: None Image: Constraint of the second |
| | Additional Parameters OK Cancel Apply |
| | |

Figure 20.58 HEC-FIA Impact Area Editor

20.9.3 Copy an HEC-FIA Alternative

To copy an HEC-FIA alternative:

- 1. Launch HEC-FIA from the CAVI taskbar.
- 2. In the HEC-FIA watershed pane, select the HEC-FIA alternative to be copied.
- 3. Right-click the selected alternative to bring up the **HEC-FIA Alternative Shortcut Menu** shown in Figure 20.59.

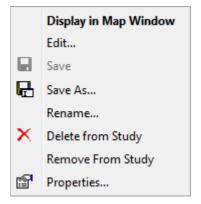


Figure 20.59 HEC-FIA Alternative Shortcut Menu

4. Select **Save As** from the alternative shortcut menu.

- 5. The **HEC-FIA Save As** dialog will open (Figure 20.60). In the dialog, specify a new alternative name in the **Name** field, and fill out the **Description** field (if desired). Leave the **Directory** field alone.
- 6. Click the **OK** button to complete the copy process. The copied alternative will now be shown in the **HEC-FIA Alternative** editor.

| Save Alternatives As | | |
|----------------------|---|--|
| Old Name: | GridsAndXSecsAlternative | |
| Name: | GridsAndXSecsAlternative | |
| Description: | Copy of GridsAndXSecsAlternative | |
| Directory: | NMS/Russian/watershed/Russian_v729/fia/alternatives | |
| | OK Cancel | |

Figure 20.60 HEC-FIA Save As dialog

20.9.4 Delete an HEC-FIA Alternative

To delete an HEC-FIA alternative:

- 1. Launch HEC-FIA from the CAVI taskbar.
- 2. In the HEC-FIA watershed pane, select the HEC-FIA alternative to be copied.
- 3. Right-click the selected alternative to bring up the shortcut menu shown in Figure 20.59.
- 4. Select **Delete from Study** and click the **Yes** button in the confirmation dialog.

For further information on how to delete alternatives in HEC-FIA, see the HEC-FIA User's Manual.

20.10 Editing a Model Alternative

A model alternative can be edited by selecting the alternative to be edited in the watershed pane and launching the associated software from the CAVI taskbar. This will open the alternative in the native model and allow editing of the model alternative. If the model alternative is edited in this manner and one or more forecast runs have been configured using this alternative it will be necessary to make sure the changes propagate through to your forecast run configurations as detailed in Chapter 12.

20.11 Configuring Model Alternative Keys

To complete configuration of a model alternative, each model alternative must be assigned a **Model Alternative Key**. The **Model Alternative Key** is an alpha-numeric identifier that will determine the names of the forecast runs.

To assign model alternative keys:

1. From the **Models** menu, select **Model Alternative Keys**, and the **Model Alternative Keys** dialog (Figure 20.61) opens.

| 📻 Model Alternative Keys 📃 🔀 | |
|------------------------------|-------------------|
| Plugin: | ResSim |
| Key | Model Alternative |
| | calibrate |
| | C:calibrate |
| В | B:calibrate |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | OK Cancel Apply |

Figure 20.61 Model Alternative Keys Dialog

- 2. Using the **Plugin** drop-down list, select the model for which to assign a key.
- 3. In the **Key** field, enter a single unique alpha-numeric character that will be used to identify the listed **Model Alternative**.
- 4. Repeat steps 2 and 3 for all models and model alternatives.
- 5. Click **OK**, and the **Model Alternative Keys** dialog closes.

Model alternatives for the standard programs might be named similar to the following:

MFP deals with future precipitation. You can configure model alternatives for use in conjunction with HEC-HMS to compute a variety of future precipitation scenarios. For example:

| Ex | Example Model Alternatives for MFP | |
|----|------------------------------------|--|
| ID | Name | |
| N | No future precipitation | |
| 2 | 2-inches future precipitation | |
| 4 | 4-inches future precipitation | |
| Q | QPF | |
| R | One-half QPF | |
| S | Twice QPF | |

HEC-MetVue deals with observed meteorological data. Model alternatives can be configured for use in conjunction with HEC-HMS to compute a variety of observed precipitation scenarios. For example:

| Example Model Alternatives for HEC-MetVue | |
|--|-------------------------------|
| ID | Name |
| N | No future precipitation |
| 2 | 2-inches future precipitation |
| 4 | 4-inches future precipitation |
| Q | QPF |
| R | One-half QPF |
| S | Twice QPF |

HEC-HMS model alternatives simulate watershed response to precipitation. HEC-HMS CAVI model alternatives will be used to forecast future flows. For example:

| Example Model Alternatives for HEC-HMS | | |
|--|----------------------|--|
| ID | Name | |
| Ν | Normal conditions | |
| W | Wet basin conditions | |
| D | Dry basin conditions | |

HEC-ResSim model alternatives assist with reservoir operations, consisting of the physical data representing a river-reservoir system and operating rules for all controllable elements in the system. For example:

| Example Model Alternatives for HEC-ResSim | | |
|---|--|--|
| ID | Name | |
| N | Normal operations | |
| R | Restricted downstream channel capacity | |
| W | White water release schedule | |
| S | Fish spawning release schedule | |

HEC-RAS model alternatives describe water surface profile and stages at gage locations, geometry information for a river, and defined flow data sets. For example:

| Example Model Alternatives for HEC-RAS | |
|--|-------------------------|
| ID | Name |
| N | Normal river conditions |
| Н | High channel roughness |
| L | Low channel roughness |
| В | Bridge out |

HEC-FIA model alternatives allow analysis of flood consequences. Its model forecast alternatives are a combination of impact area and hydrograph time series sets. For example:

| Example Model Alternatives for HEC-FIA | | |
|--|------------------------|--|
| ID | Name | |
| N | Normal conditions | |
| E | Evacuated with warning | |

The parameters can be edited within each CAVI model alternative to reflect changing conditions. The beginning of this chapter describes how to edit model alternatives for the models.

20.12 Forecast Run

A **forecast run** is the set of model alternatives (Section 20.1) that run sequentially during a forecast. As the with model alternatives, forecast runs exist independent of time. Therefore, a forecast run can be used for any forecast time window.

Create a forecast run by selecting a model alternative for each program. There are seven standard programs in the CAVI, a typical forecast run will include a combination of the six model alternatives. When a forecast is executed, the CAVI executes the programs in sequential order.

The table shows three suggested forecast runs. The codes are the names the CAVI automatically assigns to each forecast run based on the one-character **Model Alternative Keys** assigned to the model alternatives (Section 20.11). This coding is *program order dependent*.

| Example Forecast Run | | |
|----------------------|-------|--|
| Name | Code | |
| No future precip | NNNNN | |
| QPF | QNNNN | |
| Two times QPF | SWRBE | |

In the following example, the forecast alternative named *Two times QPF* has the code *SWRBE*. Each character in this code is the ID of a specific model alternative for each of the six standard programs. The code translates as follows:

Program 1: MFP – twice QPF Program 2: HMS – Wet basin conditions Program 3: ResSim – Restricted downstream channel capacity Program 4: RAS – Bridge out Program 5: FIA – Evacuated with warning S W R B E

20.12.1 Creating Forecast Run

Before this step can be done, model alternatives must have been created. Section 20.11 describes how this is done in detail.

Creating forecast runs:

- 1. From the **Models** menu in the **Setup Module**, click **Forecast Runs**, and the **Forecast Run Editor** (Figure 20.62) opens.
- 2. Click **New**, enter a new forecast run name in the **Name** field (required), a description in the **Description** field (optional).
- 3. Select program order from the **Program Order** drop-down list. See Chapter 16 for information on program order.
- 4. From each program listed below the **Program Order**, select the model alternatives for the forecast run.
- 5. From the **File** menu, click **Save**. The new forecast alternative appears in the table on the **Forecast Run Editor** (Figure 20.62).
- 6. Click **OK**, and the **Forecast Run Editor** closes.
- 7. Save the watershed.

| 📻 Forecast Run Editor* | | | | |
|------------------------|------------------|--------------------------|--------------|--|
| ForecastRun | | | | |
| Name | | Кеу | Description | |
| | with base mod | A0R0B0B0G0 | Description | |
| No Future | | 00R0B0B0 | | |
| | | | | |
| | | New X Delete | | |
| Name: | MFP-HMS-Re | sSim | | |
| Descriptio | n: Forecast with | MFP, HMS and ResSim only | | |
| Program (| Order: Default | ⊸ Key: Z0 |)R0B0 | |
| MFP | Z:User Specified | - Three Zones | - | |
| HMS | R:Recession_3_ | | • | |
| ResSim | B:B:calibrate | | • | |
| RAS | | | • | |
| FIA | | | | |
| | | | · · · | |
| | | | | |
| | | | | |
| | | | | |
| | | ок | Cancel Apply | |
| | | | Apply | |

Figure 20.62 Forecast Run Editor

20.12.2 Delete a Forecast Run

Delete a forecast run:

- 1. From the **Models** menu in the **Setup Module**, click **Forecast Runs**, and the **Forecast Run Editor** (Figure 20.62) opens.
- 2. From the table, select the forecast to be deleted.
- 3. From the File menu, click Delete and a delete confirmation dialog opens.
- 4. Click **Yes**, and the forecast run will be removed from the table on the **Forecast Run Editor**.
- 5. Click **OK** and the **Forecast Run Editor** closes.
- 6. Save the watershed.

CHAPTER 21

Model Linking Editor

After a **Forecast Run** has been created the model alternatives need to be linked. For example, output from MFP would be used as the input to HEC-HMS, and the output of HEC-HMS as the input to HEC-ResSim. This is completed using the **Model Linking Editor** shown in Figure 21.1. The **Model Linking Editor** is accessed from the **Setup Module** via the **Models > Model Linking** menu item.

| Forecast Run: | MFP-HMS-ResSim | | | | |
|-------------------------|-----------------------|-----------|-------------------------------|--------------------------------|--|
| lodel Requiring Input: | | | | Select Input Model Alternative | |
| | Model Input | | | Source | |
| Loca | tion | Parameter | Input From Location/Parameter | | |
| | | | | | |
| | | | | | |
| Highlighted text indica | tes duplicate linking | | Browse | | |

Figure 21.1 Model Linking Editor

21.1 Model Linking Editor GUI Overview

At the top of the **Model Linking Editor** the **Forecast** field displays the forecast for which the different model alternatives will be linked. When the model linking is first configured, this field will display *Base Data* to indicate that you are configuring model links between the base model alternatives. (If an active forecast is open, the **Forecast Field** displays the name of the forecast.)

Below the **Forecast** field is the **Forecast Run** drop-down list. This dropdown lists all the configured forecast runs. (Again, a forecast run is a set of model alternatives.) Use this dropdown to select the specific **Forecast Run** to be configured.

Below the **Forecast Run** dropdown list is the **Model Requiring Input** drop-down list. This dropdown lists all the model alternatives configured for use in the specified forecast run. To complete the model linking process for a given forecast run, the user will need to step through all the model alternatives listed in this dropdown.

The remaining portion of **Model Linking Editor** is the table which lists the inputs required by the model alternative specified in the **Model Requiring Input** dropdown list and the source of that input. Figure 21.2 shows an example of the **Model Linking Editor** for the Russian River watershed with an HEC-HMS model alternative requiring input.

This table has four columns as follows:

- Column 1: Location. This column identifies the name of the required input. For example, this could be:
- The precipitation grid name or discharge gage name specified in the HEC-HMS model alternative.
- The local flow name specified in the HEC-ResSim model alternative.
- The river station and node name specified in the HEC-RAS model alternative.
- Column 2: **Parameter**. This column identifies the type of data or information required by the model alternative. For example, this could be: flow, stage, or precipitation.
- Column 3: **Input From**. This column consists of drop-down lists that identify the source of the input. These dropdowns list each model alternative and *Extract List*. The *Extract List* is used to bring data and information from external sources, i.e. the CWMS database or an HEC-DSS file, into the watershed. Refer to Chapter 22 for additional information on the extract editor.
- Column 4: Location/Parameter. If the Input From column displays the name of a model alternative, this column will show a drop-down list that contains all of the model alternative results for the parameter specified in column 2. In the example shown in Figure 21.2 the first row in the table indicates that the *Interpolation* precipitation input should come from the MFP model alternative grid named *Interpolation-Precipitation*. If the Input From column displays *Extract List*, this column will display the HEC-DSS file and pathname or CWMS database pathname.

| Forecast Run: MFP-HN | MFP-HMS-ResSim · | | | | |
|--|------------------|-----------------------|---|--|---------|
| lodel Requiring Input: 🛛 🟹 Res | Sim-B:calibrate | | | Select Input Model Alter | rnative |
| | | | | | |
| Model Input Source | | | | | [|
| Location | Parameter | Input From | | Location/Parameter | |
| Austin Ck from Cazadero | Known Flow | HMS-Recession_3_Zones | • | Cazadero-Duncans Mills - Flow | • |
| Johnsons Beach Local | Known Flow | HMS-Recession_3_Zones | • | Johnsons Loc - Flow | • |
| Windsor Local | Known Flow | HMS-Recession_3_Zones | - | Windsor loc - Flow | • |
| Lambert Bridge Local | Known Flow | HMS-Recession_3_Zones | - | Lambert Loc - Flow | - |
| Digger Local | Known Flow | HMS-Recession_3_Zones | • | Digger Loc - Flow | • |
| Maacama Ck | Known Flow | HMS-Recession_3_Zones | • | Maacama-Chalk Hill - Flow | • |
| Sausal Ck | Known Flow | HMS-Recession_3_Zones | • | Sausal Ck - Flow | • |
| Chalk Hill Local | Known Flow | HMS-Recession_3_Zones | • | Chalk Hill Loc - Flow | • |
| Jimtown Local | Known Flow | HMS-Recession_3_Zones | • | Jimtown Loc - Flow | • |
| Oat Valley Ck | Known Flow | HMS-Recession_3_Zones | • | Oat Valley Ck - Flow | • |
| Feliz Ck | Known Flow | HMS-Recession_3_Zones | | Feliz Ck - Flow | |
| Min flow to keep RAS stable | Known Flow | HMS-Recession_3_Zones | | Warm Springs Seepage - Flow | • |
| Hacienda | Obs Flow | Extract List | | GUERNEVILLE CA - FLOW | - |
| Dry Creek | Obs Flow | Extract List | | MOUTH NR HEALDSBURG CA - FLOW | |
| Dry Creek near Geyserville | Obs Flow | Extract List | | GEYSERVILLE CA - FLOW | - |
| | | [<u>_</u> | | | |
| Highlighted text indicates duplication | ate linking | | | | |
| | | Browse | | | |

Figure 21.2 Model Linking Editor

Below the **Model Requiring Input** drop-down list is the **Select Input Model Alternative** button. This button can be used to set all of the **Input From** values equal to a specific model alternative or *Extract List*. For example, it may be desired to have all the HEC-ResSim model alternative input to come from the HEC-HMS model alternative results. When a selection of Model Input Locations and Parameters is made and this button is clicked, the **Select Input Model Alternative** dialog (shown in Figure 21.3) opens. In the dropdown, selected the model alternative (or *Extract List*) and click the **OK** button. This will change all value in the **Input From** column to be the specified **Select Input Model Alternative**.

| 📻 Select Input Model Alternative | | | | |
|----------------------------------|-----------|---|--|--|
| Input Model Alternative: | OK Cancel | • | | |

Figure 21.3 Select Input Model Alternative Dialog

At the bottom of the **Model Linking Editor** is the **Browse** button that opens the **Select Source Data Location** dialog (shown in Figure 21.4). In this dialog the user can scroll through the entire list of available locations and parameters for the model alternative specified in the dropdown list at the top of the dialog. To set a **Location/Parameter**, highlight a row in the **Model Linking Editor**, and then highlight the desired row in the **Select Source Data Location** dialog. Click the **Set Location** button at the bottom of the dialog.

| 📻 Select Source DataLocation | | x |
|------------------------------|-----------------------|-----|
| Location: | Johnsons Beach Local | |
| Parameter: | Known Flow | |
| Location | KMS-Recession_3_Zones | • |
| Location | Parameter | Q |
| AG Resort | Flow | |
| AG Resort-Big Sulphur | Flow | Ξ |
| Austin Ck Loc | Flow | |
| Big Sulphur Ck | Flow | |
| Big Sulphur Ck | Local Flow | |
| Big Sulphur Loc | Flow | |
| Brush Ck | Flow | |
| Calpella | Flow | |
| Cazadero | Flow | |
| Cazadero-Duncans Mills | Flow | |
| Chalk Hill | Flow | |
| Chalk Hill | Local Flow | |
| Chalk Hill Loc | Flow | |
| Chalk Hill SA | Flow | |
| Chalk Hill SA | Local Flow | Ŧ |
| Show All Source Locations | Number of Locations: | 150 |
| | Set Location Close | |

Figure 21.4 Select Source Data Location Dialog

21.2 Model Linking

To link the model alternatives, complete the following:

- 1. Open the **Model Linking Editor** by selecting the **Models > Model Linking** menu item in the **Setup Module**.
- 2. Select the Forecast Run to be configured in the Forecast Run drop-down list.
- 3. Select the first model alternative in the Model Requiring Input dropdown list.
- 4. In the **Model Linking Editor** table, specify the **Input From** for each row as either a model alternative or *Extract List*.
- 5. For each row with an **Input From** specified with a model alternative, specify the **Location/Parameter** of the required input by using the **Browse** button to open the **Select Source Data Location** dialog.
- 6. Repeat steps 3 through 5 for each model alternative in the **Model Requiring Input** dropdown list.
- 7. Repeat all steps for each **Forecast Run** to be configured.

8. Save the changes using the **File > Save** menu item.

21.3 Model Linking HEC-RAS Model Alternatives

The location listed in the **Model Linking Editor** for HEC-RAS inputs will be the river station and node name of the boundary condition location. Typically, the HEC-RAS model will not have node names configured and the location will display the river station. To configure node names, complete the following:

- 1. Open HEC-RAS from the CAVI toolbar.
- 2. Open the geometry editor (Edit > Geometric Data) from the HEC-RAS toolbar.
- 3. Open the **Node Name Table** (shown in Figure 21.5) using the **Tables > Names > Node Names** menu item in the Geometric Data editor.
- 4. Specify name for each river station with a boundary condition in the **Node Name** column. Hint: it may be useful to open the boundary condition editor to correlate river stations, node names, and boundary condition locations.

| N | Node Name Table | | | | | |
|----|---------------------|----------|----------|----------------|--------------|--|
| | River: (All Rivers) | | | | | |
| ١. | Read | in: j | | | Keplace Text | |
| | | | Node Nam | es (16 Charact | ers Maximum) | |
| L | | River | Reach | RS | Node Name | |
| L. | 1 | DryCreek | DryCreek | 244007.8 | | |
| L | 2 | DryCreek | DryCreek | 243694 | | |
| L. | 3 | DryCreek | DryCreek | 243307.5 | | |
| L | 4 | DryCreek | DryCreek | 243307 LS | | |
| L. | 5 | DryCreek | DryCreek | 243093.3 | | |
| L. | 6 | DryCreek | DryCreek | 242998 BR | | |
| L. | 7 | DryCreek | DryCreek | 242899.6 | | |
| L. | 8 | DryCreek | DryCreek | 242752.* | | |
| L. | 9 | DryCreek | DryCreek | 242605.5 | ▼ | |
| | | | | | OK Cancel | |

Figure 21.5 Node Name Table from HEC-RAS Geometry Editor

CHAPTER 22

Data Extract Editor

After completing the model linking (refer to Chapter 21 for more detail) the **Data Extract List** will need to be configured. The data extract list specifies the location of the gridded and time series data required be the different model alternatives. For example, this could be gridded precipitation data or observed flow data from the database. Configuring the **Data Extract List** is completed using the **Data Extract Editor** shown in Figure 22.1. The **Data Extract Editor** is accessed from the **Setup Module** via the **Models** | ***New*** **Edit Extract...** menu item.

| quired Input | | |
|-------------------------------|--|---|
| estination | | |
| HG/RUSSIAN/PRECIP/22NOV2 | 012-2000/22NOV2012-2100/INTERPOLATED/ | |
| USSIAN R/GUERNEVILLE CAA | LOW//15MIN/USGS/ | |
| RY C/MOUTH NR HEALDSBUR | KG CA/FLOW//15MIN/USGS/ | |
| RY C/GEYSERVILLE CA/FLOW | //15MIN/USGS/ | |
| USSIAN R/HEALDSBURG CA/ | LOW//15MIN/USGS/ | |
| JSSIAN R/GEYSERVILLE CA/F | | |
| LISSIAN R/CLOVERDALE CAIE | OW//15MIN/LISGS/ | |
| | Add To Group Filter List | |
| tract Linking | | |
| | Extract Group: Time Series | |
| Extract Groups | | |
| ime Series (runs by default) | | |
| ridded Data (runs by default) | From Russian das | To forecast das |
| | | |
| | /POTTER VALLEY/POTTER VALLEY INTAKE/FLOW/01JAN2012/1DAY/USGS/ | POTTER VALLEY/POTTER VALLEY INTAKE/FLOW/01JAN2012/1DAY/USGS/ |
| | EF RUSSIAN R/CALPELLA CA/FLOW/01N0/2012/15////USGS/ | EF RUSSIAN R/CALPELLA CA/FLOW/01NOV2012/15/IIN/USGS/ |
| | /RUSSIAN/LAKE MENDECINO/FLOW-OUT//15MIN/CDEC/ /RUSSIAN R/UKIAH CA/FLOW/01N0/2012/15MIN/USGS/ | /RUSSIAN/LAKE MENDECINO/FLOW-OUT//15/IN//CDEC/ /RUSSIAN R/UKIAH CA/FLOW/01N0/2012/15/IN//USGS/ |
| | | |
| | /RUSSIAN R/TALMAGE CA/FLOW/01N0/2012/15//IN/USGS/ /RUSSIAN R/HOPLAND CA/FLOW/01N0/2012/15//IN/USGS/ | /RUSSIAN R/TALMAGE CA/FLOW/01N0/2012/15MIN/USGS/ /RUSSIAN R/HOPLAND CA/FLOW/01N0/2012/15MIN/USGS/ |
| | RUSSIAN R/HOPLAND CAFELOW/01NOV2012/15/iiiN/USGS/ | RUSSIAN R/HOPLAND CA/FLOW/01NOV2012/15//IN/USGS/ |
| | IBIG SULPHUR C A G RESORT/CLOVERDALE CAFLOW/01NOV2012/15MIN/USGS/ | BIG SULPHUR C A G RESORT/CLOVERDALE CAFLOW/01N0/2012/15MIN/USGS/ |
| | BIG SULPHUR C/CLOVERDALE CA/FLOW/01NOV2012/15/MIN/USGS/ | BIG SULPHUR C/CLOVERDALE CA/FLOW/01NOV2012/15MIN/USGS/ |
| | RUSSIAN R/GEYSERVILLE CA/FLOW/01NOV2012/15/MIN/USGS/ | RUSSIAN R/GEYSERVILLE CA/FLOW/01N0V2012/15/MIN/USGS/ |
| | RUSSIAN RUIMTOWN CA/FLOW/01NOV2012/15MIN/USGS/ | RUSSIAN R/GETSERVILLE CAPLOW/01NOV2012/15MIN/USGS/ |
| | MAACAMA C/KELLOGG CA/ELOW/01NOV2012/15MINUSGS/ | MAACAMA C/KELLOGG CA/ELOW/01NOV2012/15/IIN/USGS/ |
| | | |
| | RUSSIAN R & DICCER RENDALEAL DSRURC CAELOW/01NO/2012/15MINU ISCS/ | |
| | RUSSIAN R A DIGGER BEND/HEALDSBURG CA/FLOW/01N0V2012/15MIN/USGS/ RUSSIAN RHEALDSBURG CAFLOW/01N0V2012/15MIN/USGS/ | RUSSIAN R A DIGGER BEND/HEALDSBURG CA/FLOW/01NOV2012/15MIN/USGS/ |
| | /RUSSIAN R/HEALDSBURG CA/FLOW/01NOV2012/15MIN/USGS/ | /RUSSIAN R/HEALDSBURG CA/FLOW/01NOV2012/15MIN/USGS/ |
| | /RUSSIAN R/HEALDSBURG CA/FLOW/01NOV2012/15/MIN/USGS/ /DRY C/GEYSERVILLE CA/FLOW/01NOV2012/15/MIN/USGS/ | RUSSIAN R/HEALDSBURG CA/FLOW/01NOV2012/15/MIN/USGS/ DRY C/GEYSERVILLE CA/FLOW/01NOV2012/15/MIN/USGS/ |
| | RUSSIAN RHEALDSBURG CAFLOWI01N0V2012/15MINUSGS/ DRY CIGEYENILE CAFLOWI01N0V2012/15MINUSGS/ DRY CMOUTH NR HEALDSBURG CAFLOWI01N0V2012/15MINUSGS/ | RUSSIAN RIHEALDSBURG CAFLOW/01N0/2012/15MINUSGS/ /DRY CIGEYSERVILLE CAFLOW/01N0/2012/15MINUSGS/ /DRY CMOUTH NR HEALDSBURG CAFLOW/01N0/2012/15MINUSGS/ |
| | RUSSIAN RIFEALDSBURG CAFLOWID1N0/2012/15MINUJSGS/ DRY CGEV5ERVILLE CAFLOWID1N0/2012/15MINUJSGS/ DRY CGIEV5ERVILLE CAFLOWID1N0/2012/15MINUJSGS/ IRUSSIAN RWIndsor CAFLOWID1N0/2012/15MINUJSGS/ | RUSSIAN RHEALDSBURG CAFLOWI01NOV2012/15MINUSGS/ DRY CIGEV3EKULG CAFLOWI01NOV2012/15MINUSGS/ DRY CIMOUTH NR HEALDSBURG CAFLOWI01NOV2012/15MINUSGS/ RUSSIAN RWindsor CAFLOWI01NOV2012/15MINUSGS/ |
| New Extract Group | RUSSIAN RHEALDSBURG CAFLOWI01N0V2012/15MINUSGS/ DRY CIGEYENILE CAFLOWI01N0V2012/15MINUSGS/ DRY CMOUTH NR HEALDSBURG CAFLOWI01N0V2012/15MINUSGS/ | RUSSIAN RHEALDSBURG CAFLOWI01NOV2012/15MINUSGS/ DRY CIGEV3EKULG CAFLOWI01NOV2012/15MINUSGS/ DRY CIMOUTH NR HEALDSBURG CAFLOWI01NOV2012/15MINUSGS/ RUSSIAN RWindsor CAFLOWI01NOV2012/15MINUSGS/ |

Figure 22.1 Data Extract Editor

22.1 Data Extract Editor GUI Overview

The **Required Input** table, located at the top of **Data Extract Editor**, lists the HEC-DSS pathnames of the model alternatives configured to use the *Extract List* in the **Model Linking Editor**. (Refer to Chapter 21 for more details on the **Model Linking Editor**.)

The **Mappings Group** list and table, located at the bottom of the **Data Extract Editor**, list the configured group names and the associated HEC-DSS or CWMS pathnames of the source data.

APPENDIX A

Glossary

The following are definitions of terms used in this manual. The terms are defined in context with HEC-RTS.

| Term | Definition |
|---|---|
| Acquisition module | The Acquisition module in the CAVI is the grouping of commands for data acquisition. These are commands for monitoring receipt of HEC- DSS files for gridded data, validating the quality of data, and editing the data, as required. |
| ArcGIS® shapefile (GIS stands for Geographic Information System) | ArcGIS [®] shapefiles store non-topological geometry and attribute information for the spatial features of a data set. A "shapefile" is a group of files that share a common base name and different extensions. At a minimum a "shapefile" has three component files: .dbf, .shp, and .shx. The .shp file contains the shapes (point, polylines, or polygons) that are displayed in the layer. Each shape has a record in the .dbf database file containing descriptive data called "attributes". The .shx file contains an index that links each shape to its record in the .dbf file. |
| Base data | Base data for a HEC-RTS watershed refers to the original set of data from which copies are made to create forecasts. |
| Baseflow method | The baseflow method is a model for calculating the subsurface flow contribution to total runoff flow in a subbasin. |
| Basin model | Basin models are one of the main components in an HEC-HMS project. Basin models are composed of subbasins, routing reaches, junctions, and other elements. Their principal purpose is to predict how meteorologic inputs are transformed into streamflow at specific locations in the watershed. |

| Cache | A cache is a temporary storage area where recently accessed watershed |
|-------|---|
| | and data files are copied and stored. |

| Calibration | Calibration is the systematic adjustment of model parameters to produce model results that more accurately reflect watershed and channel behavior. |
|--|---|
| Common schematic | A common schematic consists of a stream alignment, map layers, time series icons, computation points, impact areas, and projects that allow sharing of common data between HEC software (e.g., HEC-HMS and HECResSim) for a watershed. Use of a common schematic ensures consistency of computation nodes, routing reaches, and so on. |
| Computation point | A computation point is a location where timeseries data are exchanged between analysis applications. |
| Control and Visualization Interface (CAVI) | The CAVI is the graphical user interface (GUI) of HEC-RTS. You command HEC-RTS with graphical menus and tools available in the CAVI. With the CAVI you configure watersheds, view and edit data, setup and run forecasts, and view results. |
| Coordinated Universal Time (UTC) | UTC is a time scale that is the basis for the worldwide system of civil time. ⁹ To provide a consistent method of assigning time to data, the HEC-RTS database default time zone is UTC. No matter what time zone the data are originally measured in, the data will always be stored in UTC in the database. The time assigned to data can be converted to local time or another time zone when storing or retrieving data from the database. |
| Corps Water Management System (CWMS) | CWMS is a real-time decision support system developed by HEC. CWMS makes readily available to USACE staff information about the current state of watersheds, likely future state of watersheds, and consequences of management actions. The information helps water managers make wise operation decisions. |

| Corps Water | CWMS-Vue is a software utility developed by HEC that provides a | | |
|--|---|--|--|
| Management System Visual Utility Engine (CWMS-Vue) | graphical user interface for viewing, editing, and manipulating data in DSS files and CWMS databases. It is the CWMS version of HEC-DSSVue. | | |
| Culvert | A culvert is a conduit that conveys stream flow through a roadway embankment or past some other type of flow obstruction. ⁴ | | |

| Data Storage System (DSS also referred to as HEC-DSS) | DSS is a database system developed by HEC to store and retrieve efficiently scientific data that are typically sequential. Such data types include, but are not limited to, time series data, curve data, spatial- oriented gridded data, and others. HEC designed the system to make it easy for users and application programs to retrieve and store data. DSS is incorporated into most of HEC's major software applications. (DSS also is used widely as an acronym for "decision support system.") |
|--|---|
| Data Storage System (DSS) Pathname | A DSS pathname is a unique reference to a record or time series in a DSS file. The pathname is structured so that it is easy to group related data together. A pathname is separated into six parts (separated by slashes) labeled "A" through "F," as follows: /A/B/C/D/E/F/. |
| Data Storage System Visual Utility Engine (HEC-DSSVue) | HEC-DSSVue is a software utility developed by HEC that provides a graphical user interface for viewing, editing, and manipulating data in DSS files. |

| Data stream | A CWMS data stream is a group of processes that receive real-time data from remote sources and provide those data to the CWMS database and other files and processes. The primary CWMS processing components are DataSender, DataReceiver, DataCapture, and DataReader, which can be combined to process any type of data, but are generally used to capture, decode, and load SHEF data and National Weather Service (NWS) gridded data products into CWMS. CWMS data stream components typically run together on a CWMS Solaris server, but can be configured to operate in a Wide Area Network (WAN) of dispersed Solaris servers and PC's. A typical office using CWMS will have several CWMS data streams, allowing the office to separate the data load by data source, type of data, or region. |
|-----------------|--|
| Data validation | Data validation is the process of reviewing data and editing or deleting data that are erroneous. |
| Datum | Datum refers to the reference specifications of a measurement system, usually a system of coordinate positions on a surface (a horizontal datum), or heights above or below a surface (a vertical datum). ³ |

| Directory | A directory catalogs the computer files in a nested folder-like structure. Files are organized by storing related files in folders in the same directory. |
|---|---|
| Diversion | A diversion removes and redirects water from its normal course in a channel. |
| Domestic Satellite Receive-Only Terminal (DROT) | DROT is software that facilitates receipt of satellite data. |
| Easting | Easting is the x coordinate of a location in the user-selected World Coordinate System. |

| Flood Impact Analysis (HEC-FIA) | HEC-FIA is an HEC analysis application that assesses consequences of flow or water surface elevations in the system. Inputs include computed or observed flows or water surface elevations at critical locations. Outputs include economic, life loss, or other measures of impact, or optionally, information on actions to be taken in response to flows or elevations that will be experienced. |
|------------------------------------|--|
| Flow blending | Flow blending is the capability of HEC-RTS to transition smoothly from observed flows during the "lookback period" to simulated flows during the forecast period. The lookback period is the period of time occurring prior to the time of forecast. |
| Forecast | An HEC-RTS forecast is a simulation of watershed processes and consequences of flooding based on input data and hydrologic, reservoir operation, hydraulic, and impact analysis models configured in HEC-RTS. Forecast results include flow and stage in the channel from watershed runoff, reservoir release schedules, floodplain inundation maps, floodplain consequence reports, and reports listing actions for emergency responders to take. These results inform water management decision making. |
| Forecast alternative | A forecast alternative is a single forecast scenario defined by a specific set of data and model alternatives. A second forecast alternative would be defined by different data or model alternatives. |

| Freeboard | Freeboard is the vertical distance from the water surface to the top of the channel, levee, or floodwall at design condition, and serves as a factor of safety for containing water in the stream without overtopping the channel, levee, or floodwall. ¹ |
|--|--|
| Geographic Information System (GIS) | GIS is an integrated collection of software and data used to view and manage information about geographic places, analyze spatial relationships, and model spatial processes. ³ |
| Geo-referenced grid | A geo-referenced grid is a set of geographic data that are represented as a raster and have been linked to a coordinate system for viewing, querying, and analyzing with other geographic data. ³ |

| Gridset | A gridset is a sequence or time series of georeferenced grids that describe properties or states of a watershed as they vary spatially and through time. Examples include sequences of precipitation or air temperature grids. |
|---|---|
| HEC-GridUtil | HEC-GridUtil is a software application developed by HEC that allows you to view, process, and analyze gridded data sets stored in HEC-DSS format. |
| Hydrograph | A hydrograph is a relationship of stage, discharge, velocity, or other state of water with respect to time at a certain location. |
| Hydrologic Engineering Center (HEC) | HEC is USACE's designated Center of Expertise in the technical areas of surface and groundwater hydrology, river hydraulics and sediment transport, hydrologic statistics and risk analysis, reservoir system analysis, planning analysis, real-time water control management, and a number of other closely associated technical subjects. HEC is the developer of HEC-RTS. |
| Hydrologic Modeling System (HEC-HMS) | HEC-HMS is an HEC analysis application that simulates watershed response to precipitation. Inputs may include observed or forecasted precipitation, temperature, snowpack, and other environmental conditions. Outputs include flows throughout the watershed, including inflows to reservoirs. |

| Impact area | In HEC-RTS, an impact area is a distinct portion of a watershed in which rising stage in a stream, river, lake, or reservoir has a consequence that is to be assessed. The boundaries of an impact area are defined by a closed polygon. You characterize the effects of rising stage by describing the property and population at risk in the area bounded by the polygon as input to HEC-FIA. |
|--------------------------|--|
| Inundation | Inundation is a condition in which water covers normally dry land, primarily caused by severe events along rivers or the coast. ⁶ |
| Java Archive (JAR, .jar) | JAR is a platform-independent file format that aggregates many files into one. Multiple Java applets and their requisite components (.class files, images and sounds) can be bundled in a JAR file. The JAR format also supports compression, which reduces file size. ⁸ |

| Layers | Layers in the CAVI are like transparencies laid one on top of the other. Each includes representations of static physical images such as roads, county and state boundaries, rivers, and subbasins. These are layered in the display area as color pictures. See Chapters 3, 4, and 5 for more information about layers. |
|-----------------|--|
| Layer tree | A layer tree is a list representing the hierarchical arrangement of layers displayed in the CAVI. |
| Levee | A levee is a manmade barrier built along a stream to reduce flooding in the adjacent floodplain from rising water in the stream. |
| Log file | A log file is a file that holds messages produced by the HEC-RTS program. The types of messages include information-only messages and error messages. |
| Lookback period | The lookback period is the period of time occurring prior to the time of forecast. |
| Loss method | The loss method is a model for calculating infiltration and other abstractions of precipitation in a subbasin. |
| Map layer | A map layer is a digital map of watershed features that is configured to display in the CAVI. A map layer is displayed as a color picture. Map layers help you visualize your watershed. |

| Map projection | A map projection uses mathematical formulas to relate spherical coordinates on the globe to flat, planar coordinates. ² |
|--|--|
| Map Window | The Map Window is the window in the CAVI that shows the graphical (and usually georeferenced) representation of the watershed. |
| Meteorologic Forecast Processor (MFP) | MFP is an HEC analysis application that processes meteorological forecasts for input to HEC-HMS. Inputs are forecasted meteorological data such as precipitation and temperature. Outputs are forecasted meteorological time series formatted for compatibility with HEC-HMS. |
| Meteorologic model | Meteorologic models are one of the main components in an HEC-HMS project. Their principal purpose is to prepare meteorologic boundary conditions for subbasin runoff computations. |

| HEC-MetVue | HEC-MetVue is an HEC analysis application that processes observed meteorological data for input to HEC-HMS. Inputs are either point or gridded estimates of meteorological data such as precipitation and temperature. Outputs are observed meteorological time series formatted for compatibility with HEC-HMS |
|-------------------|---|
| Model alternative | A model alternative is a single model configuration with a specific set of input and parameters. A second model alternative would be defined by a different configuration or different input or parameters. |
| Modeling module | The Modeling module in the CAVI is the grouping of commands for model execution. These are commands for setting up and executing analysis applications and viewing results. |
| Module | Commands in the CAVI are organized by function: watershed setup, data acquisition, data visualization, and model execution. A module is the grouping of commands related to a function. The CAVI contains the Setup module for watershed setup, the Acquisition module for data acquisition, the Visualization module for data visualization, and the Modeling module for model execution. Each module has menus, tools, and a display area specific to its function. |
| Northing | Northing is the y coordinate of a location in the user-selected World Coordinate System. |

| National Weather Service (NWS) | NWS is a Federal agency that makes and issues meteorologic and hydrologic forecasts. NWS forecasts may be used as input for HEC-RTS simulations. |
|-----------------------------------|--|
| Off-channel storage area | In HEC-RAS, an off-channel storage area is a modeling element used to represent ponded water in interior areas, adjacent ponds and lakes, urban areas next to rivers, etc. |
| Parameter | A parameter is a representation of a watershed condition in a model of the watershed. You can set parameter values using the CAVI. Varying parameters may vary analysis results. |
| Precipitation grid | A precipitation grid is a spatial representation of precipitation over the whole watershed for an interval of time. |

| Project benefit | A project benefit is a reduction in adverse flood consequences attributable to a project or projects. Project benefit commonly is computed as the difference between the without- and with-project consequences. |
|---|---|
| Projects | Projects are man-made structures such as reservoirs or levees that are built to control water. |
| Quality color bar | The quality color bar is a thick, segmented line shown in the CAVI display area that represents the history of the data quality at a specific location within the time window you have established. |
| Quantitative precipitation forecast (QPF) | QPF is a spatial and temporal precipitation forecast for a specified region or area. ⁷ |
| Raw data | Raw data are data that are collected, transmitted and received, but not yet subjected to quality tests and revised. |
| Regulated flow | Regulated flow is flow that has been changed from its natural state due to the influence of hydraulic constrictions or manmade influences. |
| Reservoir | A reservoir is a structure built to control water for uses such as flood control, hydropower generation, and water supply. Storing water in a reservoir can reduce flood consequences by regulating flow to reduce flood stages. |

| Reservoir System Simulation (HEC-ResSim) | HEC-ResSim is an HEC analysis application that simulates behavior of reservoirs and linking channels, following user-specified operations for reservoir release decision making. Inputs include flows into reservoirs and unregulated flows downstream of reservoirs. Outputs include reservoir releases, downstream regulated flows, and reservoir storage conditions. |
|--|--|
| Revised data | Revised data are data that are validated and transformed for use in modeling. They are saved to the CWMS database and are identified as potentially revised data. |
| River Analysis System (HEC-RAS) | HEC-RAS is an HEC analysis application that simulates, in one-dimension, behavior of channels and adjacent floodplains. This permits determination of water surface elevations corresponding to flows computed by HEC-HMS or HEC-ResSim. Inputs include flows, and outputs include water surface elevations. |

| River Analysis System Mapper (RAS Mapper) | RAS Mapper is an interface included in HECRAS that allows you to use and visualize floodplain geospatial information along with HEC-RAS analysis results. | |
|--|---|--|
| Routing reach | A routing reach is a portion of a stream network. In HEC-HMS and HEC- ResSim, a routing reach is a modeling element used to compute behavior of flow in a channel. | |
| Scripting | Scripting is the process of automating the actions of a program, so a prescribed sequence of actions can be executed with a single action. | |
| Setup module | The Setup module in the CAVI is the grouping of watershed setup commands. These are commands for configuring inputs, models, and outputs that describe a watershed's behavior. | |
| Simulation | A simulation is a mathematical representation of the behavior of a system, given inputs and initial conditions. | |
| Stage | Stage is the vertical distance of a water surface above or below a local or national datum. | |
| Stream alignment | A stream alignment is a representation of the stream network in the watershed. The alignment shows routing reaches and indicates where confluences and bifurcations occur and provides a sense of distance and scale. | |
| Stream element | A stream element is part of the representation of the stream networ the watershed. Specifically, a stream element is a segment of the stream alignment that is composed of vertex points (points with kno coordinates). The beginning and ending vertex points of a stream element are stream nodes. Stream elements typically begin or end a confluence, bifurcation, or at the boundary of the river system. | |
| Stream junction | Stream junctions are part of the representation of the stream network in the watershed. Specifically, a stream junction is a point where two stream elements meet (two stream nodes at one location). | |
| Stream node | Stream nodes are part of the representation of the stream network in the watershed. Specifically, stream nodes are the beginning and ending points for each stream element. Stream nodes are also points where stream elements meet (stream junctions). | |

| Stream stationing | Stream stationing is a reference system for locating features with distance along a stream. CWMS creates and labels stream stations (or river stations) along each stream element. The station at the downstream end of an element is Station 0 (zero), and the stationing increases upstream along the element according to the linear distance between vertices on the stream element in the watershed coordinate system. |
|----------------------|---|
| Subbasin | A division of a watershed typically delineated based on the terrain within the watershed. The entire precipitation within a subbasin drains to a common point. |
| Supplemental program | A supplemental program is a program or script that is not included with HEC-RTS. The program or script is developed by the user and may be added to the program order so it will be executed from HEC-RTS. |
| Threshold color bar | The threshold color bar is a thick, segmented line shown in the CAVI display area that represents a linear histogram that compares current data against threshold values set for a location. |

| Time series | A time series is an ordered sequence of values of a property or state at equally spaced time intervals. ⁵ HEC-DSS supports time series composed of irregularly spaced increments. |
|---|---|
| Time series icon | A time series icon is a symbol in the display area that provides quick access to time-series data assigned to the icon. The location of the time series icon on the watershed map corresponds to the location to which the data pertains. Time series icons can be used to view data, images, web pages, scripts, and document files. |
| Time window | A time window is the duration that will be simulated. A time window is defined by starting and ending dates and times. |
| Transform method | The transform method is a model for calculating surface runoff from precipitation on a subbasin. |
| U.S. Army Corps of Engineers (USACE) | USACE is a Federal agency that operates about 700 water control projects in the U.S. as part of its water control management mission. These projects include reservoirs, navigation locks and dams, and levee and bypass systems with closure and diversion structures. |

| UNET (HEC-UNET) | HEC-UNET is a software application that models one-dimensional, unsteady, openchannel flow. HEC-UNET models flow in single reaches or networks of interconnected channels. It is a predecessor of HEC-RAS. |
|---|--|
| United States Geological Survey (USGS) | USGS is a Federal agency that collects hydrologic data with a network of gages and reports the data in real-time. |
| Validation list | A validation list is a way to organize data in the CWMS database for editing or validation. |
| Vertex point | A vertex point is a point with known coordinates on a stream element in the stream alignment. |
| Visualization module | The Visualization module in the CAVI is the grouping of commands for data visualization. These are commands for displaying observed and forecast data to evaluate the hydrometeorological state of the watershed. |
| Watershed | In HEC-RTS, a watershed is a set of data, models, and images that represent watershed lands and the channels, gages, and water control features within the watershed. |
| Watershed pane | The watershed pane in the CAVI refers to the set of Visualization, Acquisition, Modeling, and Setup module tabs (tabbed menus). Clicking a module tab opens that module in the CAVI. |
| World Coordinate System (WCS) | To maintain a geographic reference (also called a geo-reference), HEC- RTS uses a user-selected and customizable coordinate system, called the World Coordinate System. This superimposes a grid on layer features to establish x and y coordinates in WCS for each point on the layer. The x coordinate is referred to as "easting," and the y coordinate is referred to as "northing." Possible choices for the WCS include but are not limited to State Plane Coordinates and Universal Transverse Mercator (UTM) coordinates. |
| Zone | A set of subbasins in the watershed. |

- California Department of Water Resources. (2012). Urban Levee Design Criteria. http://www.water.ca.gov/floodsafe/leveedesign/ULDC_May2012.pdf>. Accessed December 20, 2013.
- Esri. ArcGIS Help 10.2. <http://resources.arcgis.com/en/help/main/10.2/index.html#//003r0000000 q000000>. Accessed December 20, 2013. 3. ESRI Press. (2006). A to Z GIS. Redlands, CA.
- 4. Federal Highway Administration. (1985). Hydraulic Design of Highway Culverts, Chapter 1, HDS 5 Introduction. http://www.fhwa.dot.gov/engineering/hydraulics/pubs/hds5si.pdf. Accessed December 18, 2013.

- National Institute of Standards and Technology (NIST)/SEMATECH.
 e-Handbook of Statistical Methods, Section 6.4.1 Definitions, Applications and Techniques.
 http://www.itl.nist.gov/div898/handbook/pmc/section4/pmc41.htm. Accessed December 16, 2013.
- 6. National Oceanic and Atmospheric Administration. "NOAA and Inundation." http://inundation.noaa.gov/>. Accessed December 18, 2013.
- 7. National Weather Service. NOAA's National Weather Service: Glossary. < http://forecast.weather.gov/glossary.php?word=qpf>. Accessed December 20, 2013.
- Oracle. Java SE Documentation. <http://docs.oracle.com/javase/6/docs/technotes/guides/jar/index.html>. Accessed December 20, 2013.
- 9. U.S. Naval Observatory. "Universal Time." http://aa.usno.navy.mil/faq/docs/UT.php>. Accessed December 18, 2013.

APPENDIX B

HEC-RTS Application Settings

B.1 Working with Watershed Directories and Files

When a new watershed is created, HEC-RTS generates a directory structure and stores all files associated with the watershed inside that structure. The watershed directory is named according to the name given to the watershed; for example, in figure B.1, the watershed directory is *Bear River Watershed*. Figure B.1 shows schematically how CWMS organizes the directories and files it creates in the watershed's project directory. The watersheds directory configuration files and data for the watershed, including maps schematic elements, and model alternative data.

```
la cavi
📄 fia
hms
layouts
naps 🗼
🍌 MetVue
🗼 ras
rss
l shared
💧 study
Bear_River_Watershed.log
Bear_River_Watershed.log.bak
Bear_River_Watershed.wksp
Bear_River_Watershed.wksp.bak
Bear_River_Watershed.wtrshd
Bear_River_Watershed.wtrshd.bak
stream.align
stream.align.bak
```

Figure B.1 HEC-RTS Directory Structure

When models are imported into the watershed, HEC-RTS creates a new folder (named after the program) in the watershed directory and copies the model files into that respective folder.

Furthermore, when a new forecast is created, HEC-RTS creates a directory named **forecasts** if it does not exist in the watershed directory. HEC-RTS then creates a dated forecast directory named according to the date of the forecast. For example, the directory named jul2010 corresponds to a forecast created for July 2010. HEC-RTS automatically copies all of the directories and files for the watershed (except for maps) into the dated forecast directory. This facilitates archiving of forecast information and ensures consistency in the model results.

B.2 Setting Application Options

HEC-RTS allows for the configuration of several application options. The user can specify the cache directory for maps and data files and clear the cache; configure the display for the **Compute Progress** dialog, specify debug levels, and can specify the location of the DBI server for the watershed.

B.2.1 Setting the CWMS_HOME Directory

The **CWMS_HOME Directory** is the location where HEC-RTS will look for required files. By default, this location is the CAVI folder where HEC-RTS is installed. If desired, this location can be changed.

To override the local CWMS_HOME directory location:

1. On the **Tools** menu, click **Options**, and the **Options** dialog (Figure B.2) opens. Click the **CWMS_HOME Directory** tab.

| General System | n Propertie | s Th | hreads | Plu | g-ins | Co | mpute Colors | |
|---------------------|-------------|-------------|----------|--------|----------|------|---------------|--|
| RTS V2 Options | D | BIUri | MetVu | e | HMS | | RAS Plugin | |
| Email Configuration | Archive | Debug | CWMS | _HOI | ME Direc | tory | CAVI Plug-ins | |
| _ | MS_HOME | directory | environn | nents | setting | | Browee | |
| Local CWMS_HOME | _ | airectory | environn | nent s | etting | | Browse | |
| _ | _ | - directory | environn | nent s | setting | | Browse | |

Figure B.2 Options Dialog - CWMS_HOME Directory Tab

- 2. Check the **Override local CWMS_HOME directory environment setting** box.
- 3. The **CWMS_HOME Directory** box is now active. Enter a directory name that specifies where HEC-RTS should copy the map layers. This directory name is entered in the **CWMS_HOME Directory** field. If the directory entered does not exist, CWMS tells the user that the directory does not exist (you must enter an existing directory name).
- 4. Another way to enter a directory name is to click **Browse**. The **Open** browser will open (Figure B.3). Navigate to the directory on the computer or network to be the cache directory. Click **OK**, the **Open** browser closes and the cache directory appears in the **Cache Directory** box.
- 5. Click **OK**, and the **Options** dialog box will close (Figure B.2).
- 6. The next time the watershed is opened, a directory with the watershed name will be created under the cache directory identified.

| 🛃 Open | | |
|--|--|----------------|
| Look <u>i</u> n: | CWMS_V1.04.01.0006 | 🤌 📁 📰 🚍 |
| My Recent Documents Desktop My Documents | □ config □ dated □ exe □ HecDssMapVue □ HecDssVue □ jar □ java □ javaDocs □ lib □ users | Up One Level |
| My Computer | | |
| My Network | File name: C:\Documents and Settings\Baker\My Documents\CWMS_V1.04.01.0000 | а <u>о</u> к |
| Places | Files of type: All Files | <u>C</u> ancel |

Figure B.3 Open Browser

B.2.2 Configuring the Compute Progress Dialog Box

When computing a forecast in the **Models Module**, the **Compute Progress** dialog (Figure 13.3) reports on the progress of the forecast and presents warning and error messages generated by the forecast. The display of the **Compute Progress** dialog can be configured. There are several options available.

To configure the display of the **Compute Progress** dialog box:

- 1. On the **Tools** menu, click **Options** (from any module).
- 2. The Options dialog opens. Click the Compute Colors Tab (Figure B.4).
- 3. For the display of the **Compute Progress** dialog, colors for normal messages, warning messages, and error messages can be set. There are thirty-two color choices in each of the lists. Change the color of messages by selecting a color from the lists.
- 4. To save the **Compute Log Report** (Section 13.2.1) as an HTML file for web page viewing, click **Use HTML for Logs**. The background color of the HTML file can be set to either white or gray by selecting the color from the **HTML Background Color** list.
- 5. Once all of the settings are done, click **OK**. The **Options** dialog will close. For any of the changes to take effect, the forecast must be recomputed.

| CAVI Plug-ins | CWMS CAVI Optic | ons | MetVue | HMS | RAS Plugin |
|---------------------|------------------|---------|-------------|--------|-------------------|
| Email Configuration | Archive Debug | CWMS_ | HOME Direct | tory N | lodel Directories |
| General Sys | tem Properties 1 | Threads | Plug-ins | C | ompute Colors |
| Normal Messages: | black | | | | • |
| Warning Messages: | orange | | | | • |
| Error Messages: | red | | | | - |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | OK | | Cancel | Apply |

Figure B.4 Options Dialog - Compute Colors Tab

B.2.3 Specifying Debug Levels

Debug levels can be set for thirty-two components of HEC-RTS. These debug levels will control the amount of error messages that are written to the CAVI Console (DOS command) window. Some of the available debug levels are scripting, HEC-GridUtil, plot defaults, units, HEC-ResSim operations, map layers (maps), general watershed functions (rmiworkspace), data type factory, parameters, file locking, HEC-ResSim reports, and more. The default debug level is three.

To set debug levels:

- 1. On the **Tools** menu, click **Options**.
- 2. The **Options** dialog will open, click the **Debug Tab** (Figure B.5).
- 3. To set the level of debugging higher or lower than 3, change the value in the **DSS Debug Level** cell.
- 4. Once the debug levels have been set, click **OK**. The **Options** dialog will close.

| 膏 Options | | | | | | × |
|-------------|-----------|---|---------|---------------|------|------------------|
| General | Syste | System Properties Threads Plug-ins Compute Colo | | | | mpute Colors |
| CAVI Plug | j-ins | CWMS CAVI C | ptions | MetVue H | IMS | RAS Plugin |
| Email Conf | iguration | Archive Debu | g CWMS_ | HOME Director | / M | odel Directories |
| DSS Debug l | _evel: | | | | | 3 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | Analu |
| | | | OK | Ca | ncel | Apply |

Figure B.5 Options Dialog – Debug Tab

B.2.4 Setting General Options

From the **General Tab** on the **Options** dialog box accessed from the **Tools** menu, options can be turned "off and on". By default, HEC-RTS will automatically save the project on exit, restore

layout, show tooltips, and cascade internal windows. It is possible to turn these options off. Additional options that are available include loading last watershed at startup, show startup screen, sync project tree to map window, and setting the watershed save interval.

To turn these options "off":

- 1. On the **Tools** menu, click **Options**.
- 2. The **Options** dialog will open. Click the **General Tab** (Figure B.6).
- 3. Click one of the option boxes to clear the check mark, thus turning off the option.
- 4. Click **OK** to save the changes and close the **Options** dialog.

By default the following options are turned off in HEC-RTS: load last watershed at startup, show startup screen, and sync project tree to map.

To turn an option "on":

- 1. On the **Tools** menu, click **Options**.
- 2. The **Options** dialog will open. Click the **General Tab** (Figure B.6).
- 3. Click one of the option boxes to set the checkmark, thus turning on the option.
- 4. Once the options have been specified, click **OK**. The **Options** dialog will close and the changes will be saved.

| Options | | | | | | |
|--------------------------|---|---|------------|--------|-------------------|--|
| CAVI Plug-ins | CWMS CAVI O | | MetVue | HMS | RAS Plugin | |
| Email Configuration | Archive Debug | | HOME Direc | | Model Directories | |
| General Syst | System Properties Threads Plug-ins Compute Colors | | | | | |
| Load Last Waters | hed at startup | | | | | |
| Show Startup Scre | en | | | | | |
| Automatically Save | Project on Exit | | | | | |
| Restore Layout | | | | | | |
| Sync Project Tree | to Map Window | | | | | |
| Watershed Save Inter | /al (in minutes): | | | | 0 | |
| 🔽 Show Tooltips | | | | | | |
| Cascade Internal Windows | | | | | | |
| | | | | | | |
| | | 0 | | Cancel | Apply | |

Figure B.6 Options Dialog – General Tab

APPENDIX C Setting Up the Coordinate System

HEC-RTS has introduced "on-the-fly" coordinate system transformation to the CAVI and related programs. This allows the CAVI to display map layers that were created in different coordinate systems in a unified view. For example, a watershed can be displayed with background maps from Internet sources such as Google Maps and Open Street Map. This feature works correctly only if a geo-referenced coordinate system is defined for the watershed and include a coordinate system definition (*.*prj* file or equivalent) for each map layer included in the watershed.

The positions of elements in the watershed's primary layers (Time Series Icons, Stream Alignment, and Study layers) are stored in the watershed coordinate system. The watershed's coordinate system can be set when creating a new watershed or change the coordinate system after the watershed has been created. This superimposes a grid on layer features to establish x-and y-coordinates in the World Coordinate System (WCS) for each point on the layer. The x-coordinate is referred to as "easting" and the y-coordinate is referred to as "northing" following customary use in surveying and mapping. The user can select the extent of this grid, the units of measurement of the grid, and even the location of the origin of the grid. This appendix focuses on how to setup and edit different coordinate systems.

C.1 Geographic Referencing

To maintain a geographic reference, a coordinate system must be specified for each watershed. To establish the grid size and coordinate system:

- 1. On the Maps menu, click Default Properties Map; the dialog will open (Figure C.1).
- 2. The information in the **Default Map Properties** dialog box includes:
- **Coordinate System:** this box identifies the established coordinate system for a watershed. To edit the coordinate system, click **Edit**.
- Extents Easting Minimum, Maximum, Northing Min, and **Max.** These values indicate the location of the left, top, right, and bottom borders of the grid in the display area. When "Zoom to All" is used from the Maps menu, the displayed map extents expand to include the full area enclosed by these coordinates.
- Set Map Extents to Display. When this button is clicked, HEC-RTS sets the geographic extents to match the display area.
- **Grow to Map Extents.** When this check box is selected, HEC-RTS automatically sets the geographic extents to define the smallest rectangle that encompasses all the objects in the workspace.

| 📻 Default I | P Default Map Properties for North Branch v607 | | | | | | |
|-------------|---|-------------|-----------|----------|------|--|--|
| Map Extent | Map Extents Default Map Layers | | | | | | |
| c | oordinate Syst | tem: Custom | | Edit | | | |
| E | Extents: | | | | | | |
| | Easting: | | Northing: | | | | |
| | Minimum: | -1000 | Min: | -1000 | | | |
| | Maximum: | 1000 | Max: | 1000 | | | |
| | Set Map Extents to Display Grow to Map Extents | | | | | | |
| | | ОК | C | ancel Ar | oply | | |

Figure C.1 Default Map Properties Dialog

Note that the geographic extents of the layers must be selected carefully to ensure that the entire watershed is included. In HEC-RTS, it's no longer necessary that all map layers be in the same coordinate system.

HEC-RTS can transform coordinates "on-the-fly" if their coordinate systems are defined properly in ways that the program can read, for example an ESRI projection (*.prj) file. Therefore, the use of GIS tools may be needed to identify or transform the layers from one coordinate system to another before using them with HEC-RTS. Although HEC-RTS has the ability to project different coordinate systems "on the fly," using a consistent coordinate system may produce more accurate placement of map elements and may result in better performance in displaying large maps.

C.2 Coordinate System Types

A **coordinate system** is a method of representing points in a space of given dimensions by coordinates. There are several different types of coordinate systems; including geographic coordinate systems, which are based on latitude and longitude coordinates, and projected coordinate systems, which represent the projection of a geographic coordinate system on a plane and use linear measures (like feet or meters) for coordinates.

The coordinate systems available in HEC-RTS are shown in Table C.1. This table also shows the units required for each coordinate system.

A **spheroid** (ellipsoid) is the shape of the earth used in the calculations that transform positions on the curved surface of the earth to positions on a flat map. It is part of the horizontal datum, which approximates the curved surface of the earth over part of the globe.

| Coordinate Systems | Units |
|-------------------------------|---|
| Х-Ү | Linear units (feet or meters) |
| Geographic | angular units (radians, degrees of arc, or seconds) |
| Universal Transverse Mercator | Linear units (feet or meters) |
| State Plane Coordinates | Linear units (feet or meters) |
| Albers Equal-Area Conic | Linear units (feet or meters) |
| Lambert Conformal Conic | Linear units (feet or meters) |
| Transverse Mercator | Linear units (feet or meters) |
| Albers Equal-Area Conic (SHG) | Linear units (feet or meters) |
| Polar Sterographic (HRAP) | Linear units (feet or meters) |

Table C.1 Coordinate Systems Available in HEC-RTS

C.2.1 X-Y Coordinate System

The label "X-Y" can be applied to a coordinate system that is either not geo-referenced or for which the geo-referencing method is unknown. When the "X-Y" coordinate system is selected, the CAVI cannot project maps to the watershed's coordinate system.

To set parameters for the X-Y Coordinate System:

- 1. On the Maps menu, click Map Default Properties, and the dialog will open (Figure C.1).
- 2. Click Edit, and the Map Coordinate Information dialog will open (Figure C.2).
- 3. From the **System** list, select **X-Y**.
- 4. From the **Units** list, select the units for the X-Y coordinate system.
- Click OK, and the Map Coordinate Information dialog will close, and the program will return to the Default Map Properties dialog box. In the Coordinate System cell, *X-Y* should be displayed.

| 📻 Map Co | Map Coordinate Information | | | | | |
|----------|----------------------------|-----------|--|--|--|--|
| Map Coo | rdinate Information | | | | | |
| System: | Х-Ү | • | | | | |
| Units: | U.S. Feet | | | | | |
| | | | | | | |
| | | | | | | |
| Load fro | om file | OK Cancel | | | | |

Figure C.2 X-Y Coordinate System

C.2.2 Geographic Coordinate System

To set parameters for the Geographic Coordinate System:

- 1. On the Maps menu, click Default Map Properties, and the dialog will open (Figure C.1).
- 2. Click Edit, and the Map Coordinate Information dialog will open (Figure C.3).

| 📻 Map Coordinate Information 📃 | | | | | |
|--------------------------------|--------------------|--|--|--|--|
| Map Coordinate Information | | | | | |
| System: | Geographic 🔹 | | | | |
| Units: | Radians | | | | |
| Spheroid: | Clarke 1866(NAD27) | | | | |
| | | | | | |
| | | | | | |
| Load from file OK Cance | | | | | |

Figure C.3 Geographic Coordinate System

- 3. From the System list, select Geographic.
- 4. From the **Units** list, select the units for the Geographic coordinate system. The only units available should be **Radians**, **Degrees of Arc**, and **Seconds of Arc**.
- 5. From the **Spheroid** list, select a spheroid type for the Geographic coordinate system. (The "Sphere of Radius 6371200 meters" should only be used with the HRAP grid coordinate system.)
- 6. Click **OK**, and the **Map Coordinate Information** dialog will close, and the program will return to the **Default Map Properties** dialog. In the **Coordinate System** cell, *Geographic* should be displayed.

C.2.3 Universal Transverse Mercator Coordinate System

The Universal Transverse Mercator (UTM) coordinate system is a projected coordinate system. UTM is used to define horizontal positions throughout the world by dividing the surface of the Earth into six-degree zones, with a central meridian in the center of each zone.

To set parameters for the Universal Transverse Mercator Coordinate System:

- 1. On the Maps menu, click Default Map Properties, and the dialog will open.
- 2. Click Edit, and the Map Coordinate Information dialog will open (Figure C.4).
- 3. From the System list, select Universal Transverse Mercator.
- 4. From the **Units** list, select the units for the Universal Transverse Mercator coordinate system.
- 5. From the **Spheroid** list, select a spheroid type for the Universal Transverse Mercator coordinate system.
- 6. In the **UTM Zone** box, enter the UTM zone number. To use a UTM zone in the southern hemisphere, enter a negative value for the zone number.
- 7. Click **OK**, and the **Map Coordinate Information** dialog box will close. The program will return to the **Default Map Properties** dialog box. In the **Coordinate System** box, *Universal Transverse Mercator* should be displayed.

| 🚰 Map Coordinate Information | | | | |
|------------------------------|-------------------------------|--|--|--|
| Map Coord | tinate Information | | | |
| System: | Universal Transverse Mercator | | | |
| Units: | U.S. Feet 🔹 | | | |
| Spheroid: | Clarke 1866(NAD27) | | | |
| UTM Zone: | | | | |
| | | | | |
| Load from | n file OK Cancel | | | |

Figure C.4 Universal Transverse Mercator Coordinate System

C.2.4 State Plane Coordinate System

The State Plane Coordinate System (SPCS) was established in the 1930's and now covers all fifty states. Zones were established for each state using either the Lambert Conformal or Traverse Mercator projections. Units are generally in feet (NAD27) or meters (NAD83).

To set parameters for the State Plane Coordinate System:

1. On the Maps menu, click Default Map Properties, and the dialog will open.

- 2. Click Edit, and the Map Coordinate Information dialog box will open (Figure C.5).
- 3. From the **System** list, select **State Plane Coordinates**.
- 4. In the **Zone** box, enter the FIPS code for the state plane zone.
- 5. Click **OK**, and the **Map Coordinate Information** dialog box will close. The program will return to the **Default Map Properties** dialog box. In the Coordinate System box, *State Plane Coordinates* should be displayed.

| 📻 Map Coordinate Information | | | | |
|------------------------------|-------------------------|-----------|--|--|
| Map Coo | ordinate Information | | | |
| System: | State Plane Coordinates | | | |
| Zone: | | | | |
| | | | | |
| | | | | |
| Load fro | om file | OK Cancel | | |

Figure C.5 State Plane Coordinate System

C.2.5 Albers Equal-Area Conic Coordinate System

The Albers Equal-Area Conic projection is used by several federal government agencies for maps of the conterminous 48 states. HEC uses an Albers projection for the definition of the Standard Hydrologic Grid (see Section C.2.8). The equal area property of this projection means that areas in the map are proportional to the corresponding areas on the earth's surface.

Directions and shapes distort increasingly away from the central meridian and outside the two standard parallels.

To set parameters for the Albers Equal-Area Conic Coordinate System:

- 1. On the Maps menu, click Map Default Properties, and the dialog box will open.
- 2. Click Edit, and the Map Coordinate Information dialog box will open (Figure C.6).

| 📻 Map Coordinate Information | | | | | x | | |
|---|-----------------------------------|---|---|----|---|--------|---|
| Map Coordinate Information | | | | | | | |
| System: | System: Albers Equal-Area Conic 🔹 | | | - | | | |
| Units: U.S. Feet | | | | • | | | |
| Spheroid: | Clarke 1866(NAD27) | | | | | | - |
| Latitude o | of the first standard parallel: | Ν | d | | 1 | | |
| Latitude of the second standard parallel: | | Ν | d | | 1 | | |
| Longitude of the central meridian: | | E | d | | 1 | | |
| Latitude of the projection origin: | | Ν | d | | 1 | | |
| False easting: | | | | | | | |
| False northing: | | | | | | | |
| | | | | | | | |
| Load from file | | | | ОК | | Cancel | |

Figure C.6 Albers Equal-Area Conic Coordinate System

- 3. From the System list, select Albers Equal-Area Conic.
- 4. From the **Units** list, select the units for the Albers Equal-Area Conic coordinate system.
- 5. From the **Spheroid** list, select a spheroid type for the Albers EqualArea Conic coordinate system.
- 6. The remaining items to be entered are the angular parameters that are required to fine-tune the projection. When specifying latitudes enter **N** or **S**, and for longitudes, enter **E** or **W**. Use the tab key to toggle between the entries.
- Click OK to save the changes and close the Map Coordinate Information dialog box. The Default Map Properties dialog box will display *Albers Equal-Area Conic* as the Coordinate System.

C.2.6 Lambert Conformal Conic Coordinate System

The Lambert Conformal Conic projection is used extensively for mapping areas of the world with predominantly east-west orientation. It is similar to the Albers Equal-Conic projection, but the projection is not done in an equal-area.

To set parameters for the Lambert Conformal Conic Coordinate System:

- 1. On the Maps menu, click Default Map Properties, and the dialog box will open.
- 2. Click Edit, and the Map Coordinate Information dialog box will open (Figure C.7).
- 3. From the **System** list, select **Lambert Conformal Conic**.

- 4. From the Units list, select the units for the Lambert Conformal Conic coordinate system.
- 5. From the **Spheroid** list, select a spheroid type for the Lambert Conformal Conic coordinate system.
- 6. When specifying latitudes enter N or S, and for longitudes, enter E or W. Use the tab key to toggle between the entries.
- Click OK to save the changes and close the Map Coordinate Information dialog box. The Default Map Properties dialog box will display *Lambert Conformal Conic* as the Coordinate System.

| 📻 Map Coordinate Information | | | | | |
|------------------------------------|---|---|---|-------|--------|
| Map Coordinate Information | | | | | |
| System: | Lambert Conformal Conic | | | - | |
| Units: | Jnits: U.S. Feet | | | - | |
| Spheroid: | Spheroid: Clarke 1866(NAD27) | | | | • |
| Latitude o | Latitude of the first standard parallel: | | d | · · · | • |
| Latitude o | Latitude of the second standard parallel: | | d | | |
| Longitude | Longitude of the central meridian: | | d | | |
| Latitude of the projection origin: | | N | d | | |
| False easting: | | | | | |
| False northing: | | | | | |
| Load from file | | | | ОК | Cancel |

Figure C.7 Lambert Conformal Conic Coordinate System

C.2.7 Transverse Mercator Coordinate System

The Transverse Mercator projection is where a sphere is projected onto a cylinder tangent to a central meridian. It is similar to the Lambert Conformal Conic project but is used to portray large areas in a north-south orientation. Many national grid systems are based on the Transverse Mercator projection.

To set parameters for the Transverse Mercator Coordinate System:

- 1. On the Maps menu, click Default Map Properties, and the dialog will open.
- 2. Click Edit, and the Map Coordinate Information dialog will open (Figure C.8).
- 3. From the **System** list, select **Transverse Mercator**.
- 4. From the **Units** list, select the units for the Transverse Mercator coordinate system.
- 5. From the **Spheroid** list, select a spheroid type for the Transverse Mercator coordinate system.

- 6. Enter a scaling factor for central meridian, in the Scale factor at central meridian cell.
- 7. When specifying latitudes enter N or S, and for longitudes, enter E or W. Use the tab key to toggle between the entries.
- 8. Click **OK** to save the changes and close the **Map Coordinate Information** dialog box. The **Default Map Properties** dialog box will display *Transverse Mercator* as the Coordinate System.

| 🚰 Map Coordinate Information | | | | |
|------------------------------------|---------------------|-----------|--|--|
| Map Coordinate Information | | | | |
| System: | Transverse Mercator | | | |
| Units: | U.S. Feet | • | | |
| Spheroid: | Clarke 1866(NAD27) | • | | |
| Scale factor at central meridian: | | | | |
| Longitude of the central meridian: | | E d ' " | | |
| Latitude of the projection origin: | | N d | | |
| False easting: | | | | |
| False northing: | | | | |
| | | | | |
| Load from | ı file | OK Cancel | | |

Figure C.8 Transverse Mercator Coordinate System

C.2.8 Albers Equal-Area Conic (SHG) Coordinate System

This is a special case of the Albers Equal-Area Conic coordinate system. The projection parameters are set to match USGS 48-state maps, which are used for several common data sources including precipitation data on the Standard Hydrologic Grid. If this option is selected for the coordinate system, all parameter fields will be filled in the editor. This coordinate system is also used by USACE's MMC, but with units of US Feet instead of meters. The watershed can be quickly set to MMC's coordinate system by selecting the SHG system and then switching the units to "US Feet".

To use the parameters for the Albers Equal-Area Conic (SHG) Coordinate System:

- 1. On the Maps menu, click Default Map Properties, and the dialog box will open.
- 2. Click Edit, and the Map Coordinate Information dialog box will open (Figure C.9).

| r Map Coordinate Information | | | | | | | | |
|------------------------------|----------------------------------|---|----|---|----|---|------|----|
| Map Coord | dinate Information | | | | | | | |
| System: | Albers Equal-Area Conic (SHG) | | | | | | | • |
| Units: | Meters | | | | | | | • |
| Spheroid: | GRS 1980(NAD83) | | | | | | | • |
| Latitude | of the first standard parallel: | Ν | 29 | d | 30 | 1 | 0 | 2 |
| Latitude | of the second standard parallel: | Ν | 45 | d | 30 | 1 | 0 | • |
| Longitud | e of the central meridian: | W | 96 | d | 0 | 1 | 0 | ÷ |
| Latitude | of the projection origin: | Ν | 23 | d | 0 | 1 | 0 | • |
| False ea | sting: | | | | | | | 0 |
| False no | rthing: | | | | | | | 0 |
| | | | | | | | | |
| Load from | n file | | | | OK | | Cano | el |

Figure C.9 Albers Equal-Area Conic (SHG) Coordinate System

- 3. From the System list, select Albers Equal-Area Conic (SHG).
- 4. From the **Units** list, select the units for the Albers Equal-Area Conic (SHG) coordinate system.
- 5. From the **Spheroid** list (Figure C.9), select a spheroid type for the **Albers Equal-Area Conic** (**SHG**) coordinate system.
- 6. The remaining parameters are informational and are not editable.
- 7. Click **OK** to save the changes and close the **Map Coordinate Information** dialog box. The **Default Map Properties** dialog box will display *Albers Equal-Area Conic* as the Coordinate System. Note that the (SHG) label is not part of the displayed coordinate system name, and that if the editor is re-opened all parameters of the projection will be editable.

C.2.9 Polar Stereographic (HRAP) Coordinate System

The Hydrologic Rainfall Analysis Project grid is used by the US National Weather Service for a variety of precipitation products. The row and column numbers in the grid are based on a Polar Stereographic projection of the northern hemisphere. The parameters are set to match NWS map coordinates used for radar grids, so <u>do not change any parameter settings</u>.

To use the parameters for the Polar Stereographic (HRAP) Coordinate System:

- 1. On the Maps menu, click Default Map Properties, and the dialog box will open.
- 2. Click Edit, and the Map Coordinate Information dialog box will open (Figure C.10).

| 📻 Map Coordinate Information | | | | | |
|---|----------------------------|--------------|---------|--|--|
| Map Coord | Map Coordinate Information | | | | |
| System: | Polar Stereographic (| HRAP) | • | | |
| Units: | Meters | | • | | |
| Spheroid: | Sphere of Radius 637 | 71200 Meters | • | | |
| Axis Semi-major: 6371200 Semi-minor: 6371200 | | | | | |
| Central M | eridian: | W 105 d 0 ' | 0 " | | |
| Latitude o | f true scale: | N 60 d 0 ' | 0 | | |
| False eas | sting: | | 1905000 | | |
| False nor | thing: | | 7620000 | | |
| Load from | n file | ОК | Cancel | | |

Figure C.10 Polar Stereographic (HRAP) Coordinate System

- 3. From the System list, select Polar Stereographic (HRAP).
- 4. For Version 3.0, ignore the items in the Axis box; this will be removed from this dialog box in a later version of HEC-RTS.
- 5. The remaining parameters are informational and are not editable.
- 6. Click **OK** to save the changes and close the **Map Coordinate Information** dialog box. The **Default Map Properties** dialog box will display *Polar Stereographic (HRAP)* as the Coordinate System.

APPENDIX D

Using Map Editors

There are 10 map layer formats supported by HEC-RTS, and the different map layers are described in Section 5.2 of this manual. In HEC-RTS several options can be configured for each type of map layer, except for AutoCAD® DXF files. Additional customization is in development for future versions of the software.

To access the map layers editor, from the **Maps** menu, click **Map Layers**. The **Map Layers** editor will open (Figure D.1). From the **Layer Tree** either double-click on a map layer name, or right-click on a map layer name and click **Properties** from the shortcut menu. An editor specific to the type of map layer selected will open.

| 🚰 Map Layers | |
|--|-----------|
| Layers Edit View | |
| Currently Opened Maps | |
| Setup | |
| Modeling | |
| Acquisition | |
| Visualization | |
| Map Layers Map Layers Stream Alignment Study Map Layers Study Map Layers Study Map Layers Study Map Layers Study Map Layers Map Layers M | |
| | OK Cancel |

Figure D.1 Map Layers Editor

D.1 ArcGIS® Shapefiles (.shp)

Shapefiles store non-topological geometry and attribute information for geo-referenced points, lines, or polygons. The format is native to ESRI's ArcGIS programs. Vector GIS layers can be exported from ArcGIS databases to shapefiles for display in HEC-RTS watersheds.

To edit the display properties of a line, polygon, or point shapefile:

- 1. From the **Layer Tree** (Figure D.1), right-click on an ArcGIS® shapefile from the shortcut menu and click **Properties** or double-click on the ArcGIS® shapefile filename.
- 2. If the shapefile chosen is a polygon, the **Edit Polygon Properties** dialog will open (Figure D.2).
- 3. Across the top of the dialog is displayed the location and name of the shapefile.

To edit properties of an ArcGIS® shapefile:

- 1. Click the **Fill** tab of the **Edit Polygon Properties** dialog (Figure D.2).
- 2. The **Draw Features using** option allows for selection of how the feature will be drawn, either using **One Fill** or the **Attribute Values**. If Attribute Values is selected, this option will associate the **Field for values** from the shapefile to a color and label. In Figure D.2, *AREA* has been selected, which displays the value of the *AREA* in the shapefile as blue to red gradations.
- 3. By default, the shapefile will display lines and areas (polygons). To turn off the fill, clear the **Display Fill** cell.
- 4. To change the style of line or polygon areas use the **Style** selection list
- 5. To classify the values in the **Field for values** check the **Use Gradations** cell and specify the number of classes. This will group the values in the **Field for values** into the range of classes specified.
- 6. The **Transparency** bar controls to what level the transparency of the shapefile will be displayed.
- 7. The properties of the color editor are discussed in detail in Appendix E. From the color palette, select a color. If the feature is being drawn using an attribute value, select a color for the start and end value.

| 📻 Edit Polygon Properties | | | | |
|---|-------------------------|-------|--|--|
| C:/Users/srahimi/Desktop/North_Branch_v607/maps/np_shed.shp | | | | |
| Fill Border Labels | | | | |
| Draw Features using: | | | | |
| Attribute Values | | | | |
| 🔽 Display Fill | | | | |
| Field for values AREA | | - | | |
| Style | | • | | |
| | | | | |
| Vise Gradations | | 5 🌲 | | |
| Transparency | | | | |
| | | 25 | | |
| Color | | | | |
| Start blue | | - | | |
| End red | | • | | |
| Color | Value | | | |
| | 7.0098232E7 - 9.7267304 | | | |
| 1.16555768E8 - 1.26398352E8 1.485704E8 - 1.88421696E8 | | | | |
| 2.02799216E8 - 2.7108768E8 | | | | |
| 3.79840544E8 - 3.79840544E8 | | | | |
| | | | | |
| | K Cancel | Apply | | |

Figure D.2 Edit Polygon Properties dialog – Fill Tab

- 8. Click **Apply**, and the color for the selected field will appear in the display area. Click **OK**, and the **Edit Polygon Properties** dialog will close.
- 9. To save any changes, from the **File** menu, choose **Save Watershed**. Changes are saved to a file with the extension *.*gdr*. For example, if the shapefile name is *subbasin.shp*, and changes have been made and saved, a file *subbasin.gdr* will be created.

To change the border color, style and weight of the ArcGIS® shapefile:

- 1. Click the Border tab of the Edit Polygon Properties dialog (Figure D.3).
- 2. The border display setting can be changed in this dialog.

| 📻 Edit Polygon Properties 🛛 🔍 | |
|---|--|
| C:/Users/srahimi/Desktop/North_Branch_v607/maps/np_shed.shp | |
| Fill Border Labels | |
| Display Border | |
| Color black | |
| Style | |
| Weight | |
| | |
| | |
| OK Cancel Apply | |

Figure D.3 Edit Polygon Properties dialog – Border Tab

To format the labels of the ArcGIS® shapefile:

1. Click the Label tab of the Edit Polygon Properties dialog (Figure D.4).

| 📻 Edit Poly | gon Properties | × |
|--------------|---|-------------|
| C:/Users/sra | ahimi/Desktop/North_Branch_v607/maps/nj | o_shed.shp |
| Fill Border | r Labels | |
| Label feat | tures using: | |
| AREA | | • |
| | | |
| | AaBbCc 123 | |
| Font Sans | sSerif | - |
| Bold | Sample text | |
| Italic | AaBbCc 123 | |
| Size | | |
| | | 12 |
| Placemen | nt | |
| Position: | EAST | ▼ |
| | 0 | |
| Rotation | 0 90 180 | 270 360 |
| | | |
| | ОК Са | Incel Apply |

Figure D.4 Edit Polygon Properties dialog – Labels Tab

- 2. To display labels associated with the shapefile, click on the **Label features using** drop down window and choose the attribute field which the labeling will be based on.
- 3. The Font, Size, and Placement of the label can be changed in this window.

D.2 USGS Digital Line Graph (.dlg)

This layer type is a vector representation of the data. When HEC-RTS interacts with a *dlg* file it automatically creates a *dlgbin* file for use.

To edit a USGS Digital Line Graph file:

- 1. From the **Layer Tree** (Figure D.1), right-click on a USGS Digital Line Graph file. From the shortcut menu, click **Properties**, or double-click on the USGS Digital Line Graph filename.
- 2. The USGS Digital Line Graph Editor will open (Figure D.5).
- 3. Across the top of the dialog is displayed the location and name of the USGS Digital Line Graph file.

| 📻 USGS Digital Line Graph Editor |
|---|
| C:/CWMS_2x/watershed/Bald_Eagle_2.0/maps/hydro.dlgbin |
| Properties Scale |
| Default Color: Draw Nodes Draw Lines Draw Areas Octuation (0.4) |
| Saturation (0-1): |
| Brightness (0-1): 1 |
| |
| OK Cancel Apply |

Figure D.5 USGS Digital Line Graph Editor – Properties Tab

- 4. The appearance of nodes, line, and areas can be controlled by selecting and clearing **Draw Nodes**, **Draw Lines**, and **Draw Areas**, respectively (Figure D.5).
- 5. The saturation and brightness level of the selected color can be controlled by entering values in the **Saturation** or **Brightness** cells. Values entered for saturation or brightness must be between zero (0) and one (1).
- 6. To save any changes, from the **File** menu of the CAVI Main Window, choose **Save Watershed**. The color for a USGS digital line graph file is stored in the watershed file (*.*wtshd*).

To set scaling for a USGS Digital Line Graph:

1. Click the Scale tab of the USGS Digital Line Graph Editor (Figure D.6).

2. Both zoom-in and zoom-out scale factors can be set. By default the digital line graph layer is set for **Always show layer**. To set visualization scales click **Only show layer in the following scale range**.

| USGS Digital Line Graph Editor C:/CWMS_2x/watershed/Bald_Eagl Properties Scale | e_2.0/maps/hydro.dlgbin | | |
|--|-------------------------|--|--|
| Always show layer Only show layer in the following | g scale range | | |
| Only visible below 1: | Set to Current | | |
| Only visible above 1: | Set to Current | | |
| Current Scale 1 : 1166505 | | | |
| OK Cancel Apply | | | |

Figure D.6 USGS Digital Line Graph Editor – Scale Tab

- 3. To set the scale so that the digital line graph layer becomes visible while zooming in, the scale can be set to the current scale by clicking **Set to Current**. To enter a value, from the **Only visible below 1:** cell enter the scale factor.
- 4. To set the scale so that the digital line graph layer becomes visible while zooming out, the scale can be set to the current scale by clicking **Set to Current**. To enter a value, from the **Only visible above 1:** cell enter the scale factor.
- 5. Click **OK**, the **USGS Digital Line Graph Editor** will close (Figure D.6), and the visualization scale is set for the digital line graph layer.
- 6. Click **OK**, the **Map Layers** editor closes (Figure D.1).

D.3 Elevation Options Dialog

For the other map layer formats – USGS DEM, ASCII NetTin, and ArcGIS® DEM; they all have the same editor, the **Elevation Options** dialog.

To edit an ASCII NetTin file:

- 1. From the **Layer Tree**, right-click on an ASCII NetTin file. From the shortcut menu, click **Properties**, or double-click on the ASCII NetTin name.
- 2. The Elevation Options dialog will open (Figure D.7).
- 3. Across the top of the dialog, is displayed the name of the ASCII NetTin file.

| F Elevation Options | × |
|---|--|
| sw2yr02ha_ams.ascbin | |
| Properties Scale | |
| Terrain | Scale |
| Draw Edges | 1,852 |
| Contour Limits | 1,732 |
| Tic Interval() II.0 System Specified Min/Max Values | 1,612 |
| Maximum() 1868.0 Minimum() 177 | 2.0 1,492 |
| Brightness (0.0-1.0) | 1,552 1,492 1,432 1,372 1,0 1,252 0,0 1,132 1,192 1,192 |
| Saturation (0.0-1.0) | 1,312 |
| Transparency (0.0-1.0) | 0.0 1,192 |
| ✓ Aspect Shading | 1,132 |
| | 60.0 1,012 952 |
| Adjust Color Scale to Clipping Area | 60.0 952 892 832 772 |
| | 772 |
| Maximum Clipping | 712 |
| | 68.0 592 532 |
| Color | 472 |
| Minimum Clipping | 72.0 73.0 73.0 73.0 73.0 75.0 |
| | 72.0 292 232 172 |
| Color | 172 |
| ОК | Cancel Apply |

Figure D.7 Elevation Options Dialog - Properties Tab

To edit properties of an ASCII NetTin file:

- 1. Click the **Properties** tab of the **Elevation Options** dialog (Figure D.7).
- 2. From the dropdown list, there are available color contour schemes Aspect Shading, Grayscale, Linear, Precipitation, Red-GreenBlue, and Terrain (default).
- 3. The **Draw Edges** check box is specifically for ASCII NetTin files. If selected, the edges of the triangles that make up an ASCII NetTin file will be drawn.
- 4. The contour tic interval can be set by entering a value in the **Tic Interval** cell. The program sets the maximum and minimum limits of the contours automatically. The user can set their own maximum and minimum limits. Clear **System Specified Min/Max Values**, the **Maximum** and **Minimum** cells (Figure D.7) are now available to enter values.
- 5. The brightness (amount of white), saturation (amount of black), and transparency (level of opacity or alpha) for the colors can be controlled. The values can be adjusted by using the **Brightness**, **Saturation**, and **Transparency** slider bars or cells.
- 6. By default the **Aspect Shading** option is on, aspect shading is where the map layer is made to appear in relief by placing an imaginary light source above the map and shading the contours. The angle of the light source can be adjusted by using the **Angle** slider bar or the cell. If aspect shading is not wanted, clear **Aspect Shading**.
- 7. Clipping provides a way to highlight an area based on color choices and values. For maximum clipping, fill the contour with the clip color from the maximum value of the map to the value entered for **Maximum Clipping**. An example of where maximum clipping might be used would be smog levels, cloud cover, or snow level at a particular

elevation. By default, maximum clipping is turned off, to select click **Maximum Clipping**. Then either enter a maximum clipping value by using the slider bar or enter a value in the cell. The **Maximum Clipping** color can also be set. Click **Color**, the **Color Chooser** will open (see Appendix E for more on the color chooser). From the color palette, select a color, click **OK**. The **Color Chooser** will close and the selected color will now appear on the **Color** button and at the top of the **Scale** (Figure D.7).

8. Minimum clipping will fill the contour with the clip color from the minimum value of the map to the value entered for Minimum Clipping. An example of where minimum clipping might be used would be to see where a water level would be if it flooded to a particular elevation. By default, minimum clipping is turned off, to select click Minimum Clipping. Then either enter a minimum clipping value by using the slider bar or enter a value in the cell. The Minimum Clipping color can also be set. Click Color and the Color Chooser will open (see Appendix E for more on the color chooser). From the color palette, select a color, and click OK. The Color Chooser will close and the selected color will now appear on the Color button and at the bottom of the Scale (Figure D.7).

To set scaling for an ASCII NetTin file:

1. Click the Scale tab of the Elevation Options dialog (Figure D.8).

| 📻 Elevation Options | |
|--|----------------------|
| | sw2yr02ha_ams.ascbin |
| Properties Scale | |
| Always show layer | |
| Only show layer in the following scale | range |
| Only visible below 1: | Set to Current |
| Only visible above 1: | Set to Current |
| Current Scale 1 : 7149208 | |
| | |
| | OK Cancel Apply |

Figure D.8 Elevation Options dialog - Scale Tab

- 2. Both zoom-in and zoom-out scale factors can be set. By default the ASCII NetTin layer is set for Always show layer. To set visualization scales click Only show layer in the following scale range.
- 3. To set the scale so that the ASCII NetTin layer becomes visible while zooming in, set the scale to the current scale by clicking **Set to Current**. To enter a value, from the **Only visible below 1:** cell enter the scale factor.
- 4. To set the scale so that the ASCII NetTin layer becomes visible while zooming out, set the scale to the current scale by clicking **Set to Current**. To enter a value, from the **Only visible above 1:** cell enter the scale factor.

- 5. Click **OK**, the **Elevation Options** dialog will close (Figure D.8), and the visualization scale is set for the ASCII NetTin layer.
- 6. Click **OK**, and the **Map Layers** editor closes (Figure D.1).

APPENDIX E

Using Color Chooser

The **Color Chooser** window (Figure E.1) affords great flexibility when needing to select default colors for map layers, labels, and background colors in the watershed display. The **Color Chooser** window has three tabs: **Swatches**, **HSB**, and **RGBA**, offering three methods for choosing a color. For each method, the preview area allows the user to see their choice before applying changes.

| 📻 Color Chooser | |
|---|--|
| Swatches HSB RGBA | |
| | |
| Image: Construction of the construc | |
| Preview Sample Text Sample Text Sample Text Sample Text Sample Text Sample Text Sample Text Sample Text | |
| OK Cancel Reset | |

Figure E.1 Color Chooser – Swatches Tab

E.1 Swatches Tab

The **Swatches** tab provides a palette of pre-defined colors. From the palette, select a color. Once a color has been selected, the **Recent** field displays that color, as also does the **Preview** field. Click **OK**, and the **Color Chooser** dialog will close. Depending on where the **Color Chooser** was accessed, click either **Apply** or **OK** for the color change to appear in the display area.

For example, for a stream alignment, the **Color Chooser** would have been accessed from the **Stream Alignment Properties** dialog. After selecting the color from the **Color Chooser** dialog

and clicking **OK**, click **OK** or **Apply** from the **Stream Alignment Properties** dialog. Then click **OK** from the **Map Layer** dialog for the color change to appear in the **Map Window**.

E.2 HSB Tab

HSB is the Hue, Saturation, and Brightness color model, which allows the user to set the hue, saturation, and brightness of the colors. From the **Color Chooser** window, select the **HSB** tab; and the **HSB** tab (Figure E.2) becomes available.

| 📻 Color Chooser | |
|-----------------|---|
| Swatches HSB RG | BA |
| | 0 217 0 100 0 86 217 0 0 82 219 |
| Preview | Sample Text Sample Text Sample Text Sample Text Sample Text Sample Text OK Cancel Reset |

Figure E.2 Color Chooser – HSB Tab

There are several ways to adjust the hue, saturation, value, and transparency of the colors. The slider bar, in conjunction with the **Hue**, **Saturation**, and **Brightness** options will change the selected color. Or a value can be entered directly for **Hue**, **Saturation**, and **Brightness** cells. The following rules apply to the values that can be entered for each cell:

- **Hue**: Hue is measured in a circle from zero (0) to 359 degrees as follows: 0 = red, 60 = yellow, 120 = green, 180 = cyan, 40 = blue, 300 = magenta.
- **Saturation**: Saturation is the amount of black measured from zero (0) to one hundred (100) percent.
- **Brightness**: Is a measurement of the brightness of a color measured from zero (0) to one hundred (100) percent. A value of zero (0) is considered black.

The final way to set a color on the **HSB** tab is from the color palette. Click and drag the crosshair symbol, which will automatically change the hue, saturation, and value, along with the red, green and blue color values.

Click **OK**, and the **Color Chooser** window will close. Depending on where the **Color Chooser** window was accessed from, click either **Apply** or **OK** for the color change to appear in the display area.

E.3 RGBA Tab

RGBA is the Red, Green, Blue, and Alpha color model, which allows the user to set the red, green, blue and alpha values of the colors. From the **Color Chooser** window, select the **RGBA** tab; and the **RGBA** tab (Figure E.3) becomes available.

| 📻 Color Chooser | |
|-----------------|---|
| Swatches HSB | RGBA |
| Red | 0 85 170 255 |
| Green | 0 85 170 255 |
| Blue | 0 85 170 255 |
| Alpha | 0 85 170 255 |
| Preview | Sample Text Sample Text Sample Text Sample Text Sample Text Sample Text |
| | OK Cancel Reset |

Figure E.3 Color Chooser – RGBA Tab

There are two ways to adjust the red, green, blue, and alpha value of colors. There is a slider bar for **Red**, **Green**, **Blue**, and **Alpha**. **Alpha** controls the opacity of the color. While changing the slider bar for each one, the color being produced is shown in the **Preview** field. Another way to affect the color is to directly enter a value in the **Red**, **Green**, **Blue**, and **Alpha** cells. Click **OK**, and the **Color Chooser** window will close. Depending on where the **Color Chooser** window was accessed from, click either **Apply** or **OK** for the color change to appear in the display area.

APPENDIX F

Using DSS-Vue

DSS-Vue (Data Storage System Visual Utility Engine) is a graphical user interface program for viewing, editing, and manipulating data in HEC-DSS files. With DSS-Vue, data may be plotted, tabulated, edited, and manipulated with over fifty mathematical functions. Along with these functions, DSS-Vue provides several utility functions, such as entering data sets into a database, renaming data set names, copying data sets to other database files, and deleting data sets.

In HEC-RTS, DSS-Vue will be used mainly as a viewing tool for data. This appendix will review some of the general functions in DSS-Vue (for further detail, see the HEC-DSSVue User's Manual).

F.1 HEC-Data Storage System Concepts

HEC-DSS is a database system that was designed to efficiently store and retrieve scientific data that is typically sequential. Such data types include, but are not limited to, time series data, curve data, spatial-oriented gridded data, textual data, and others. The system was designed to make it easy for users and application programs to retrieve and store data.

DSS data is stored in blocks, or records, within a file, and each record is identified by a unique name called a *pathname*. The **pathname** is formulated in a way that makes it easy to group related data together.

Software from HEC has the ability to read from and write to HEC-DSS (DSS) files. This capability facilitates data exchange among applications. For example, you could use HEC-ResSim to generate the time series data input for HEC-FIA. A pathname may consist of up to 391 characters and is, by convention, separated into six parts, which may be up to sixty-four characters each. Pathnames are automatically translated into all upper case characters. They are separated into six parts (delimited by slashes "/") labeled "A" through "F," as follows: /A/B/C/D/E/F/. Table F.1 provides an example naming convention for regular-interval time series. A typical regular-interval time series might be:

/RED RIVER/BEND MARINA/FLOW/01JAN1995/1DAY/OBS/

 Table F.1 DSS Pathname Parts

| Part | Description |
|------|---|
| А | Project, river, or basin name |
| В | Location |
| С | Data parameter (e.g., FLOW, PRECIP) |
| D | Starting date of block, in a 9 character military format (ddmmyyyy) |
| Е | Time interval |
| F | Additional user-defined descriptive information |

F.2 Overview of DSS-Vue in HEC-RTS

From the **Tools** menu, choose **HEC-DSS-Vue...**, and the **DSS-Vue** main window opens. The main window and the different components are illustrated in Figure F.1.

| athnames | Shown: 21 P | tershed/Russian_F athnames Selected: 1 | 60 Pathnames | sianRiver_Flowdata.dss in File: 742 File Size: 2.01 MB | File Inform | | x64 | |
|---------------------|------------------------|---|--------------|---|-------------------|--------|-------|--------------------|
| Search By Parts: | A: | | C: D: | • | E: | | • | Pathnam Filters |
| Number | Part A | Part B | Part C | Part D / range | Part E | Part F | | i inter s |
| vumber | | | | | | | _ | L. |
| | 1 RUSSIAN | CDM | FLOW | 310ct2012 - 30Mar2013 | IR-DAY | CDEC | | |
| | 2 RUSSIAN 3 RUSSIAN | CLV | FLOW | 28Dec1996 - 06Jan1997 | IR-MONTH 15MIN | CDEC | -111 | |
| | 4 RUSSIAN | CLV | FLOW | 310ct2012 - 30Mar2013 06Jan1995 - 02Jan2006 | 1HOUR | CDEC | -111 | |
| | 5 RUSSIAN | DGY | FLOW | 310ct2012 - 30Mar2013 | IR-DAY | CDEC | | |
| | 6 RUSSIAN | DRY | FLOW | 310ct2012 - 30Mar2013 | 15MIN | CDEC | -111 | |
| | 7 RUSSIAN | DRY | FLOW | 25Dec2005 - 02Jan2006 | 1HOUR | CDEC | -111 | |
| | 8 RUSSIAN | HAC | FLOW | 25Dec2005 - 02Jan2006 28Dec1996 - 06Jan1997 | IR-MONTH | CDEC | - 8 | |
| | 9 RUSSIAN | HAC | FLOW | 01Nov2012 - 30Mar2013 | IR-DAY | CDEC | -111 | Pathnan |
| | 10 RUSSIAN | HAC | FLOW | 06Jan1995 - 02Jan2006 | 1HOUR | CDEC | - 11 | Table |
| | 11 RUSSIAN | HEA | FLOW | 310ct2012 - 30Mar2013 | 15MIN | CDEC | | |
| | 12 RUSSIAN | HEA | FLOW | 06Jan1995 - 02Jan2006 | 1HOUR | CDEC | -111 | |
| | 13 RUSSIAN | HOP | FLOW | 28Dec1996 - 06Jan1997 | IR-MONTH | CDEC | -1.11 | |
| | 14 RUSSIAN | HOP | FLOW | 31Dec2012 - 30Mar2013 | IR-DAY | CDEC | | |
| | 15 RUSSIAN | HOP | FLOW | 01Nov2012 - 30Dec2012 | 15MIN | CDEC | - 1 | |
| | 16 RUSSIAN | HOP | FLOW | 06Jan1995 - 02Jan2006 | 1HOUR | CDEC | | |
| | 17 RUSSIAN | RRU | FLOW | 01Nov2012 - 30Mar2013 | IR-DAY | CDEC | - | |

Figure F.1 HEC-DSS-Vue Main Window

The **Menu Bar** contains the menus for the main window of DSS-Vue. The following list is a description of the available menus.

- File: This menu is used for file management and contains the following: New, Open..., Close DSS File(s), Print Catalog Preview, Print Catalog, a list of most *recently opened files*, and Close.
- Edit: This menu allows editing of data in a tabular format or graphically thru a graphical editor, and this menu also provides options for manipulating records in a DSS file: renaming records, deleting records, undeleting records, duplicating records, copying records to another DSS file, and merging of DSS files. Also, from this menu, it is possible to select all of the pathnames contained in the file. The menu contains the following commands: Tabular Edit, Graphical Edit, Select All, Rename Records, Delete Records, Undelete, Duplicate, Copy To, Merge (copy) into, and Edit in Excel.
- View: This menu provides options for viewing HEC-DSS pathnames. Available commands are: Pathname List, Pathname Parts, Condensed Catalog, No Pathnames, Unsorted List, Search by string, Search by parts, Refresh Catalog, Unit System, Time Zone, and Filter By Office/Groups.
- **Display:** After a pathname has been selected, this menu provides the ability to display the data for that pathname. Available commands are: **Plot**, **Plot Individual Data Sets**, **Tabulate**, **Display Data Options**, **Supplemental Information**, **Time Window**, **Charts** and **Tabulate in Excel**.
- Groups: This menu provides management and commands for groups of data. Available commands are: Save Selected, Get, Get (add to list), Plot, Plot Individual Sets, Tabulate, Math, and Manage.
- Data Entry: This menu provides options for entering and adding data. Available commands are: Manual Time Series, Manual Paired Data, Manual Text, Import, and Export.
- Tools: This menu provides access tools for math operations, comparisons, and scripts. Available commands are: Math Functions, Compare, Search for Value, Check File Integrity, Squeeze, Script Editor, and Script Selector.
- Advanced: This menu provides options for manipulating records in a DSS file. Available commands are: Condensed Disk Catalog, Abbreviated Disk Catalog, Full Disk Catalog, Output, Debug, Program Options, and Console Output.
- Help: Displays current version information about HEC-DSS-Vue.

The **Toolbar** (Figure F.1) contains buttons that provide the capability to open a DSS file, plot the data, edit the data in a table, edit the data from a graphical editor, and apply math functions to the data. These buttons provide a shortcut to the respective commands in the **Display** menu.



Open File Button – Opens an **Open HEC-DSS File** browser, which allows you to select a DSS file.

Plot Button – Plots the data of the selected pathname(s).

Tabulate Button – Displays the data of the selected pathname(s) in a tabular form.

Graphical Edit Button – Displays the data of the selected pathname(s) in a graphical editor.



Math Functions Button – Allows the user to perform math functions on the data of the selected pathname(s) from the **Math Functions** dialog.

The **File Information** panel (Figure F.1) displays the filename or database and path of the opened file/database, and statistics about the pathnames in the file and the size of the file or number of data sets in the HEC-DSS database.

| : er: | • • | Type: | | • | Duration: | | - |
|----------------|---|--|--|---|---|---|--|
| | • | Interval: | | | | | |
| n | | | | • | Version: | | • |
| | Parameter | | Туре | Interval | Duration | Version | |
| AN JACINTO | Flow | | Inst | 1Hour | 0 | OBS | |
| | Depth-Snow Water | Equivalent | Inst | 0 | 0 | CDEC-raw | |
| | Temp-Air | | Inst | 0 | 0 | CDEC-raw | |
| ay | Precip-Cum | | Inst | 0 | 0 | CDEC-raw | |
| Dam Ridge | Precip-Cum | | Inst | 0 | 0 | CDEC-raw | |
| Dam Ridge | Temp-Air | | Inst | 1Hour | 0 | CDEC-raw | |
| Dam Ridge | Volt-Battery | | Inst | 1Hour | 0 | CDEC-raw | |
| AN IACINTO | Flow | | Inst | 1Hour | 0 | OBS | - |
| utes.0.RED-dcp | | | | | | | |
| | lay Dam Ridge Dam Ridge Dam Ridge SAN TACINTO utes.0.RED-dcp | Depth-Snow Water Temp-Air Jay Precip-Cum Dam Ridge Precip-Cum Jam Ridge Temp-Air Jam Ridge Volt-Battery SAN JACINTO Flow | Depth-Snow Water Equivalent Temp-Air fay Precip-Cum Dam Ridge Precip-Cum Dam Ridge Temp-Air Dam Ridge Volt-Battery SAN IA CINTO Flow utes. 0. RED-dcp | Depth-Snow Water Equivalent Inst Temp-Air Inst ay Precip-Cum Inst Dam Ridge Precip-Cum Inst Dam Ridge Temp-Air Inst Dam Ridge Temp-Air Inst Dam Ridge Vot-Battery Inst SN IAC/NOD Flow Inst | Depth-Snow Water Equivalent Inst 0 Temp-Air Inst 0 ay Precip-Cum Inst 0 Dam Ridge Precip-Cum Inst 0 Dam Ridge Temp-Air Inst 1Hour Dam Ridge Temp-Air Inst 1Hour Dam Ridge Temp-Air Inst 1Hour SAN IAC/NOD Flow Inst 1Hour | Depth-Snow Water Equivalent Inst 0 0 Temp-Air Inst 0 0 ay Precip-Cum Inst 0 0 Dam Ridge Precip-Cum Inst 0 0 Dam Ridge Temp-Air Inst 0 0 Dam Ridge Temp-Air Inst 1Hour 0 Dam Ridge Temp-Air Inst 1Hour 0 Dam Ridge Temp-Air Inst 1Hour 0 Dam Ridge Ust-Battery Inst 1Hour 0 Val MC/NTO Elow Inst 1Hour 0 | Depth-Snow Water Equivalent Inst 0 0 CDEC-raw Temp-Air Inst 0 0 CDEC-raw 'ay Precip-Cum Inst 0 0 CDEC-raw Dam Ridge Precip-Cum Inst 0 0 CDEC-raw Dam Ridge Temp-Air Inst 0 0 CDEC-raw Dam Ridge Temp-Air Inst 1Hour 0 CDEC-raw Dam Ridge Volt-Battery Inst 1Hour 0 CDEC-raw Dam Ridge Volt-Battery Inst 1Hour 0 CDEC-raw JAN LAC/INCO Elow Inst 1Hour 0 ODEC-raw |

Figure F.1 Example HEC-RTS Database

The **Pathname Filters** (Figure F.2) are used to sort pathnames by parts. There is a filter list, A through F, for each individual part. The **Pathname Table** displays the filtered data set names contained in the database. The pathnames are displayed by the individual parts. The **Selected Pathname List** displays the pathnames that were selected from the **Pathname Table**.

The **Select Commands** (Figure F.1) are available after selecting the pathnames to view or manipulate. Available commands are **Select, De-Select, Clear Selections, Restore Selections**, and **Set Time Window**. These commands will be detailed later on in this appendix.

After entering time window information, the **Status Bar** (Figure F.1) will display the time window information. A time window is where a specific time frame is given for viewing or manipulating data.

F.3 Opening a HEC-DSS File

There are several ways to open a HEC-DSS file from HEC-DSS-Vue. One way is to type in the location and filename of the DSS file in the **File Name** field of the **HEC-DSS-Vue** main window (Figure F.1). After entering the correct information, press **<Enter>**, and the **Pathname Table** will display the pathnames of the selected DSS file, and the **File Information** (Figure F.1) field will display statistics about the DSS file.

| Look in: | North_Branch_v607 | 🔹 🔊 😰 📰 - | |
|-----------------|----------------------|-----------|--------|
| 0 | 🕌 cavi | | |
| - in | 🌽 fia | | |
| Recent Items | b forecasts | | |
| | 퉬 hms | | |
| | layouts | | |
| | 퉬 maps | | |
| Desktop | 🍰 MetVue | | |
| | 퉬 mfp | | |
| T | 🐌 New Folder | | |
| | 퉬 ras | | |
| My Documents | 🔒 reports | | |
| Documents | 퉬 rss | | |
| 1 | 퉬 scripts | | |
| | 퉬 shared | | |
| Computer | 🍰 study | | |
| | 🍌 w2 | | |
| | horecast.dss | | |
| Network | File name: | | Open |
| | Files of type: *.dss | | Cancel |

Figure F.3 Open HEC-DSS File Browser

Locate the DSS file to be opened and click **OK**. The **Open File** browser will close, and the HEC-DSS-Vue main window will display the name of the DSS file, and all of the pathnames associated with that DSS file will appear in the **Pathname Table** (Figure F.2).

F.4 Set Time Window

To view the data for a certain block of time, set a time window:

- 1. Click **Set Time Window**, and the **Set Time Window** dialog opens (Figure F.5). By default, the time window is set to **No Time Window**. There is an option of setting an exact time window or a time window that is relative to the current time.
- 2. To enter a specific time frame, select **Specific Time Window**. Enter a **Start Date** and **Start Time**, in the format ddmmmyyyy (i.e., *26Nov1993*). Do the same for the **End Date** and **End Time**.
- 3. All the window fields can be cleared by clicking **Clear**. To use the current date and time, click **Set Current Time** and all time window fields will be filled. If needed, edit the ending date and time.
- 4. To set the time frame relative to the current time, select **Relative to Current Time**. Enter the number of time increments to **Go Back** or **Go Forward** from the current time. Then select the time step increment to **Go Back** and **Go Forward** from the current date in the drop-down lists. Choices are: **minutes, hours, days, months,** or **years**.
- 5. To set the time frame based on water year, select **By Individual Water Year** and enter the **Start Date of Water Year** in the format dd mmm (i.e., *01 Oct*). Alternately, click on the ellipsis (...) to use a calendar tool for selecting the start date of the water year.

| | ne Window | |
|----------------|---------------|-------------------|
| Start Date: | 15 Apr 2009 | Start Time: 06:00 |
| End Date: | 15 May 2009 🛄 | End Time: 07:00 |
| | Clear | Set Current Time |
| Go Forward: | days | v |
| | I Water Year | |
| 🖱 By Individua | | |

Figure F.5 Set Time Window Dialog

- 6. To save the time window settings select the **Retain Between Sessions**.
- 7. Click **OK**, and the **Set Time Window** dialog closes. The time window is set, and it is displayed in the **Status Bar** of the **DSSVue** main window (Figure F.1).

F.5 Pathnames

HEC-DSS provides a pathname of parts A through F separated with forward slashes, "/". The respective filters will display in the **Pathname Filters** located on the DSS-Vue main window. The following sections describe the basics of the pathname.

F.5.1 Viewing DSS Pathnames

The display of DSS pathnames in the **Pathname Table** shows all of the pathnames by the different parts for DSS records (Figure F.1). This display can be changed from the **View** menu. Available commands are **Pathname List, Pathname Parts, Condensed Catalog**, and **No Pathnames**.

The **Pathname List** command (Figure F.6) displays the pathnames in the **Pathname Table**, while **No Pathnames** displays nothing. The **Pathname Parts** command (default) is the same as the **Condensed Catalog**, except with DSS records' D part. In the **Condensed Catalog**, the D part displays the date span for each DSS pathname.

| Number | Pathname | |
|--------|--------------------------------------|--|
| 1 | //HEALDSBURG/FLOW/01DEC2014/15MIN// | |
| 2 | //HEALDSBURG/FLOW/24NOV2014/IR-DAY// | |
| 3 | //HEALDSBURG/FLOW/25NOV2014/IR-DAY// | |
| 4 | //HEALDSBURG/FLOW/26NOV2014/IR-DAY// | |
| 5 | //HEALDSBURG/FLOW/27NOV2014/IR-DAY// | |
| 6 | //HEALDSBURG/FLOW/28NOV2014/IR-DAY// | |
| 7 | //HEALDSBURG/FLOW/29NOV2014/IR-DAY// | |
| 8 | //HEALDSBURG/FLOW/30NOV2014/IR-DAY// | |
| 9 | //HEALDSBURG/FLOW/01DEC2014/IR-DAY// | |
| 10 | //HEALDSBURG/FLOW/02DEC2014/IR-DAY// | |
| 11 | //HEALDSBURG/ELOW/03DEC2014/IR-DAY// | |

Figure F.6 DSS Pathname List Display

F.5.2 Sorting DSS Pathnames by Parts

Another way to change the display of the DSS pathnames is through sorting by pathname parts. Sorting DSS pathnames by parts is the command **Search pathnames by part** (default). To sort by pathname parts, from the **Pathname Filters** (Figure F.8), decide which DSS pathname parts will be used. There is a **Filter List** for each individual pathname part.

| Search | A: | | C: STAGE | | • E: | | • |
|-----------|---------|--------|----------|-----------|----------|--------|---|
| By Parts: | B: | | ▼ D: | | ▼ F: OBS | | • |
| Number | Part A | Part B | Part C | Part D | Part E | Part F | |
| | 1 NPOT | BARNU | STAGE | 01JUN2001 | 1HOUR | OBS | |
| | 2 NPOT | BARNU | STAGE | 01JUL2001 | 1HOUR | OBS | |
| | 3 NPOT | BARNU | STAGE | 01AUG2001 | 1HOUR | OBS | |
| | 4 NPOT | BARTO | STAGE | 01JUN2001 | 1HOUR | OBS | |
| | 5 NPOT | BARTO | STAGE | 01JUL2001 | 1HOUR | OBS | |
| | 6 NPOT | BARTO | STAGE | 01AUG2001 | 1HOUR | OBS | |
| | 7 NPOT | CUMBE | STAGE | 01JUN2001 | 1HOUR | OBS | |
| | 8 NPOT | CUMBE | STAGE | 01JUL2001 | 1HOUR | OBS | |
| | 9 NPOT | CUMBE | STAGE | 01AUG2001 | 1HOUR | OBS | |
| | 10 NPOT | FRANK | STAGE | 01JUN2001 | 1HOUR | OBS | |
| | 11 NPOT | FRANK | STAGE | 01JUL2001 | 1HOUR | OBS | |
| | 12 NPOT | FRANK | STAGE | 01AUG2001 | 1HOUR | OBS | |
| | 13 NPOT | KITZM | STAGE | 01JUN2001 | 1HOUR | OBS | |

Figure F.8 Pathname Filters

An example is shown in Figure F.5 where DSS filters are used to see all of the STAGE records that are observed data. From the **Filter C** list, select *STAGE*, and from the **Filter F** list, select *OBS*. The **Pathname Table** displays only the pathnames that fit the criteria selected from the **Filter Lists**.

Another way to sort the pathnames is available from the **View** menu. Click **Search pathnames by string**. The details for this method are described in the HEC-DSSVue User's Manual.

F.5.3 Selecting Pathnames

With the appropriate list of pathnames in the **Pathname Table**, select which pathnames to view or manipulate. To select a pathname, double-click on a pathname in the **Pathname Table**, and the selected pathname will appear in the **Selected Pathname List** (Figure F.1). Alternatively, click on a pathname in the **Pathname Table**, and then click **Select**.

To select multiple pathnames, in the **Pathname Table**, click on a pathname the pathname will be highlighted. Find the next pathname to include in a group, hold down the **SHIFT** key and click.

The block of pathnames will be highlighted. Click **Select**, and all the pathnames within that block will be added to the **Selected Pathname List**.

Another way to select multiple pathnames is from the **Pathname Table**. Click and drag across the pathnames, release the mouse button and the block of pathnames will be highlighted. Click **Select**, and all of the pathnames within that block will be added to the **Selected Pathname List**.

Individual pathnames can be selected to be in a group for selection. From the **Pathname Table**, select a pathname which will be highlighted. To select another not in a contiguous group, hold down the **CTRL** key and select the next pathname which will be highlighted. Continue to do this until all of the desired pathnames have been selected. Release the **CTRL** key and click **Select**. All the selected pathnames will be added to the **Selected Pathname List**.

All of the pathnames displayed in the **Pathname Table** can be selected. From the **Edit** menu, choose **Select All**. All of the pathnames will now appear in the **Selected Pathname List**.

F.5.4 Clearing Selected Pathnames

To clear a pathname from the **Selected Pathname List** (Figure F.1), select a pathname and click **De-Select**. The pathname will be cleared from the **Selected Pathname List**. To clear all pathnames from the **Selected Pathname List**, click **Clear Selections**.

Groups of pathnames can be cleared by using the same concepts described in selecting pathnames (Section F.6.5) by using the **SHIFT** and **CTRL** keys. Once pathnames have been cleared from the **Selected Pathname List**, the pathnames can be restored to the **Selected Pathname List** by clicking **Restore Selections**.

F.6 Visualizing Data

After a pathname or multiple pathnames have been selected, the data associated with the pathname can be visualized. This can be done through a graphical means – plots, or through a tabular form – tabulate. Further details on plots and tables are discussed in Appendix I.

F.6.1 Plots

To view a plot of the pathnames in the **Selected Pathname List** (Figure F.1), either click the **Plot** button from the **Toolbar**, or from the **Display** menu, choose **Plot**. Either way will open the **Plot Window** (Figure F.10).

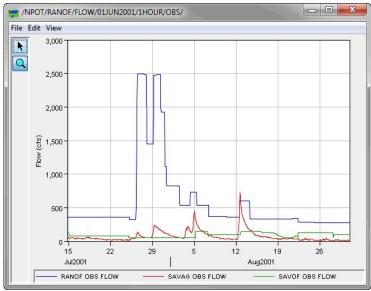


Figure F.10 Plot Window

The parameters for the plots are labeled and color-coded, date ranges are specified along one axis, and the units of measure are specified along the other axis. The **Plot Window** can be resized by grabbing the corner of the window and dragging it to the desired size.

Areas of the plot can also be zoomed in on. Click the **Zoom Tool**; find the area on the plot to zoom in on, and click and drag over the area. The plot will refresh, and the area within the zoom rectangle will fill the plot window. To *zoom out*, with the **Zoom Tool** selected, right-click anywhere on the plot area.

F.6.2 Table

To view a table of the pathnames in the **Selected Pathname List** (Figure F.1), either click the **Tabulate** button from the **Toolbar**, or from the **Display** menu, choose **Tabulate** to open the **Tabulate Window** (Figure F.11).

The **Tabulate Window** displays the ordinate (starting from the start date/time), the date and time stamp, and the values for the selected data sets. From the **Tabulate Window**, there are several options for displaying the tabular data (e.g., displaying commas in the number formatting, setting the precision of decimal places for your data).

| | BARNU | BARTO |
|------------------|--|--|
| Date / Time | STAGE | STAGE |
| | OBS | OBS |
| | ft | ft |
| | INST-VAL | INST-VAL |
| 14 Jul 01, 19:00 | 3.3640 | 1.2827 |
| 14 Jul 01, 20:00 | 3.3760 | 1.2800 |
| 14 Jul 01, 21:00 | 3.3640 | 1.2800 |
| 14 Jul 01, 22:00 | 3.3760 | 1.2727 |
| 14 Jul 01, 23:00 | 3.3880 | 1.2700 |
| 14 Jul 01, 24:00 | 3.3660 | 1.2700 |
| 15 Jul 01, 01:00 | 3.3760 | 1.2627 |
| 15 Jul 01, 02:00 | 3.3640 | 1.2600 |
| 15 Jul 01, 03:00 | 3.3920 | 1.2600 |
| 15 Jul 01, 04:00 | 3.3840 | 1.2600 |
| 15 Jul 01, 05:00 | 3.3640 | 1.2527 |
| 15 Jul 01, 06:00 | 3.3600 | 1.2500 |
| 15 Jul 01, 07:00 | 3.3760 | 1.2500 |
| 15 Jul 01, 08:00 | 3.3560 | 1.2500 |
| 15 Jul 01, 09:00 | 3.3580 | 1.2500 |
| 15 Jul 01, 10:00 | 3.3680 | 1.2427 |
| 15 Jul 01, 11:00 | 3.3620 | 1.2400 |
| 15 Jul 01, 12:00 | 3.3600 | 1.2400 |
| | 14 Jul 01, 19:00 14 Jul 01, 20:00 14 Jul 01, 20:00 14 Jul 01, 22:00 14 Jul 01, 23:00 14 Jul 01, 23:00 15 Jul 01, 02:00 15 Jul 01, 02:00 15 Jul 01, 02:00 15 Jul 01, 03:00 15 Jul 01, 05:00 15 Jul 01, 06:00 15 Jul 01, 07:00 15 Jul 01, 07:00 15 Jul 01, 09:00 15 Jul 01, 09:00 15 Jul 01, 10:00 15 Jul 01, 10:00 | Date / Time STAGE OBS INST-VAL INST-VAL 14 Jul 01, 19:00 3.3640 14 Jul 01, 20:00 3.3760 14 Jul 01, 22:00 3.3760 14 Jul 01, 22:00 3.3640 15 Jul 01, 02:00 3.3640 15 Jul 01, 05:00 3.3640 15 Jul 01, 06:00 3.3640 15 Jul 01, 07:00 3.3660 15 Jul 01, 09:00 3.3680 15 Jul 01, 09:00 3.3560 15 Jul 01, 09:00 3.3680 15 Jul 01, 10:00 3.3680 15 Jul 01, 10:00 3.3680 15 Jul 01, 11:00 3.3620 |

Figure F.11 Tabulate Window

F.7 Data Management Functions

DSS-Vue provides several tools for manipulating records. It provides the capability of creating DSS records - time series or paired data. The user can rename, duplicate, delete, and undelete records. There is the ability to copy records from one DSS file to another and merge two DSS file into one DSS file. The user can also perform maintenance and check the status of a DSS file. The following sections review a few of the available data management functions. For further details see the HEC-DSSVue User's Manual.

F.7.1 Renaming DSS Records

To change the pathname parts of a DSS pathname:

- 1. Select one or more pathnames.
- 2. From the **Edit** menu, choose **Rename Records**. The **Rename Record to:** dialog (Figure F.12) opens.
- 3. Each of the fields (A F) represents the different pathname parts. Enter one or more of the new pathname parts in the appropriate field.
- 4. Click **OK**, and the **Rename Records to:** dialog closes. A message appears informing the user of the number of records renamed. The selected pathname is no longer displayed in the **Selected Pathname List** (Figure F.1), and the pathname will display in the **Pathname Table** (Figure F.1) with the new pathname parts.

| Pathname: | /NPOT/BARM | NU/FLOW/*/1HO | UR/OBS/ | |
|-----------|------------|---------------|---------|------|
| A: NPOT | B: | BARNU | C: | FLOW |
| D: * | E: | 1HOUR | F: | OBS |

Figure F.12 Rename Records to: Dialog

F.7.2 Duplicating DSS Records

Duplicating a DSS record allows the user to make a copy of a record, but with a pathname part that has been changed. To duplicate records:

- 1. Select one or more pathnames.
- 2. From the Edit menu, choose Duplicate Records. The New pathname parts for duplicate records: dialog (similar to Figure F.12) will open.
- 3. Each of the fields (**A F**) represents the different pathname parts. Enter one or more of the new pathname parts in the appropriate field.
- 4. Click **OK**, and the **New pathname parts for duplicate records:** dialog closes. A message appears informing the user of the number of records that were duplicated. A new pathname is displayed in the **Pathname Table** (Figure F.1).

F.7.3 Deleting and Undeleting DSS Records

To delete DSS records:

- 1. Select one or more DSS pathnames.
- 2. From the Edit menu, choose Delete Records.
- 3. A message appears asking to confirm the deletion. Click Yes.
- 4. A message appears informing the user of the number of records that were deleted. Click **OK**, and the message closes. The pathname are removed from the **Selected Pathname** List and the **Pathname List** (Figure F.1).
- 5. If records were unintentionally deleted, before the next operation, from the **Edit** menu, point to **Undelete** \rightarrow **Select**, and the **Undelete Records** dialog opens (Figure F.13).
- 6. To select all the records displayed in the **Undelete Records** dialog, click **Select All**. To select individual records, under the **Select** column, click the checkbox that corresponds to the correct record.

- 7. To restore the selected records, either click **Apply** or **OK**. A message appears letting indicating that the records have been undeleted. Click **OK**, and the message closes, the **Undelete Records** dialog closes, and the records will be displayed in the **Selected Pathname List** and the **Pathname List** (Figure F.1).
- 8. For further information on deleting and undeleting records in a DSS file, see the HEC-DSSVue User's Manual for further details.

| Select | Record | |
|--------|---|--------|
| 1 | /COTTONWOOD R NEOSHO RAPIDS, KS/NEOC/FLOW/13MAR2010/IR-D | AY/US |
| 1 | /COTTONWOOD R NEOSHO RAPIDS, KS/NEOC/FLOW/14APR2010/IR-D | AY/US |
| J | /COTTONWOOD R NEOSHO RAPIDS, KS/NEOC/FLOW/14FEB2010/IR-D/ | AY/US |
| 1 | /COTTONWOOD R NEOSHO RAPIDS, KS/NEOC/FLOW/14MAR2010/IR-D | AY/US |
| | (COTTONWOOD & NEOSHO RAPIDS, KS/NEOC/ELOW/15APR2010/IR-D | AVILIO |

Figure F.13 Undelete Records Dialog

F.8 Editing DSS Data

DSS data can be edited either in tabular form or from a graphical editor (with the appropriate permissions). To edit data in a tabular form:

- 1. Select one or more pathnames. The pathname(s) will appear in the **Selected Pathname** List (Figure F.1).
- 2. From the **Edit** menu, click **Tabular Edit**. A **Tabular Edit** dialog (Figure F.14) opens with the data for the selected pathname(s) displayed.
- 3. The columns in gray cannot be edited. The user can edit individual cells, insert (beginning of record), append (end of record), and delete rows (this command actual deletes the editable value of the selected row).
- 4. From the **File** menu, click **Save**. The **Saved Data Set** message appears, indicating that a record has been saved. Click **OK**, and the **Saved Data Set** message closes.
- 5. From the **File** menu, click **Close** and the **Tabular Edit** dialog (Figure F.13) closes.
- 6. For further details on tabular editing see the HEC-DSSVue User's Manual.

| Ordinate Units Type 1 2 | GMT-05:00 Date / Time 14 Jul 01, 19:00 | BARNU FLOW OBS cf: |
|-------------------------|--|-----------------------------|
| Units Type 1 | | FLOW OBS |
| Type 1 | 14 10 01 10:00 | |
| 1 | 14 101 10:00 | |
| | 14 Jul 01 10:00 | INST-VA |
| 2 | 14 Jul 01, 19.00 | 362. |
| | 14 Jul 01, 20:00 | 367. |
| 3 | 14 Jul 01, 21:00 | 362. |
| 4 | 14 Jul 01, 22:00 | 367. |
| 5 | 14 Jul 01, 23:00 | 373. |
| 6 | 14 Jul 01, 24:00 | 363. |
| 7 | 15 Jul 01, 01:00 | 367. |
| 8 | 15 Jul 01, 02:00 | 362. |
| 9 | 15 Jul 01, 03:00 | 374. |
| 10 | 15 Jul 01, 04:00 | 371. |
| 11 | 15 Jul 01, 05:00 | 362. |
| 12 | 15 Jul 01, 06:00 | 361. |
| 13 | 15 Jul 01, 07:00 | 367. |
| 14 | 15 Jul 01, 08:00 | 359. |
| 15 | 15 Jul 01, 09:00 | 360. |
| 16 | 15 Jul 01, 10:00 | 364.4 |
| 17 | 15 Jul 01, 11:00 | 361. |
| 18 | 15 Jul 01, 12:00 | 361. |
| 19 | 15 Jul 01, 13:00 | 361. |
| 20 | 15 Jul 01, 14:00 | 361. 364. |

Figure F.14 Tabular Edit Dialog

To edit data using the graphical editor:

- 1. Select one or more pathnames and the pathname(s) will appear in the **Selected Pathname List** (Figure F.1).
- 2. From the **Edit** menu, click **Graphical Edit**, and the **Graphical Editor** (Figure F.15) opens.
- 3. The **Graphical Editor** allows the user to edit the data in a graphical mode. This editor is very similar to the **Data Validation Editor** from the **Acquisition Module**. Review Chapter 9 of this User's Manual for similar functionality.
- 4. From the **File** menu, click **Save**, and the **Save Changes** message appears asking if the changes should be saved. Click **OK**, and the **Save Change**s message closes.
- 5. The **Saved Data Set** message opens indicating which record(s) was saved. Click **OK**, and the **Saved Data Set** message closes.
- 6. From the **File** menu, click **Close**, and the **Graphical Editor** (Figure F.13) closes.
- 7. For further details on graphical editing see the HEC-DSSVue User's Manual.

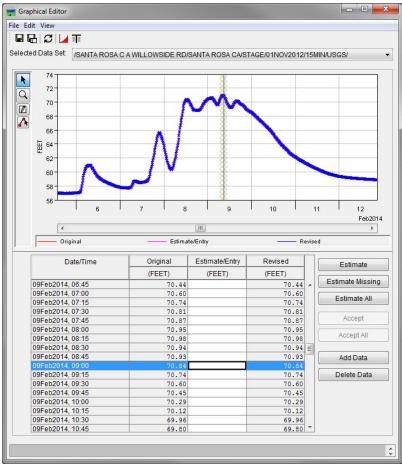


Figure F.15 Graphical Editor

APPENDIX G

Using HEC-GridUtil

A precipitation grid contains an estimate of the spatial distribution of precipitation intensity over the watershed for an interval of time. Precipitation grids come from a variety of sources, including radar measurements, interpolation between rain gages, and atmospheric models. HEC-GridUtil provides tools for viewing and manipulating precipitation grids. Once HEC-GridUtil has been configured to display grids in a watershed, that configuration can be used in HEC-RTS for the same watershed. Gridded data is also produced by MFP as output. Once a Forecast that includes MFP has been computed, the gridded data output can be viewed in the Models module. This appendix provides an overview of HEC-GridUtil, the utility for setting up gridded data for use with the CAVI. For additional information, see the HEC-GridUtil User's Manual.

G.1 Overview of HEC-GridUtil

In order to view grids of precipitation and snowmelt in HEC-RTS that are not MFP output, gridsets must first be created within the watershed using HEC-GridUtil. A **gridset** can be thought of as a sequence or time series of grids. A single DSS record of grid data contains data for only one time interval, so HEC-GridUtil uses gridsets to group gridded records for viewing and calculations on grids that change through time.

The procedure for starting and logging in to HEC-GridUtil is the same as for the HEC-RTS CAVI (Section 2.1). After clicking **OK**, the HECGridUtil main window will open (Figure G.1). The components of the HEC-GridUtil main window are described in the following sections.

G.1.1 Menu Bar

The **Menu Bar** contains the menus for the HEC-GridUtil software. The following list is a description of the available menus.

- File: This menu is used for watershed management and contains the following commands: New Watershed, Open Watershed, Save Watershed, Save Map As, Exit, and lists any previously opened watersheds.
- View: This menu is used to control the display of maps, time windows, and other components in the display area. Available commands are: Zoom to All, Layers, Unit

System, Icons, Restore Windows, Grid Lines, Set Time Window, Time-Series Plot, Color Scales, and Cumulative Display.

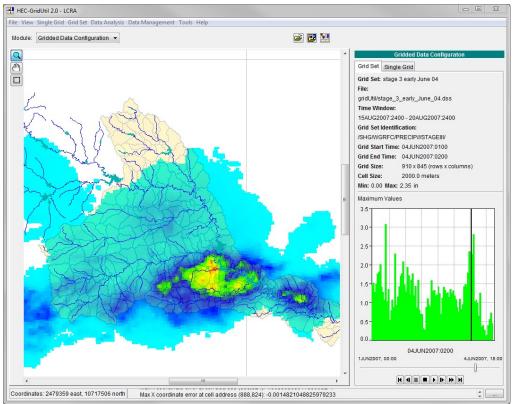


Figure G.1 HEC-GridUtil Main Window

- Single Grid: This menu is used to create, open, edit, and delete single grids: Available commands are: New, Open, Save, Close, Edit, Info, Import, Export, Delete, Rename, and Reload.
- Grid Set: This menu is used to create, open, edit, and delete grid sets. Available commands are: New, Open, Save, Close, Edit, Info, Import, Export, Delete, Rename, Reload, Update, and Previous.
- **Data Analysis**: Use this menu to set a time range and access the Analysis Expression Builder. Available commands are: **Time Series Functions** and **Mean Areal Value**.
- **Data Management**: This menu is contains tools to manage gridded data. Available commands are: **Data Mosaic** and **Extract Region**.
- **Tools:** This menu provides options for output logs, access to DSS data (using HEC-DSSVue), allows creating and editing of scripts, provides the ability to send messages to other users, and general information. Available commands are: **HEC-DSSVue**, **Scripts**, **Console Log**, **Options**, and **Information**.

• Help: This menu provides information about HEC-GridUtil. Available options are: User's Manual, Install Example Data, and About.

G.1.2 Display Area

The **Display Area** (Figure G.1) is where elements can be manipulated and results can be viewed using tools in the **Toolbar**. The following list is a description of the available tools for HEC-GridUtil.



Zoom Tool - this tool allows zooming in and out of the display area. To *zoom in*, hold the mouse button down and outline the area to zoom in on. To *zoom out*, click the right mouse button (right-click).

Pan Tool – this tool is used to move the display area while zoomed in.

Extract Tool – this tool is used to extract a region from the available grid data.

When moving any of these tools over the display area, a tool-tip box will show the grid value at the location of the tool. If the **Extract Tool** is active, a single click will place a fixed box at the location; so that values at that location will continue to be displayed as a sequence of grids is stepped through. Double-clicking with the extract tool removes all fixed boxes that have been placed in the display area.

G.1.3 Gridded Data Configuration Module

The **Gridded Data Configuration Module** (Figure G.1) provides controls that execute commands and displays information about the active gridset. This information includes the name of the gridset, the location of the DSS file that contains the grids, gridset identification, size of the gridset, the minimum and maximum precipitation values in the gridset, and a legend for the gridset.

The **Grid Animation Controls** are located on the lower-right corner of the **Gridded Data Configuration Module**. The controls show the time span of the grids. The time and date centered above the controls show the end time of the time interval covered by the currently displayed grid.

G.2 Creating Gridsets with HEC-GridUtil

The information in this section is an overview of creating a gridset with HEC-GridUtil. For more detail on gridsets, importing and exporting gridsets, and other available function dealing with gridsets, review the HEC-GridUtil User's Manual.

G.2.1 Set the Display Coordinate System

Before creating gridsets with HEC-GridUtil, the coordinate system of both the watershed's maps and the grids to be displayed must be known. This information includes the

coordinate system name, the units, and the spheroid type. If the coordinate system is UTM or State Plane, the zone number must also be known. (Use the FIPS code to identify a State Plane zone.)

To set the watersheds coordinate system:

- 1. From the View menu, click Layers, and the Layer Selector dialog will open.
- 2. On the **Maps** menu, click **Map Display Coordinates**; and the **Display Coordinate Information** dialog will open.
- 3. Click **Edit**, and the **Map Coordinate Information** dialog will open (Figure G.2). If the coordinate system is not already correctly set for the map layers, the settings will need to be changed.

| 💾 Map Coor | dinate Information |
|------------|-------------------------|
| Map Coord | inate Information |
| System: | State Plane Coordinates |
| Units: | U.S. Feet 👻 |
| Spheroid: | Clarke 1866(NAD27) |
| Zone: | |
| | OK Cancel |

Figure G.2 Map Coordinate Information Dialog

- 4. From the **System** list, select the coordinate system of the watershed maps.
- 5. From the **Units** list, select the appropriate units.
- 6. If the coordinate system uses Spheroids, a **Spheroid** list will be shown. From the **Spheroid** list select the appropriate spheroid or datum for the gridset.
- 7. Finally, depending on which coordinate system was chosen, information for **zones** or **projection** parameters will need to be added. In Figure G.2, *State Plane Coordinates* was chosen, so zone information would need to be entered in the **Zone** field.
- 8. Click OK, and the Map Coordinate Information dialog will close.

G.2.2 Create a Gridset

To create a gridset:

1. From the **Grid Set** menu, click **New**. The **Create a New Grid Set** dialog (Figure G.3) will open.

| | | _ | | | |
|-----------------------|-------------|---|--|--|--|
| Vatershed: LCRA | | | | | |
| Existing GridSets | | | | | |
| Name | Description | | | | |
| stage 3 early June 04 | | | | | |
| | | | | | |
| New GridSet | | - | | | |
| New GridSet Name: | | | | | |
| | | - | | | |

Figure G.3 Create a New Grid Set Dialog

- 2. Enter a name in the **Name** cell and a description in the **Description** cell. Gridset names should describe the source of the data. For example, a gridset made up of grids created by gageInterp might be named *Interpolated*, and a gridset composed of stage III NEXRAD radar scenes might be named *StageIII*.
- 3. Click New, and the Select Grid Set dialog will open (Figure G.4).
- 4. If **Use CWMS file names** is checked, then from the **Prefix** dropdown selection list it is possible to sort the DSS files using three hardwired choices: **precip**, **airtemp**, or **snow**.
- 5. If **Use CWMS file names** is not checked, then click **Add File(s)**, and an **Open File** browser will open. Select a DSS file that contains precipitation grid data. Click **OK**; and the **Open File** browser will close.
- 6. The lists in the **Grid Set Identifier** cell (Figure G.4) will now contain lists of DSS path parts. These lists are the **Grid Type** (A part), **Location** (B part), **Parameter** (C part), **Version** (F part), and **Time Interval**. The time interval list is the difference between the grids start and end times, as represented in the D and E parts of its path.

| elect DSS Files | | | | | | |
|--|-----------------|---------|------------|-----------------------------|-------|----------------|
| Prefix: | | | | | | |
| | File Lis | t | | | | Add File(s) |
| C:/Program Files (x86 |)/HEC/HEC-Gri | dUtil/2 | 2.0/exampl | es/HEC-Grid | (| Remove |
| rid Set Identifier Srid Type (A-Part) | Location (B-Pa | rt) | Paramet | er (C-Part) | Ver | rsion (F-Part) |
| SHG 👻 | WGRFC | • | PRECIP | - | ST | |
| Available Time Rang | le | | | Time Inte | erval | 1 Hour |
| 15 August 2007, 24: | 00 | | | 📃 Instanta | neou | s |
| 20 August 2007, 23: | 00 Coor | dinat | e System: | SHG | • | Edit |
| 🗸 Set display scale l | imits | | | | | |
| linimum Value (in): | | 0.0 | Maximur | n Value <mark>(in)</mark> : | | 2. |
| Override Default Tir | ne Window for [| Displa | ay | | | |
| ime Window for Disp | lay (UTC) | | | | | |
| Absolute Time | | D -+- | | | | Time |
| Absolute Time | Begin | Date | ; | | | Time |
| Relative Time | Degin | _ | | |) | - |
| | End | | | | | |

Figure G.4 Select Grid Set Dialog

- 7. From **Grid Type** list select *SHG*, from the **Location** list select the name of the watershed.
- 8. From the **Parameter** list, a user might select *PRECIP* (for a precipitation grid), and from the **Version** list select the type of grids included in the set (i.e., *RADAR*, *STAGE III*, *INTERPOLATED* selections for a precipitation grid).
- 9. The grid coordinate system should automatically set itself to SHG when SHG was selected as the grid type. If it did not, select SHG from the **Coordinate System** list (Figure G.4).
- 10. Make sure Set display scale limits is selected.
- 11. Enter values in the **Minimum Value** and **Maximum Value** cells. If the gridset is a precipitation grid, set the maximum value to a realistic high value for one hour's precipitation in the basin. Cells in the grid with precipitation depths greater than this value will show black on the display. Set the minimum value to zero.
- 12. Click **OK**; and the **Select Grid Set** dialog will close. The precipitation grids will now be available (Figure G.1). The gridset that was created will also be available for viewing in the **Visualization Module** of the CAVI. Note that gridsets with fixed time

windows (those that have the "override default time window for display" box checked) cannot be displayed in HEC-RTS.

G.2.3 Set the Time Window

To set the time window for displaying the gridset in HEC-GridUtil:

- 1. From the **View** menu, click **Set TimeWindow**, and the **Time Window** dialog (Figure G.5) will open.
- By default, the time window is set to the Specific Time Window. To set the time window to be relative to the current time, select the radio button next to Relative to Current Time. Enter a number in the Go Back cell and then select a unit from the list next to the days, hours, months, or years. In the example, Figure G.5, the time window has been set for eight days.

| Time Window | × |
|---|------------|
| 💿 No Time Window | |
| © Specific Time Window | |
| Start Date: Start Time: | |
| End Date: End Time: | |
| Clear Set Cu | rrent Time |
| Relative to Current Time Go Back: 2 days Go Forward: 6 days Retain Between Sessions OK Cancel | Apply |

Figure G.5 Time Window Dialog - Relative to Current Time

- 3. No Time Window can also be set.
- 4. The **Set TimeWindow for Display** dialog (Figure G.6) allows the user to enter a specific time. In the **Start Date** and **Start Time** cells, enter the beginning time for the gridset. In the **End Date** and **End Time** cells, enter the ending time for the gridset.
- 5. Either way, once finished with setting the time window, click **OK**, and the **Time Window** dialog will close.

| Specific Tir | me Window | | |
|-------------------------|--------------|----------------|----------|
| Start Date: | 15 Aug 2007 | Start Time: 24 | 4:00 |
| End Date: | 20 Aug 2007 | End Time: 24 | 4:00 |
| [| Clear | Set Curre | ent Time |
| Relative to Go Back: | Current Time | /S * | |
| | day | 19 - | |

Figure G.6 Time Window Dialog - Specific Time Window

G.3 Viewing Precipitation Grids in HEC-RTS

Grids are viewed in the **Visualization Tab in the Watershed Pane** of HEC-RTS. A single gridset (created in HEC-GridUtil) can be viewed. For further details on viewing precipitation grids, see Section 10.4 of this User's Manual. In addition, more details are provided in the HECGridUtil User's Manual.

APPENDIX H

Scripting

In HEC-RTS, scripts provide a way to automate the program for the purpose of executing a prescribed set of actions with a simple trigger. Scripting simplifies user operation, ensures repeatability and consistency of results, reduces time required to generate results, and permits schedules of an operation in the future.

HEC-RTS uses the **Jython** scripting language. Jython is a special implementation of the **Python** scripting language that is able to interact with programs written in Java.

Some uses of scripting in HEC-RTS:

- Running an existing forecast with one or more alternatives with a single button click (replacing many mouse clicks with one).
- Creating a new forecast based on the current time, and running it with one or more alternatives.
- Scheduling an action such as creating a new forecast to happen sometime in the future (possibly on a recurring basis).

H.1 Scripts

Scripts can apply to all HEC-RTS watersheds, or they can be specific to an HEC-RTS watershed. Scripts can be scheduled for execution and users can check on the status of scripts. This is accomplished from the **Select Scripts** dialog, which is accessed in the **Visualization Module**, Scripts box in the Watershed Pane. Right-click in the Scripts box, located in the Watershed Pane, and click Edit, the **Select Scripts** dialog will open (Figure H.1).

H.1.1 Select Scripts

- Available: The Available column lists all of the available scripts that can be added to the Visualization Module, Scripts box. Use the buttons Add or Add All to add script buttons to the watershed Visualization Module. The Remove or Remove All buttons will delete script buttons from the watershed Visualization Module.
- Selected: This column lists all script buttons that are or will be added to the Visualization Module, Scripts box.

| 📻 Select Scripts | | x |
|-------------------------|------------|-----------|
| Available | | Selected |
| 2-CDEC | Add 🕨 | 1-USGS |
| 3_Grid_Russian dss | Remove | |
| Junctions Reservoirs | Add All 🕨 | |
| Subbasins | Remove All | |
| | | OK Cancel |

Figure H.1 Select Scripts Dialog

H.1.2 Edit Existing Script Buttons

In the **Visualization Module**, after creating scripts and requesting that a button be created for that script, the user can edit the script associated with the button, delete the script associated with the button, and schedule a job for that script. All of these tasks can be accomplished through the script button shortcut menu (Figure H.2).

| 1-USGS | 2-CDEC | dss |
|--------|--------|-----|
| | Edit | |

Figure H.2 Script Button Shortcut Menu

H.2 Script Editor

Create, edit, and delete scripts using the **Script Editor**. From the **Tools** menu click **Script Editor**, and the **Script Editor** will open (Figure H.3). Components of the **Script Editor** include the **Menu Bar**, the **Script Context Pane**, the **API Pane**, and the **Editor Pane**. The following sections describe these components.

| Script Editor Title E | |
|---------------------------|--|
| File Edit | Menu Bar |
| 12 🖨 🗴 🖻 🛍 | Main Toolbar |
| Russian River Scripts | APIS - Application - Application Desktop - Application Desktop - Console - Console Window - Project - Managers - Console Window - State - C |
| Script Context Pane | <pre>Project P</pre> |

Figure H.3 Script Editor

H.2.1 Menu Bar

An overview of the Script Editor's Menu Bar:

- File: From this menu, create and import scripts, open, delete, print, save, and run scripts, or make a copy of the script. Available commands are New, Open, Run, Delete, Save, Save As, Print, and Close.
- Edit: From this menu, modify a script or search a script. Available commands are: Cut, Copy, Paste, Select All, and Find.

H.2.2 Script Context Pane

The **Script Context Pane** (Figure H.4) of the **Script Editor** the user can navigate to folders in the HEC-RTS directory structure and access scripts. The tree structure allows for navigation through the directory structure for scripts within HEC-RTS. Scripts can be stored that are applicable to all HEC-RTS modules or to individual HEC-RTS modules. The name of the script is also the script name displayed on the associated script button in the **Script Selector** (Figure H.1). To edit a script double-click on the script name and the script opens in the **Editor Pane**.

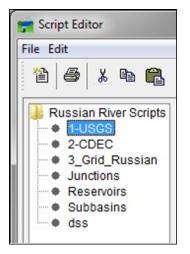


Figure H.4 Script Context Pane

H.2.3 Editor Pane

Scripts are modified in the **Editor Pane** of the **Script Editor**. The name displayed on the associated script button in the **Script Selector** (Figure H.1) is the same as the name in the **Script Context Pane** and the *.*py* name (i.e. *1-USGS.py*) in the **File** box of the **Editor Pane**. **File** box (Figure H.5) also shows where the user can find the location of the associated file of the script. By default, a button for each script created will appear on the **Script Selector**. If the user wants an icon to appear on the script button, then from the **Icon** list, select an icon. If the user does not want a button, they need to clear **Display Script to User**.

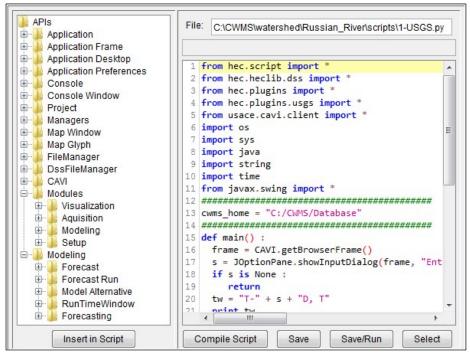


Figure H.5 Editor Pane

The **Test Arguments** field (Figure H.5) allows for the initialization of the values of variables used by the script. As many semicolon separated variable assignments can be entered as a script requires (e.g., var1="abc"; var2=7.5) or the area can be left blank.

The **Description** field (Figure H.5) allows the user to enter a description of the script. The first line of the description serves as the tooltip for the associated script button.

The field below the **Description** field in the **Editor Pane** (Figure H.5) is where the script text will be entered and serves as an editing window. This field will be referred to as the **Script Text** field. By right-clicking in the **Script Text** box, shortcut menu will appear (Figure H.6) that contains the following commands:

- **Cut:** Copies the currently-selected script text to the system clipboard and removes it from the script.
- **Copy:** Copies the currently-selected script test to the system clipboard and leaves it in the current script.
- Paste: Copies text from the system clipboard into the script at the current cursor location.
- Select All: Selects all the text in the script.

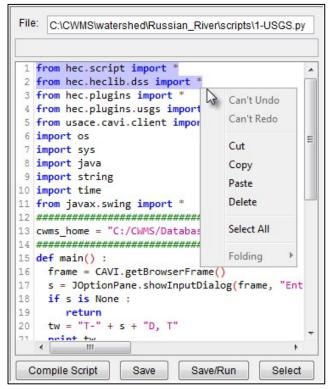


Figure H.6 Script Text Shortcut Menu

H.3 Create a Script

Create a script by selecting either the **General Scripts** directory or the **Watershed Directory** in the **Script Context Pane** of the **Script Editor** (Figure H.3) and choosing **File > New**. Enter the name of the script in the subsequent dialog.

H.4 Save a Script

In the **Script Context Pane** (Figure H.4), select the script to be saved. From the **File** menu, click **Save** or click on the **Save** button. The script can also be saved and executed by simply clicking on the **Save/Run** button from the **Script Editor** (Figure H.3). The **Editor Pane** (Figure H.5) will become grey and the name of the script will appear in the **Script Context Pane** (Figure H.3) in the appropriate place.

H.5 Delete a Script

In the **Script Context Pane** (Figure H.4), select the script to be deleted. From the **File** menu, click **Delete**. A **Confirm Deletion** message will appear asking the script should really be deleted, click **Yes**. The confirmation message will close, and the script will no longer appear in the **Script Context Pane**.

H.6 Edit a Script

There are three ways to edit a script from the **Script Editor** (Figure H.3). When editing is enabled, the **Editor Pane** (Figure H.5) will change from grey to white. From the **Script Context Pane** (Figure H.4), double-click the script. From the shortcut menu, click **Edit Script**. From the **Script Editor** (Figure H.3), click the **Edit** button.

Another way to edit a script is to select a script from the **Script Context Pane**, and from the **File** menu, click **Open**.

H.7 Running a Script

H.7.1 Manually Running a Script

There are three ways to manually run a script: the first way is from the **Script Selector** (Section H.1.1). From the **Script Selector**, select the script you wish to run, and click **Run**.

The second way is to manually run a script is from the **Script Editor** (Section H.2). From the **Script Editor**, from the **Script Context Pane** (Figure H.4), select a script. From the **File** menu, click **Run**, and the script will execute.

The last way to trigger a script is to assign the script to a **Time Series Icon** and trigger the run through the icon's shortcut menu. See Chapter 18 on **Time Series Icons** for more details.

H.7.2 Automatically Running a Script

Running scripts automatically in HEC-RTS is accomplished by scheduling script jobs. From the **Script Selector** (Section H.1), from the **Script** menu, click **Schedule Script Job**. The **Schedule Script Job** dialog will open (Figure H.7). Another way to launch the **Schedule Script Job** dialog is from the **Script Selector** dialog: Right-click on a script button, and from the shortcut menu (Figure H.2), click **Schedule Script Job**.

| Schedule S | Script Job | | × |
|------------|------------|--------------------|---------------|
| | | | Location |
| Job Name: | 3_Grid_R | ussian | Run on Client |
| Script: | 3_Grid_R | ussian 💌 | Run on Server |
| Single J | lob | Start Date: | |
| Recurring | ng Job | Start Time (hhmm): | PST |
| Repeat eve | ery: | Minute(s) 👻 | |
| | | OK Car | Apply |

Figure H.7 Schedule Script Job Dialog Box

H.7.2.1 Schedule Script Job Dialog Box

To setup a script to run automatically:

- 1. The **Job Name** field (Figure H.7) contains the name of the job that will run the script. The job name contains the name of the script, and the start date and start time that will be entered. This name can be changed, but it is recommended that it is not changed.
- 2. From the **Script** name list (Figure H.7), the script that should run automatically can be selected.
- 3. In the **Location** box (Figure H.7), a script can be scheduled to run only on the client in HEC-RTS.
- 4. Enter a starting date in the **Start Date** cell (i.e., DDMMMYYYY format), and a start time in the **Start Time** cell (Figure H.7). The date and time reference is local time of the computer running the CAVI client (usually the PC), as indicated the time zone ID next to the **Start Time** box.
- 5. The script that is being set up can be run automatically one or be recurring. By default the job is setup to run once **Single Job** (Figure H.7) is selected. To make the job recurring, select **Recurring Job**, and enter the interval for the job to recur at in the **Recurrent Interval** box, and from the list select **Minute(s)**, **Hour(s)**, or **Day(s)**.

6. Once everything is setup, click **OK**, and a confirmation message will open indicating that the script has been scheduled. Click **OK**, and the confirmation message will close, and the **Schedule Script Job** dialog will close (Figure H.7).

H.7.2.2 Checking the Status of a Scheduled Script

To check the status of an automatically schedule script, from the **Script Selector** dialog (Figure H.1), from the **Script** menu, click **Status**; the **Script Job Status** dialog will open (Figure H.8). The following gives an overview of what information is being provided:

1. The **Job Name** column (Figure H.8) displays the name assigned to the script job when it was initially scheduled.

| Status Job Vie | ew | | | | | |
|----------------|--------|----------|--------|-------------|----------|------------------------------|
| Job Name | Script | User | Status | Interval | Location | Date/ Time |
| tester-server | tester | Q0hecmdp | Error | 2 Minute(s) | Server | Fri Nov 06 13:56:00 PST 2015 |
| tester-1 | tester | Q0hecmdp | Error | 2 Minute(s) | Server | Fri Nov 06 13:56:00 PST 2015 |
| tester-2 | tester | Q0hecmdp | Error | 2 Minute(s) | Server | Fri Nov 06 13:56:00 PST 2015 |

Figure H.8 Script Job Status Dialog Box

- 2. The **Script** column (Figure H.8) displays the name of the script that is executed with the scheduled job runs. A script can be used in more than one script job at a time.
- 3. The User column (Figure H.8) displays the name of the user that scheduled the script.
- 4. The **Status** column (Figure H.8) displays the status of the scheduler (not the script itself). This column will display three states:
 - Pending: The scheduler is waiting to start the script job for the first time.
 - Successful: The scheduler started the script job successfully.
 - Error: The scheduler did not start the script job successfully.
- 5. To see whether the job was a single execution or a recurring execution, the **Interval** column (Figure H.8) displays this information.
- 6. From the **Location** column (Figure H.8) it is indicated whether the job executed on the client or the server.
- 7. If the job is recurring, the **Date/Time** column (Figure H.8) will display the date and time of the next scheduled execution.

H.7.2.3 Deleting a Scheduled Script

From the **Script Job Status** dialog box (Figure H.8), from the table, select a schedule script. From the **Job** menu, click **Delete**; and a message will open asking if this scheduled script should really be deleted. Click **Yes**, and the message will close, and the scheduled script will no longer appear in the table.

APPENDIX I

Plots

Plots are highly customizable and offer an array of information to assist with reviewing data in HEC-RTS. This appendix covers some of the capabilities of plots within HEC-RTS. For more detail, see the HEC-DSSVue User's Manual.

I.1 Plot Window

The **Plot** window provides tools that facilitate the viewing of HEC-RTS data. The main plot window and the different components are illustrated in Figure I.1. The **Title Bar** contains the name of the location that the data represents. For example, in Figure I.1, the plot is illustrating the power and flow data at a reservoir location named *Lake Sonoma*.

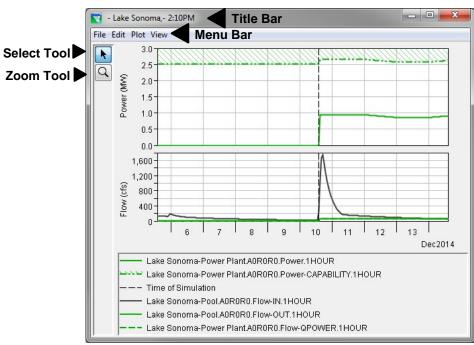


Figure I.1 Plot Window

I.1.1 Menu Bar

Following is an overview of the **Menu Bar** (Figure I.1) for the **Plot w**indow. The commands available from the menus will facilitate the viewing and customizing of plots.

- File: From this menu the user can view the plotted data in a tabular format, save the plot as a graphics file, save a template, use a template, copy the plot to the clipboard, and print the plot. Available commands are: Tabulate, Save As, Save Template, Apply Template, Save Specification, Copy to Clipboard, Print, Page Setup, Print Preview, Print Multiple, and Close.
- Edit: From this menu the user can customize the plot. Available commands are: Plot Properties, Default Line Styles, and Default Plot Properties.
- **Plot:** From this menu the user can select variable to plot, open and save plot type. Available commands are: **Select Variables**, **Open Plot Type**, and **Save Plot Type**.
- View: From this menu the user can have the plot window always on top of your desktop, and you can choose to use line styles. Available commands are: Always On Top, Use Line Styles, Zoom to all, Legend Placement, Hide Legend, Refresh, and Live Display.

I.1.2 Tools

The **Tools** appear in a toolbar on the left side of the **Plot** window (Figure I.1). The tools change the appearance of the mouse, as well as the functionality of the mouse.

Pointer/Select Tool: With the **Pointer/Select Tool**, shortcut menus can be accessed that allow for the customization of features of plots using the plot editing tools.

Zoom Tool: The **Zoom Tool** allows the user to view data closely at a specific time. To *zoom in*, hold the mouse button down and outline the area to be enlarged. To *zoom out*, click the right mouse button (right-click). The zoom out is done by a factor of two and positions the clicked location at the center of the display area.

I.2 Customizing Plots

I.2.1 Overview

From the **Plot** window, several editors allow for configuration of default properties for all plots, as well as customize individual plots. Figure I.2 shows the features plot area that can be configured.

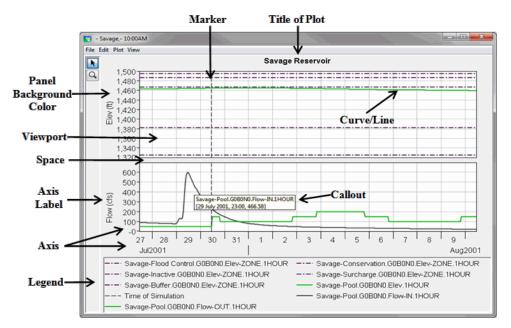


Figure I.2 Elements of the Plot Window

- Title of Plot: Add a title to all plots or to individual plots.
- Marker: Add markers on the X- and Y-axes and customize the appearance of these markers.
- **Panel Background Color:** Specify the background color of the plot window (light grey is the default) for all plots only.
- **Curve/Line Properties:** Choose the line and point styles, add labels, and specify symbols to indicate quality.
- Label: Add borders and backgrounds to axis and legend labels.
- **Spacer:** Specify the distance between viewports, between a viewport and the legend, and the width of side margins.
- Viewport: Customize the border around the viewport, the background color and pattern, and the appearance of gridlines. You can also specify the number, size, and content of viewports.
- Callout: Add descriptive callouts at specific points along a line.
- Axis: Specify either a linear or log axis type, specify the axis scale, and customize tic marks.
- **Legend:** Add titles to the plot legend and specify whether the legend appears below or to the right of the plot.

I.2.2 All Plots

All the plots for an entire watershed can be customized. From the **Plot** window (Figure I.1), from the **Edit** menu, there are two commands - **Default Line Styles** and **Default Plot Properties**. These commands will allow for customization of all new plot windows that will be accessed for a watershed.

I.2.2.1 Default Line Style Options

The **Default Line Style Options** dialog (Figure I.3) is for adjusting the curves (lines) in all of the plots.

| 🟹 Default Li | ne Style Op | ptions | | | | |
|--------------|-------------|--------|------------|-----------|------------------------------|----------------------------------|
| File | | | | | | |
| | Line | Styles | | | Line Label Defaults | |
| Name | Para | Туре | Line Nu | Line/Fill | Line Point | |
| Elev | | A 🔻 | | | | w Points |
| Elev | Elev | A 🔻 | 2 | | Style: | |
| Elev | Elev | A | 3 | | Style: Line C | Color: blue 👻 |
| Elev | Elev | A | 4 | | Weight Fill Co | olor: blue 🚽 |
| Elev | Elev | A • | 5 | | Size: | 8 - |
| Elev | Elev | A | 6 | | O Au | tomatic Symbol Drawing |
| Elev | Elev | A | 7 | - | Fill Color: | aw Symbols on Data Points |
| Elev | Elev | A • | 8 | | Fill Pattern: | |
| Elev-Zone | Elev | A 🔻 | 1 | | Type: O Stepped Linear Offs | et |
| Elev-Zone | Elev | A 🔻 | 2 | | Draw Missing Value Symbols | |
| Elev-Zone | Elev | A | 3 | | Style: | aw Symbols at Specified Interval |
| Elev-Zone | Elev | A | 4 | | Line Color: red V | val |
| Elev-Zone | Elev | A 🔻 | 5 | | Fill Color: red 🗸 Offs | et |
| Elev-Zone | Elev | A • | 6 | | Size: 3 | |
| Opened nu | | ř. | L | -77777. | | |

Figure I.3 Default Line Style Options Dialog

It allows the user to add curve (line) types, change the color and fill of the curves (lines), and add labels for the curves (lines) for all plots. For more detailed information on **Default Line Style Options** dialog, refer to the HEC-DSSVue User's Manual.

From the **Line** tab (Figure I.3) the color, style, and weight for the curves (lines) in all plots can be set. If the curves have points, the style, color, and fill color for the points on the curves in all plots can be set.

From the **Default Line Style Options** dialog (Figure I.3) labels can be added to the curves and their position can be adjusted (**Label** tab) for all plots. The user can manually adjust the maximum and minimum values for your X-axis, set viewport weight, and reverse the X-axis (**Defaults** tab) for certain curve types such as Precip.

I.2.2.2 Default Plot Properties

The **Default Plot Properties** dialog (Figure I.4) allows the user to configure the other properties of the plots. The tabs for this dialog allow the user to make adjustment to the viewport, add a title for all plots, adjust grids, labels, axes, marker lines, and legend, change the color of the panel background, change the layout of the legend, and adjust the size of the spacer.

| Style Legend Iter | n Quality Symbo | ls | | |
|-------------------|------------------|----|--|--|
| Missing Value S | mbols | | | |
| 📃 Draw Missin | g Values Symbol: | S | | |
| Style: | ♦ | | | |
| Line Color: | red | - | | |
| Fill Color: | red | + | | |
| Size: | * 8 * | | | |
| | | | | |

Figure I.4 Default Plot Properties Dialog

To add a title for all plots:

- 1. Open a **Plot** window (Figure I.1).
- 2. From the Edit menu, click Default Plot Properties.
- 3. The **Default Plot Properties** dialog (Figure I.4) opens.
- 4. Select the **Title** tab (Figure I.5).
- 5. To add a title, click **Show Plot Title**. In the **Text** field enter a title that will appear on all of the plots in the watershed. The title can be aligned, font size adjusted, a border with color can be added, and a color background can be added to the title.
- 6. Click **Apply**, and the title will appear on all plots.
- 7. Click **OK**, and the **Default Plot Properties** dialog closes.

| | Plot Prop | | 2 | | | | | | and the second s | | | | X |
|---------|--------------------------|--------|-------|-----------|-----------|-----|---------|----------|--|-----|------|---|-------|
| | Viewport v Plot Title | | Axis | Legend | Marker Li | nes | Layout | | | | | | |
| Text | | | | | | | | | | | | | |
| Font | | | | | | | Border | | | | | | |
| Font | Dialog | | | | |] | Dra | w Border | | | | | |
| Style: | Bold | | talic | | | | Color | | b | ue | | | - |
| Color | | black | | | |] | Style: | | | | - | - | * |
| Size: | 12 | | | | Ŧ | | Weigh | nt | _ | | | | |
| | Use F | ont So | aling | | | | Backgro | ound | | | | | |
| | Min Size | 8 | •] N | lax Size: | 16 🔻 | | Color | w Backgr | ound | | blue | | Ŧ |
| Alignme | ent: Cent | er | | | | | Patter | n: | | | | | - |
| Sample | 9 | | | | | | Trans | parency: | | | | | 0 |
| Samp | le Text | | | | | | | | | | | | |
| Import | | Export | | | | | | OK | | Can | cel | | Apply |

Figure I.5 Default Plot Properties Dialog – Title Tab

To change the panel background color for all plots:

- 1. Open a **Plot** window (Figure I.1).
- 2. From the Edit menu, click Default Plot Properties.
- 3. The **Default Plot Properties** dialog (Figure I.4) opens.
- 4. Select the **Layout** tab (Figure I.6).
- 5. To change the panel background color of the plot, from the **Panel Background Color** list, select a color.
- 6. Click **Apply**, and the new color will appear in the background panels for all the plots
- 7. Click OK, and the Default Plot Properties dialog closes.

| Tip Default Plot Properties | × |
|---|---------------------------------|
| Curves Viewport Title Axis Legend Marker Lines Layout | |
| Window Size in Pixels Width: | Set to Current Plot Window Size |
| Height: | |
| Panel Background Color: purple 💌 | |
| Space size in pixels: | |
| | |
| | |
| Import Export OK | Cancel Apply |

Figure I.6 Default Plot Properties Dialog - Layout Tab

I.2.3 Individual Plots

To customize individual plots that are being displayed (Figure I.1) two dialogs can be used, or shortcut menus may be used to make changes through individual editors. The dialogs include **Plot Properties** accessible from the **Edit** menu and **Select Plot Variables** accessible from the **Plot** menu.

I.2.3.1 Individual Plot Properties

The **Plot Properties** dialog (Figure I.7) allows for configuration of multiple display properties of an individual plot. This includes the border and background patterns of the viewport; adding a title to the plot; adjusting the gridlines of the plot; editing the titles, tic marks, and scale of an axis; adjusting the style, adding points, and adding quality symbols for curves; adjusting the color, adding labels, and positioning of marker lines; adding a title, icon, and moving the legend; changing the color of the panel background; adjusting the layout of the legend; and the size of the spacer.

To change the gridlines of an individual plot:

- 1. Open a **Plot** window (Figure I.1).
- 2. From the Edit menu, click Plot Properties.
- 3. The **Plot Properties** dialog (Figure I.7) opens.
- 4. The **Title Bar** displays the name of the location that data is being plotted.
- 5. If the plot has multiple viewports, the **Select Viewport** list displays the viewport where the editing is taking place.

| ect Viewport Viewport (1,1) urves Viewport Title Axis Legend Marker Lines La | wout |
|---|--|
| urves Savage-Flood Control G080N0, Elev-ZONE, 1HOUE Savage-Conservation, G080N0, Elev-ZONE, 1HOUE Savage-Inactive, G080N0, Elev-ZONE, 1HOUR | R 🔺 |
| Line | Point |
| Color: darkpurple Style: Weight Fill: None Below Above Fill Color: blue Fill Pattern: Type: Stepped Linear Interpolate for missing values | Style: Line Color: darkpurple Fill Color: darkpurple Size: 7 Oraw Symbols on Data Points Skip Offset Draw Symbols at Specified Interval |
| Missing Value Symbols Draw Missing Value Symbols Style: Line Color: Fill Color: Size: | Interval |

Figure I.7 Individual Plot Properties Dialog - Curves Tab

- 6. Choose the **Viewport** tab (Figure I.8).
- 7. From the **Major X Grid** panel, click **Draw Major X Grid**. Select from the **Color**, **Style**, and **Weight** drop-down lists to modify the major X-axis gridline properties. Also, the **Minor X Grid** can be modified by clicking the **Draw Minor X Grid** and modifying the minor X-axis gridlines properties.
- 8. From the **Major Y Grid** panel, click **Draw Major Y Grid**. Select from the **Color**, **Style**, and **Weight** drop-down lists to modify the major Y-axis gridline properties. Also, the **Minor Y Grid** can be modified by clicking the **Draw Minor Y Grid** and modifying the minor Y-axis gridlines properties.
- 9. Click **Apply**, and the color, style, and weight changes that were made will reflect on the gridlines of the plot.
- 10. Click OK, and the Plot Properties dialog (Figure I.8) closes.

| Irves Viewport Title Axis | Legend Marker Lines Layout | |
|--|--|-------------------|
| Major X Grid Draw Major X Grid Color: lightgray Style: Weight: | Major Y Grid Draw Major Y Grid Color: Iightgr Style: Weight: | Border |
| Minor X Grid | Minor Y Grid | Background |
| Color: lightgray | Color: Iightgr | ray - Color: blue |
| Style: | • Style: | Pattern: |
| Weight: | Weight: | Transp 0 |

Figure I.8 Individual Plot Properties Dialog - Viewport Tab

I.2.3.2 Select Plot Variables

The **Select Plot Variables** dialog (Figure I.9) allows the user to customize the layout of an individual plot. The user can add and remove axes, arrange the order of viewports, add and remove viewports, and set the weight of viewports. The plot components are displayed in a tree structure.

To add a viewport to an individual plot:

- 1. Open a **Plot** window (Figure I.1).
- 2. From the **Plot** menu, click **Select Variables**.
- 3. The Select Plot Variables dialog (Figure I.9) opens.

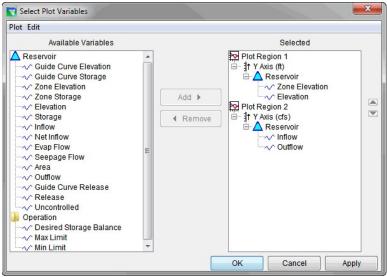


Figure I.9 Select Plot Variables Dialog

- 4. From **Edit** menu, click **Add Plot Region**, and a new plot region (viewport) is added to the bottom of the **Selected** tree.
- 5. Data now needs to be added from the **Available Variables** tree to the new plot region. Select a curve from **Available Variables** tree and click **Add**.
- 6. In this example (Figure I.10), *Zone Storage* is added to the *Reservoir* tree from the **Available Variables** by selecting *Plot Region 3* in the **Selected** tree and clicking **Add**.
- 7. Click **Apply**, and the plot region displays the curve that was added.
- 8. Click **OK**, and the **Select Plot Variables** dialog (Figure I.10) closes, and the plot will display the changes that were made.

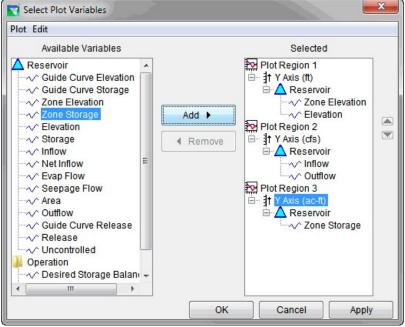


Figure I.10 Select Plot Variables Dialog - Added Data to Viewport

I.2.3.3 Shortcut Menus

To edit a specific property of a plot without using the **Individual Plot Properties** dialog (Figure I.7), use individual plot property dialogs instead. To access these dialogs, select the **Pointer/Select** tool, *right-click* the element of the **Plot** window (Figure I.2) to be edited, and from the shortcut menu that appears, click **Edit Properties**.

I.2.3.4 Edit Title Properties

To add a title to an individual plot:

1. Right-click the **Plot** window where the title is (or will be) displayed (Figure I.11).

| File Edit Plot View | | | |
|---------------------|------------------|-----------------|---|
| k | Savage Reservoir | Title | 1 |
| Q 1,480 E | | Edit Properties | |

Figure I.11 Plot Title Shortcut Menu

- 2. From the shortcut menu, click **Edit Properties**.
- 3. The Edit Title Properties dialog (Figure I.12) opens.
- 4. Check **Show Plot Title**, and in the **Text** field, enter the title for the individual plot. From this dialog the user can also set the alignment, the size of the font, and add a border and background colors to the title.
- 5. Click **Apply**, and the title is displayed on the plot.
- 6. Click **OK**, and the **Edit Title Properties** dialog (Figure I.12) closes.

| Show Plot Title | |
|------------------------------|-----------------|
| Text Savage Reservoir | |
| Font | Border |
| Font: Dialog - | Color: blue |
| Style: V Bold Italic | Style: |
| Color black | Weight |
| Size: 12 👻 | weight. |
| Use Font Scaling | Background |
| Min Size: 8 🗸 Max Size: 16 🗸 | Draw Background |
| | Color: blue 👻 |
| Alignment: Center - | Pattern: |
| Sample Savage Reservoir | Transparency: 0 |
| | OK Cancel Apply |

Figure I.12 Edit Title Properties Dialog

I.2.3.5 Edit Marker Lines Properties

To edit the marker lines of an individual plot:

1. Right-click the **Plot** window where the marker line is (or will be) displayed (Figure I.13).

| File Edit P | lot View | | |
|-------------|----------|-----------------|--------|
| R C | F | | Savage |
| Elev (ft) | 1,480 | | |
| Ш | 1,440 | Marker Line | |
| | | Edit Properties | |
| | | Delete | |

Figure I.13 Marker Line Shortcut Menu

- 2. From the shortcut menu, click Edit Properties.
- 3. The Edit Marker Line Properties dialog (Figure I.14) opens.
- 4. To change the style of the marker line, click the **Draw Line** checkbox. The color, style, and weight of the marker line can be changed. Fill can be added if needed.
- 5. To add a label to the marker line, click the **Draw Label** checkbox. The user can add a label, the alignment of the label, and the placement of the label along the marker line.
- 6. If the plot has more than one viewport, marker line properties must be set for each viewport.
- 7. Click **Apply**, and the changes to the marker line are displayed on the plot.
- 8. Click **OK**, and the **Edit Marker Line Properties** dialog (Figure I.14) closes.

| 😴 Edit Marker Line Properties | × |
|--|---|
| Date 28Jul20 | 001 Time 1902 |
| Line Color: Style: Weight: Fill: None Below Above Fill Color: Fill Pattern: | Label Draw Label Text: Font Font Dialog Style: Bold Italic Color Diack Size: 10 Use Font Scaling |
| Sample Sample Text | Min Size: 5 - Max Size: 5 - Alignment: Left - Above - |

Figure I.14 Edit Marker Line Properties Dialog

I.2.3.6 Edit Curve Properties

To edit the curves of an individual plot:

1. Right-click on the curve in the **Plot** window (Figure I.15).

| dit Plot View | | |
|--------------------|--|-----------|
| | Savage | Reservoir |
| G 1,480 | | |
| € 1,460 ≩ 1,460 | Savage-Conservation.G080N0.Elev-ZONE.1HOUR | |
| 1,440 | Edit Properties | |
| | Hide Curve | |
| 600 | Remove Curve | |
| £ 400 | Add Callout | |

Figure I.15 Curve Shortcut Menu

- 2. From the shortcut menu, click Edit Properties.
- 3. The Edit Curve Properties dialog (Figure I.16) opens.
- 4. To change the style of the curve, select the **Style** tab. The user can change the color, style, and weight of the curve. Fill can be added below or above the curve if needed.
- 5. To display the quality of the data that the curve represents, select the **Quality Symbols** tab, and click the **Draw Quality Symbols** checkbox. Then, set the symbol color and size for each type of quality.

| Draw Curve Show in | Legend Remove Curve |
|---|--|
| Style Label Legend Item Quality Symbols | |
| Line Image: Color: Image: Color: | Point Draw Points Style: |
| Style: | Line Color: darkpurple - |
| Fill: None Below Above Fill Color: Fill Pattern: Type: Stepped Linear Interpolate for missing values Missing value symbols Draw Missing Value Symbols Style: Line Color Fred Fred Fred Fred Fred Fred Fred Fre | Size: a - Automatic Symbol Drawing Draw Symbols on Data Points Skip Offset Draw Symbols at Specified Interval Interval Offset Offset |
| Line Color: red v Fill Color: red v Size: 8 | Sample |

Figure I.16 Edit Curve Properties Dialog – Style Tab

- 6. If the plot has more than one curve, properties for each curve will need to be edited individually.
- 7. If the plot has more than one viewport, curve properties will need to be set for each viewport.
- 8. Click **Apply**, and the changes to the marker line are displayed on the plot.
- 9. Click OK, and the Edit Curve Properties dialog (Figure I.16) closes.

To add a callout to a curve of an individual plot:

- 1. Right-click the **Plot** window where a curve is displayed (Figure I.15).
- 2. From the shortcut menu, click Add Callout.
- 3. The Add Callout dialog (Figure I.17) opens.
- 4. Enter the callout you want in the **Callout Text** field.
- 5. Click Apply, and the changes to the marker line are displayed on the plot.
- 6. Click **OK**, the new callout is displayed on the plot, and the **Add Callout Dialog** (Figure I.17) closes.

| Cancel |
|--------|
| |

Figure I.17 Add Callout Dialog

I.2.3.7 Edit Axis Title Properties

To edit the appearance of axis titles for an individual plot:

1. Right-click the **Plot** window where the axis title is displayed (Figure I.18).

| 🟹 - Savage,- 7:44AM | 1 | | | • X |
|--|---|--|--|-----|
| File Edit Plot View | | | | |
| 1,480 € 1,440 ★ 1,440 ★ 1,440 ★ 1,440 ★ 1,440 ★ 1,440 ★ 1,440 ★ 1,480 Edit Properties 600 € 100 | | | | |

Figure I.18 Axis Title Shortcut Menu

- 2. From the shortcut menu, click **Edit Properties**.
- 3. The Edit Axis Properties dialog (Figure I.19) opens.
- 4. To give an axis title a border, click the **Axis Label** tab. In the **Border** panel, click **Draw Border**. The user can set the color, style, and weight of the border around the axis title.
- 5. To give an axis title a background color, in the **Background** panel, click **Draw Background**. The user can set the color and the pattern of the background for the axis title.
- 6. Click Apply, and the axis title is displayed with your changes.
- 7. Click OK, and the Edit Axis Properties dialog (Figure I.19) closes.

| Show Axis Label | |
|----------------------------|-----------------|
| ext Elev (%S) | Parameter: |
| Font | Border |
| Font: Dialog | Draw Border |
| Style: 🔄 Bold 📄 Italic | Color: blue |
| Color black | Style: |
| Size: 12 | ▼ Weight: ▼ |
| Vse Font Scaling | Background |
| Min Size: 8 🗸 Max Size: 16 | Draw Background |
| Min Size: 8 V Max Size: 16 | Color: blue 👻 |
| lignment: Right | ▼ Pattern: |
| Sample Elev (%S) | Transparency: 0 |

Figure I.19 Edit Axis Properties Dialog – Axis Label Tab

I.2.3.8 Edit Spacer Properties

To edit the spacer properties for an individual plot:

1. Right-click the **Plot** window where the spacer is (Figure I.20) located on the plot. Spacers are between viewports, on either side of each viewport, and at the top of the plot.

| | =:=:= | =.= |
|------|-------|-----|
| | | |
| | | |
| | | |
| | | |

Figure I.20 Spacer Shortcut Menu

- 2. From the shortcut menu, click **Edit Properties**.
- 3. The Edit Spacer Properties dialog will open (Figure I.21).
- 4. Enter the size of the spacer in pixels in the Size in Pixels cell.
- 5. Click **Apply**, and the changes you made to the spacer will appear on the plot.
- 6. Click **OK**, and the **Edit Spacer Properties** dialog (Figure I.21) will close.

| Edit Spacer F | Properties | × |
|----------------|------------|-------|
| Size in Pixels | | 13 |
| ОК | Cancel | Apply |

Figure I.21 Edit Spacer Properties Dialog

I.2.3.9 Edit Viewport Properties

To edit the viewports of an individual plot:

1. Right-click in the **Plot** window where a viewport is displayed (Figure I.22).

| le Edit Plot View | | |
|-------------------|------------------|------|
| 1,480 | | |
| € 1,440 | | |
| a 1,400 | Viewport | |
| 1,360 | Edit Properties | |
| 1,320 | Add Marker | |
| 600 | Add Marker Point | |
| ଞ ⁴⁰⁰ | | |
| | | |
| | | |

Figure I.22 Viewport Shortcut Menu

- 2. From the shortcut menu, click Edit Properties.
- 3. The Edit Viewport Properties dialog (Figure I.23) opens.

| Major X Grid Draw Major X Grid Color: lightgray Style: Weight | Major Y Grid Draw Major Y Grid Color: Iightgray Style: Weight | Border Color: Style: Weight |
|---|---|---|
| Minor X Grid | Minor Y Grid | Background |
| Color: lightgray + Style: | Color: lightgray + Style: | Color: blue Pattern: Transparency: 0 |

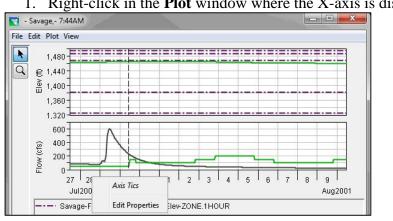
Figure I.23 Edit Viewport Properties DIalog

- 4. To change the viewport border's color, pattern or transparency click **Draw Border** under the **Border** panel.
- 5. To change the viewport background's color, pattern or transparency click **Draw Background** under the **Background** panel.

- 6. To change the color, style, or weight of the gridlines of the viewport, click the **Draw Major X Grid**, **Draw Major Y Grid**, **Draw Minor X Grid**, or **Minor Y Grid** checkboxes under the grid section.
- 7. If the plot has more than one viewport, curve properties will have to be set for each viewport.
- 8. Click **Apply**, and the changes to the viewport are displayed on the plot.
- 9. Click **OK**, and the **Edit Viewport Properties** dialog (Figure I.23) closes.

I.2.3.10 Edit Axis Tics Properties

To edit the X-axis scale of an individual plot:



1. Right-click in the **Plot** window where the X-axis is displayed (Figure I.24).

Figure I.24 Axis Tics Properties Menu

- 2. From the shortcut menu, click Edit Properties.
- 3. The Edit Axis Properties dialog (Figure I.25) opens.
- 4. Select the **Scale** tab. In the select table the user can choose to automatically set the maximum, minimum, view maximum, view minimum, and view range. Also, the user can set the number of label levels and reverse the X-axis.
- 5. To change the tic marks of the X-axis, select the **Tics** tab. The user can add minor tics marks, do minor tic marks only, and change the color of the tic mark and tic mark label.
- 6. If the plot has more than one viewport, axis tics properties will have to be set for each viewport.
- 7. Click **Apply**, and the changes to the X-axis are displayed on the plot.
- 8. Click OK, and the Edit Axis Properties dialog (Figure I.25) closes.

| 🟹 Viewport (1,1) - Axis mi | nutes Properties | × |
|----------------------------|------------------|--------------|
| Scale Axis Label Tics |] | |
| Auto | Date | Time |
| Maximum: | 14Dec2014 | 1400 |
| Minimum: | 05Dec2014 | 1400 |
| View Maximum: | 14Dec2014 | 1400 |
| View Minimum: | 05Dec2014 | 1400 |
| View Range: | | Min 👻 |
| Number of Label Levels | 2 | |
| Reverse Axis | | |
| | ОК | Cancel Apply |

Figure I.25 Edit Axis Tics Properties Dialog – Scale Tab

I.2.3.11 Edit Legend Panel Properties

To edit the legend panel of an individual plot:

1. Right-click the Plot window where the legend panel is displayed (Figure I.26).

| Savage-Flood Control.G0B0N0.Elev-ZONE.1HOUR Savage-Inactive.G0B0N0.Elev-ZONE.1HOUR | Legend Panel | ation.G0B0N0.Elev-ZONE.1HOUR ge.G0B0N0.Elev-ZONE.1HOUR |
|--|-----------------|---|
| Savage-Buffer.G0B0N0.Elev-ZONE.1HOUR | Edit Properties | 30N0.Elev.1HOUR 30N0.ElevIN.1HOUR |
| Savage-Pool.G0B0N0.Flow-OUT.1HOUR | Hide Legend | |

Figure I.26 Legend Panel Shortcut Menu

- 2. From the shortcut menu, click Edit Properties.
- 3. The Edit Legend Properties dialog (Figure I.27) opens.
- 4. Give the legend panel a title by checking the **Draw Legend Title** and entering information in the **Text** field.
- 5. Add icon information to the left and right areas of the legend bock from the **Left Block** and **Right Block** tabs. For example, to add a description to display on the left side of the legend panel, click the **Left Block** tab and enter the description in the **Text** field.
- 6. To add an icon, enter the path and filename of icon to be display in the **Icon** panel for either the left or right sides of the **Legend** panel.
- 7. Click Apply, and the changes to the legend panel are displayed on the plot.
- 8. Click **OK**, and the **Edit Legend Properties** dialog (Figure I.27) closes.

| C Edit Legend Properties | |
|--|-----------------|
| Show Legend Legend Position: Bottom of Pan | el 🔻 |
| Legend Title Left Block Right Block | |
| ✓ Draw Legend Title | |
| Text | |
| Font | Border |
| Font: Dialog 👻 | 🔲 Draw Border |
| Style: Bold Italic | Color: blue |
| Color black | Style: |
| Size: 12 🔻 | Weight: |
| Use Font Scaling | Background |
| Min Size: 8 👻 Max Size: 16 💌 | Color: blue |
| Alignment: Right | Pattern: |
| Sample Sample Text | Transparency: 0 |
| L | OK Cancel Apply |

Figure I.27 Edit Legend Properties Dialog – Legend Title Tab

I.3 Exporting and Importing Templates

After customizing a plot, its settings can be saved as a template for use in other plots. Generally, templates would be used when scripting plots. For example, every day the user might want to generate a plot of flow, stage, and precipitation via a script, and then apply a template that has all of the correct formatting, such as viewport placement, size, line colors, and fills.

To create a template from a plot:

- 1. Open a **Plot** window (Figure I.1).
- 2. From the **File** menu, click **Save Template**, and the **Export Plot Template** dialog will open (Figure I.28).
- 3. Specify whether the template should be available for **All Applications**, **This Watershed only**, **All Users Watershed**, or **All Users**. Then enter a name for the template in the **Name** field.
- 4. Click **OK**, and the **Save Template** dialog closes saving the template.

| Availability | |
|--------------|---------------|
| All Appl | lications |
| This W | atershed only |
| 🔘 All Use | rs Watershed |
| 🔘 All Use | rs |
| | |
| | |
| Name: | |

Figure I.28 Export Plot Template Dialog

To apply (import) a template that was previously created to another plot that is currently open:

- 1. Open a **Plot** window (Figure I.1).
- 2. From the **File** menu, click **Apply Template**.
- 3. The **Import Plot Template** dialog (Figure I.29) opens.
- 4. Specify whether the template should be available for **All Applications** or **This Watershed only**.
- 5. Choose the desired template from the list.
- 6. After selecting a template, its name will display in the **Name** field.
- 7. Click **OK** to apply the template to the current plot, and the **Import Plot Template** dialog closes.

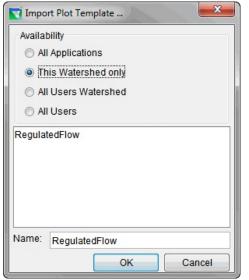


Figure I.29 Import Plot Template

APPENDIX J

Printing and Copying HEC-RTS Data

Plots and tables in the **Visualization**, **Acquisition**, and **Modeling** modules offer detailed views of data and model results that can be printed or copied and pasted into other applications. In addition, reports generated by the individual models can be printed.

J.1 Plots

Plots provide a graphical representation of the data. From the **Plot** window (Figure J.1) the user can view the plot, as well as print, save as a graphics file, copy the contents of the **Plot** window to the clipboard, and save the properties of the plot to a template to be used by other plots. Following is an overview of the menu bar of the **Plot** window. The commands available from the menus are:

- File: View the plotted data in a tabular format, save the plot as a graphics file, save a template, use a template, copy the plot to the clipboard, and print the plot. Available commands are: Tabulate, Save As, Save Template, Apply Template, Save Specification, Copy to Clipboard, Print, Page Setup, Print Preview, Print Multiple, and Close.
- Edit: Customize the plot. Available commands are: Plot Properties, Default Line Styles, and Default Plot Properties.
- Plot: Select variable to plot, open and save plot type. Available commands are: Select Variables, Open Plot Type, and Save Plot Type.
- View: Have the plot window always on top of the desktop, and choose to use line styles. Available commands are: Always On Top, Use Line Styles, Zoom to all, Legend Placement, Hide Legend, Refresh, and Live Display.

The **Tools** appear in a toolbar on the left side of the **Plot** window (Figure J.1). The tools change the appearance of the mouse, as well as the functionality of the mouse:



Pointer/Select Tool. With the **Pointer/Select Tool**, the user can access shortcut menus that allow them to customize features of your plots using the plot editing tools.



Zoom Tool. The **Zoom Tool** allows the user to view data closely at a specific time. To *zoom in*, hold the mouse button down and outline the area you to be enlarged. To *zoom*

out, click the right mouse button (right-click). The zoom out is done by a factor of two and positions the clicked location at the center of the display area.

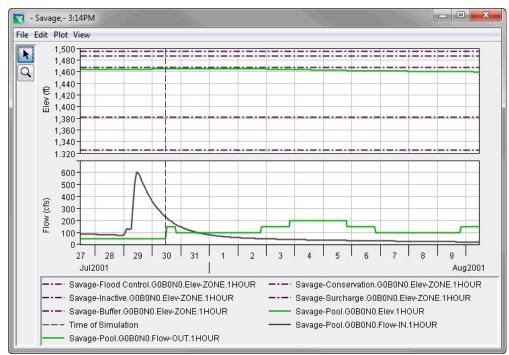


Figure J.1 Plot Window

J.1.1 Save As

The **Save As** command allows the plot to be saved as a graphics file. HEC-RTS has four possible formats: **Windows Metafile** (*.*wmf*), **Postscript** (*.*ps*), **JPEG** (*.*jpg*, *.*jpeg*), and **Portable Network Graphics** (*.*png*). To create a graphics file:

- 1. On the File menu, click Save As, and the Save browser (Figure J.2) opens.
- 2. Select the location the file will be saved to from the **Save in** drop-down list.
- 3. Enter a name for the file in the **File name** field.
- 4. From the **Files of type** list, select the type of graphics file that will be created.
- 5. Click **Save**, and the **Save** browser closes, and the plot is saved as the selected graphics file type.

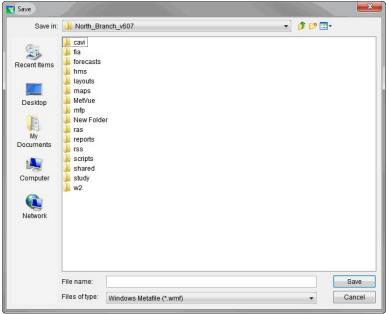


Figure J.2 Save Browser

J.1.2 Copy to Clipboard

The **Copy to Clipboard** command copies the contents of the **Plot** window to the clipboard. Once the copy is complete, the plot can be pasted as an image into other applications.

J.1.3 Print Commands

The **Plot** window (Figure J.1) provides the user with several different commands to setup the printing process and to print.

J.1.4 Print

The **Print** command opens a standard system **Print** dialog (Figure J.3). From the **Print** dialog select the printer, choose to print to a file, and the number of copies to print. Click **OK**, and the **Print** dialog closes and the plot will print to the selected printer.

| 🛓 Print | | × |
|-------------|--------------------|----------------------------------|
| Printer | | |
| Name: | Canon Inkjet S9000 | ▼ Properties |
| Status: | Ready | |
| Type: | Canon Inkjet S9000 | |
| Where: | CanonS9000-P2 | |
| Comment: | | Print to file |
| Print range | | Copies |
| Al | | Number of copies: 1 |
| Pages | from: 1 to: 1 | |
| Select | ion | <u>1</u> 1 <u>2</u> 2 <u>3</u> 3 |
| | | |
| | | OK Cancel |
| | | |

Figure J.3 Print Dialog

J.1.5 Page Setup

The **Page Setup** command opens the **Page Setup** dialog (Figure J.4). The page display can be formatted from this dialog. Following is a list of the available options:

| Orientation | ne Reversed | |
|--|--------------|-----|
| Margins | | |
| Left: 1.0 in Top: 1. Right: 1.0 in Bottom: 1. | Set Margi | ns |
| Additional Options | | |
| Frame around plot | | |
| Page Numbers | | |
| Printer Scale | | |
| Maximum Plotting Area | a | |
| 🔿 User Defined Scale | 1 in Horiz = | ft. |
| | 1 in Vert = | ft. |
| | | |
| | | |

Figure J.4 Page Setup Dialog

• **Orientation:** To set the orientation, select **Portrait** or **Landscape** from the **Orientation** panel. By default, the pages are printed in **Portrait**.

• Margins: The default margin settings are displayed in the Margins panel of the Page Setup dialog. To set the margins, click Set Margins, and the Printer Margins dialog (Figure J.5) opens. From the Printer Margins dialog, it is possible to adjust the top, left, bottom, and right margins.

| Тор | 1.0 | in |
|--------|-----|----|
| Left | 1.0 | in |
| Bottom | 1.0 | in |
| Right | 1.0 | in |

Figure J.5 Printer Margins Dialog

- Additional Options: To include page numbers on the printed page, select the Page Numbers checkbox (Figure J.4).
- Printer Scale: The default option is Maximum Plotting Area.

J.1.6 Print Preview

The **Print Preview** command opens the **Print Preview** dialog (Figure J.6). From the **Print Preview** dialog, the user can view the plot, adjust the scaling of the plot, and print the plot. The **Print** command automatically prints the plot to the default system printer.

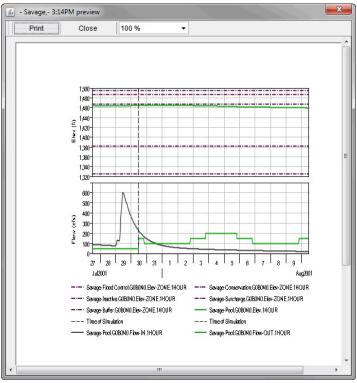


Figure J.6 Print Preview Dialog

J.1.7 Print Multiple

The **Print Multiple** command opens the **Print Multiple** dialog (Figure J.7). To be able to print multiples plots multiple individual plot windows must be open. The opened plots are listed in the **Available Plots** list of the **Print Multiple** dialog.

| ≝ Print Multiple File | | × |
|---|--------------|--------------|
| Available Plots | Selected Plo | ts |
| - Jennings Randolph,- 3:52PM - Savage,- 3:52PM | | ^ |
| Plots Per Page 1 | • | |
| Number Across | | |
| Number Down | | |
| | | Print Cancel |

Figure J.7 Print Multiple Dialog

To select plots to be printed on one page, double-click on a plot name in the **Available Plots** list. The plot name will move to the **Selected Plots** list. Adjustments can be made to the way the plots are arranged on a page, horizontally or vertically. Use the **Number Across** or **Number Down** sliders. The grid to the right of the sliders reflects the user's choices. From the **File** menu, the **Page Setup** and **Print Preview** commands are available.

J.2 Tables

Tables provide a tabular format of the data. From the **Tabulate** window (Figure J.8) the user can view the data and results, as well as print the table, copy the selected contents of the **Tabulate** window to the clipboard, adjust the display of the data, and save the data to an ASCII file. Following is an overview of the menu bar of the **Tabulate** window.

The commands available from the menus are:

- File: Print the data in a tabular format and view a plot of the data. Available commands are: Save, Save As, Print, Print Preview, Export, Plot, and Close.
- Edit: Select data to be copied to the clipboard. Available commands are: Allow Editing, Cut, Copy, Paste, Select All, Find, and Compare Data Sets.
- View: Control the appearance of the data displayed in the Tabulate window. Available commands are: Commas, Reverse Order, Date and Time Separately,

Date with 4 Digit Years, Show Decimal Places (up to 6 decimal places), and **Show Missing As** (blank, -901.00, M, -M-).

| ile Edit Viev | N | | | |
|---------------|--------------------|--------------|-------------|--------------|
| | 100000 | Lake Mendoci | EF RR NR CA | Lake Mendoci |
| Ordinate | Date / Time | Flow | Flow | Flow |
| 2010-00 | | A0R0R0 | A0R0R0 | A0R0R0 |
| Units | | cfs | cfs | cfs |
| Туре | | INST-VAL | INST-VAL | INST-VAL |
| 1 | 05 Dec 2014, 14:00 | 6.31 | 47.123 | 53.43 |
| 2 | 05 Dec 2014, 15:00 | 157.57 | 46.511 | 204.08 |
| 3 | 05 Dec 2014, 16:00 | 265.26 | 47.159 | 312.42 |
| 4 | 05 Dec 2014, 17:00 | 145.37 | 49.536 | 194.91 |
| 5 | 05 Dec 2014, 18:00 | 85.83 | 53.319 | 139.15 |
| 6 | 05 Dec 2014, 19:00 | 60.86 | 58.757 | 119.62 |
| 7 | 05 Dec 2014, 20:00 | 76.96 | 62.774 | 139.74 |
| 8 | 05 Dec 2014, 21:00 | 79.27 | 65.127 | 144.40 |
| 9 | 05 Dec 2014, 22:00 | 95.19 | 66.217 | 161.40 |
| 10 | 05 Dec 2014, 23:00 | 117.02 | 66.370 | 183.39 |
| 11 | 05 Dec 2014, 24:00 | 59.97 | 66.401 | 126.37 |
| 12 | 06 Dec 2014, 01:00 | 34.56 | 66.238 | 100.80 |
| 13 | 06 Dec 2014, 02:00 | 33.94 | 66.006 | 99.95 |
| 14 | 06 Dec 2014, 03:00 | 33.34 | 64.310 | 97.65 |
| 15 | 06 Dec 2014, 04:00 | 32.75 | 61.320 | 94.07 |
| 16 | 06 Dec 2014, 05:00 | 32.16 | 57.869 | 90.03 |
| 17 | 06 Dec 2014, 06:00 | 31.59 | 54.239 | 85.83 |
| 18 | 06 Dec 2014, 07:00 | 31.03 | 50.854 | 81.88 |
| 19 | 06 Dec 2014, 08:00 | 30.48 | 47.866 | 78.34 |
| 20 | 06 Dec 2014, 09:00 | 29.94 | 45.218 | 75.15 |
| 21 | 06 Dec 2014, 10:00 | 29.40 | 42.881 | 72.28 |
| 22 | 06 Dec 2014, 11:00 | 32.58 | 40.828 | 73.41 |
| 23 | 06 Dec 2014, 12:00 | 34.63 | 39.038 | 73.66 |
| 24 | 06 Dec 2014, 13:00 | 34.01 | 37.487 | 71.50 |
| 25 | 06 Dec 2014, 14:00 | 33.40 | 36.144 | 69.55 |

Figure J.8 Tabulate Window

J.2.1 Copying to the Clipboard

To copy data from the **Tabulate** window (Figure J.8) to the clipboard, there are several ways. To use the **Copy** command from the **Edit** menu, first select the cells in the table to be copied to the clipboard. To select the whole table, from the **Edit** menu choose **Select All**. If only a certain area is needed, from the table click and drag over the cells to be copied, and the selection will be highlighted. Then, from the **Edit** menu, choose **Copy**. The contents will be copied to the clipboard so the data can be pasted into other applications. In addition, right-clicking on the table will open a shortcut menu which will also allow data to be copied to the clipboard.

J.2.2 Displaying Data

By default, data is displayed with commas and two decimal places. There are several options to change the way the data is displayed using the **View** menu. To disable the display of commas, from the **View** menu, click **Commas**.

For time series data the date and time are displayed in the following default format: ddmmmyy hhmm. The way the date and time are displayed can be changed. From the View menu, click **Date and Time Separately**; and the date and time are now displayed in two separate columns in the table. Another way is from the View menu, click **Date with 4 Digit Years**; and the date displays a four-digit year instead of a two-digit year. Numbers by default are displayed with two decimal places. To see more or less number of decimal places, from the **View** menu, point to **Decimal Places**, and click on the number (up to 6 decimal places) of decimal places to be displayed.

J.2.3 ASCII Files

The table of data can be saved to an ASCII file. Right-click on the table, and from the shortcut menu, click **Export**. The **Table Export Options** dialog will open (Figure J.9). From this dialog, set certain options for the ASCII file.

| Table Export Options | | |
|--|-----------|--|
| Field Delimiter: | TAB • | |
| Fixed Width Columns | | |
| Quoted Strings | | |
| Include Column Headers | | |
| Include Row Headers | | |
| Print GridLines | | |
| Print Title: LOC/27JUL2001/1HOUR/G0B0N0/ | | |
| | OK Cancel | |

Figure J.9 Table Export Options Dialog

The delimiter for the file can be set from the **Field Delimiter** drop-down list. The field delimiter choices are **TAB** (default), **SPACE**, **COMMA COLON**, and **SEMI-COLON**. The user can also make choices on whether the file contains fixed width columns, strings are set in quotes, whether to include column headers in the file, include gridlines in the file, and whether to include the a title in the file.

When all of the options are set, click **OK**, and a **Save** browser (Figure J.2) opens. Find the location where the file should be saved and provide a filename. Click **Save** and the file is created without a filename extension. Since this is an **ASCII** file, the file should have an extension of **.txt**.

J.2.4 Printing

The **Print** command opens a standard system **Print** dialog (Figure J.3). From the **Print** dialog the user can select the printer, choose to print to a file, and the number of copies to print. Click **OK**, and the **Print** dialog closes, and the table will print to the selected printer.

Another way to print is to right-click on the table. From the shortcut menu click **Print**, and the **Properties** dialog (Figure J.10) opens. From this **Properties** dialog, the format of the table for

output can be set up. From the **Page** tab, the user can set the orientation; fit the table to a page, and decide whether to include the entire table or only a selection.

In addition, the user can also choose to print the table in ASCII, add headers, add background color to headers (non-ASCII option), and add gridlines.

| A Properties |
|-----------------------------------|
| Page Header/Footer Table Title |
| Orientation |
| A 💿 Portrait A 🔿 Landscape |
| Scaling |
| ✓ All columns on one page |
| Selection |
| Entire Table |
| Print |
| ASCII Repeat Headers |
| Use Header Background 🔽 Gridlines |
| Repeat fixed columns |
| Print Cancel |

Figure J.10 Properties Dialog

To add header or footer information to the table report, click the **Header/Footer** tab. From the **Header/Footer** tab enter header or footer information.

The title of the table report defaults to the pathname tag associated with the data. To change this title, click the **Table Title** tab. From the **Table Title** tab, enter or change the title, and decide if the title should print on each page of the report. When everything is set, click **Print**, and the **Print** dialog (Figure J.3) opens.

To preview the table report, right-click on the table, and from the shortcut menu, click **Print Preview**. The **Properties** dialog (Figure J.10) opens. Setup the options for the table report, click **Print**, and the **Print Preview** dialog (Figure J.11) opens.

From this **Print Preview** dialog, the user can view the table report, adjust the scaling of the report, and print the report. The **Print** command automatically prints the report.

| Ordinate Date / Time SAVAGE INFLO FLOW-CUMLOC G0B0N0 SAVAGE INFLO FLOW SAVAGE INFLO FLOW Units dfs dfs dfs 1 27 Jul 2001, 16:00 89.33 89.33 2 27 Jul 2001, 17:00 89.12 89.12 3 27 Jul 2001, 18:00 88.89 88.89 4 27 Jul 2001, 20:00 88.14 88.14 6 27 Jul 2001, 20:00 87.76 87.76 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 22:00 87.37 87.37 | Preview | | | | |
|---|---------|----------|--------------------|--------------|--------------|
| Ordinate Date / Time FLOW-CUMLOC G0B0N0 FLOW G0B0N0 Units cfs cfs Type INST-VAL INST-VAL 1 27 Jul 2001, 16:00 89.33 2 27 Jul 2001, 17:00 89.12 3 27 Jul 2001, 18:00 88.89 4 27 Jul 2001, 19:00 88.53 5 27 Jul 2001, 20:00 88.14 6 27 Jul 2001, 21:00 87.76 7 27 Jul 2001, 22:00 87.37 8 27 Jul 2001, 23:00 86.99 | rint | Close | 100 % | • | |
| Ordinate Date / Time FLOW-CUMLOC G0B0N0 FLOW G0B0N0 Units cfs cfs Type INST-VAL INST-VAL 1 27 Jul 2001, 16:00 89.33 2 27 Jul 2001, 17:00 89.12 3 27 Jul 2001, 18:00 88.89 4 27 Jul 2001, 19:00 88.53 5 27 Jul 2001, 20:00 88.14 6 27 Jul 2001, 20:00 87.76 7 27 Jul 2001, 22:00 87.37 8 27 Jul 2001, 22:00 86.99 | | | | | |
| Ordinate Date / Time FLOW-CUMLOC G0B0N0 FLOW G0B0N0 Units cfs cfs Type INST-VAL INST-VAL 1 27 Jul 2001, 16:00 89.33 2 27 Jul 2001, 17:00 89.12 3 27 Jul 2001, 18:00 88.89 4 27 Jul 2001, 19:00 88.53 5 27 Jul 2001, 20:00 88.14 6 27 Jul 2001, 21:00 87.76 7 27 Jul 2001, 22:00 87.37 8 27 Jul 2001, 23:00 86.99 | | | | | |
| Ordinate Date / Time FLOW-CUMLOC G0B0N0 FLOW G0B0N0 Units dfs dfs dfs Type INST-VAL INST-VAL INST-VAL 1 27 Jul 2001, 16:00 89.33 89.33 2 27 Jul 2001, 17:00 89.12 89.12 3 27 Jul 2001, 18:00 88.89 88.89 4 27 Jul 2001, 19:00 88.53 88.53 5 27 Jul 2001, 20:00 88.14 88.14 6 27 Jul 2001, 21:00 87.76 87.76 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 23:00 86.99 86.99 | | | | | |
| Ordinate Date / Time FLOW-CUMLOC G0B0N0 FLOW G0B0N0 Units dfs dfs dfs Type INST-VAL INST-VAL INST-VAL 1 27 Jul 2001, 16:00 89.33 89.33 2 27 Jul 2001, 17:00 89.12 89.12 3 27 Jul 2001, 18:00 88.89 88.89 4 27 Jul 2001, 19:00 88.53 88.53 5 27 Jul 2001, 20:00 88.14 88.14 6 27 Jul 2001, 21:00 87.76 87.76 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 23:00 86.99 86.99 | _ | | | | |
| GOBON0 GOBON0 Units cfs cfs Type INST-VAL INST-VAL 1 27 Jul 2001, 16:00 89.33 89.33 2 27 Jul 2001, 17:00 89.12 89.12 3 27 Jul 2001, 19:00 88.89 88.89 4 27 Jul 2001, 20:00 88.14 88.14 6 27 Jul 2001, 21:00 87.76 87.76 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 23:00 86.99 86.99 | | | | SAVAGE INFLO | SAVAGE INFLO |
| Units dts cfs Type INST-VAL INST-VAL 1 27 Jul 2001, 16:00 89:33 89:33 2 27 Jul 2001, 17:00 89:12 89:12 3 27 Jul 2001, 18:00 88:89 88:89 4 27 Jul 2001, 19:00 88:53 88:53 5 27 Jul 2001, 20:00 88:14 88:14 6 27 Jul 2001, 22:00 87.76 87.76 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 23:00 86.99 86.99 | | Ordinate | Date / Time | FLOW-CUMLOC | FLOW |
| Type INST-VAL INST-VAL 1 27 Jul 2001, 16:00 89.33 89.33 2 27 Jul 2001, 17:00 89.12 89.12 3 27 Jul 2001, 18:00 88.89 88.89 4 27 Jul 2001, 19:00 88.53 88.53 5 27 Jul 2001, 20:00 88.14 88.14 6 27 Jul 2001, 22:00 87.76 87.76 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 23:00 86.99 86.99 | | | | G0B0N0 | G0B0N0 |
| 1 27 Jul 2001, 16:00 89.33 89.33 2 27 Jul 2001, 17:00 89.12 89.12 3 27 Jul 2001, 18:00 88.89 88.89 4 27 Jul 2001, 19:00 88.53 88.53 5 27 Jul 2001, 20:00 88.14 88.14 6 27 Jul 2001, 21:00 87.76 87.76 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 23:00 86.99 86.99 | | Units | | cfs | cfs |
| 2 27 Jul 2001, 17:00 89.12 89.12 3 27 Jul 2001, 18:00 88.89 88.89 4 27 Jul 2001, 19:00 88.53 88.53 5 27 Jul 2001, 20:00 88.14 88.14 6 27 Jul 2001, 21:00 87.76 87.76 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 23:00 86.99 86.99 | 3 | Туре | | INST-VAL | INST-VAL |
| 3 27 Jul 2001, 18:00 88.89 88.89 4 27 Jul 2001, 19:00 88.53 88.53 5 27 Jul 2001, 20:00 88.14 88.14 6 27 Jul 2001, 21:00 87.76 87.76 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 23:00 86.99 86.99 | 2 | 1 | 27 Jul 2001, 16:00 | 89.33 | 89.33 |
| 4 27 Jul 2001, 19:00 88.53 88.53 5 27 Jul 2001, 20:00 88.14 88.14 6 27 Jul 2001, 21:00 87.76 87.76 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 23:00 86.99 86.99 | | 2 | 27 Jul 2001, 17:00 | 89.12 | 89.12 |
| 5 27 Jul 2001, 20:00 88.14 88.14 6 27 Jul 2001, 21:00 87.76 87.76 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 23:00 86.99 86.99 | 2 | 3 | 27 Jul 2001, 18:00 | 88.89 | 88.89 |
| 6 27 Jul 2001, 21:00 87.76 87.76 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 23:00 86.99 86.99 | | 4 | 27 Jul 2001, 19:00 | 88.53 | 88.53 |
| 7 27 Jul 2001, 22:00 87.37 87.37 8 27 Jul 2001, 23:00 86.99 86.99 | | 5 | 27 Jul 2001, 20:00 | 88.14 | 88.14 |
| 8 27 Jul 2001, 23:00 86.99 86.99 | 3 | 6 | 27 Jul 2001, 21:00 | 87.76 | 87.76 |
| | | 7 | 27 Jul 2001, 22:00 | 87.37 | 87.37 |
| | | 8 | 27 Jul 2001, 23:00 | 86.99 | 86.99 |
| 9 27 Jul 2001, 24:00 86.61 86.61 | | 9 | 27 Jul 2001, 24:00 | 86.61 | 86.61 |
| 10 28.lul 2001 01:00 86.23 86.23 | | 10 | | 86 23 | 86 23 |

Figure J.11 Print Preview Dialog

J.3 Printing Reports from HEC-RTS

J.3.1 Setup Module

In the **Setup Module**, from the **Reports** menu there are several reports that are available that display information about the watershed elements. To print these reports, from the **File** menu of the report window, click **Print**, and the **Properties** dialog (Figure J.10) opens. See Section J.2.4 for further details on the printing these reports.

J.3.2 Modeling Module

In the **Modeling Module**, from the **Reports** tab there are several reports that provide information by model about the active forecast run. Chapters 11 and 12 describe the available reports in detail.

J.3.3 Results

When a forecast run is selected, the **Extract** and **Post Reports** can be viewed by choosing them from the **Forecast** menu **Log** secondary menu options. The extract report (Figure J.12) can be opened and printed. Choose **Print** from the **File** menu. See Section J.1.3 for further details about printing.

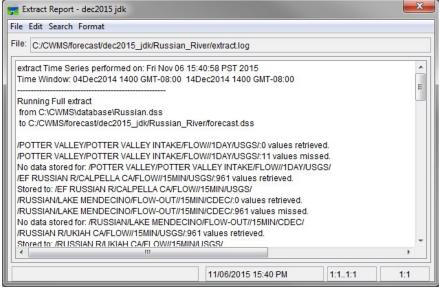


Figure J.12 Extract Report

J.3.4 Forecast Run

When a forecast run is selected the log file can be viewed from the **Reports** tab in the **Modeling Module**. Click **Extract Log** and a log extract report opens displaying the report (Figure J.12). This report can be printed by clicking **Print** from the **File** menu. See Section J.1.3 for further details about printing.

J.3.5 HEC-ResSim

All of the **HEC-ResSim** reports are printable, and the reports can be exported to an ASCII text file. To print HEC-ResSim reports, from the **File** menu of a HEC-ResSim report, click **Print**, and the **Properties** dialog (Figure J.10) opens. See Section J.2.4 for further details on printing these reports.

J.3.6 HEC-RAS

The **HEC-RAS** reports can be copied to the clipboard and are printable. To copy to the clipboard, choose **Copy Plot to Clipboard** or **Copy Values to Clipboard** from the **File** menu. To print HEC-RAS reports, from the **File** menu of a HEC-RAS report, click **Print**, and the **Print Options** dialog (Figure J.13) opens.

| Print Options | 11/1 | | | × |
|-------------------|--------------------------|-------------|-------|--------|
| Printer Xerox 75 | 45 PCL6 | | | Setup |
| Paper: Letter, 8 | 1/2 x 11 in. | | | |
| Orientation | | | | |
| Portrait | C Landscape | | | |
| Margins | | | | |
| Left: 1. in | Top: 1. in | Set Margins | | |
| Right: 1. in | Bottom: 1. in | Secmargins | | |
| Additional Option | s | | | |
| Print Grey Hea | | | | |
| Print Grid Line | s | | | |
| Page Number | s Starting Page: | 1 | | |
| Table Options | | | | |
| Max Font Size (p | ooint size) | 8 | | |
| (It will be scal | ed to fit horizontally) | | | |
| Entire Table | | | | |
| C Selected Rang | je | | | |
| | | | Print | Cancel |
| | | | | |

Figure J.13 Print Options Dialog – HEC-RAS

From this **Print Options** dialog, the format of the report can be set up for printing.

Following is a list of the available print options:

• Setup: Click Setup, and the Print Setup dialog (Figure J.14) opens. From the Print Setup dialog, the user can select a printer and change the printer properties, change the paper size and source, and set the orientation.

| Name: | Canon Inkjet S9000 | Properties |
|---------|--------------------|---------------|
| Status: | Ready | |
| Type: | Canon Inkjet S9000 | |
| | Canon S9000-P2 | |
| Comment | | |
| Paper | | Orientation |
| Size: | Letter | Portrait |
| Source: | Auto Sheet Feeder | A C Landscape |

Figure J.14 Page Setup Dialog – HEC-RAS

- Orientation: As with the Print Setup dialog, set the orientation using the Print Options dialog (Figure J.14). To set the orientation, select Portrait or Landscape from the Orientation panel. By default, the pages are printed in Portrait.
- Margins: The default margin settings are displayed in the Margins panel of the Page Setup dialog. To set the margins, from the Print Options dialog (Figure J.13), click Set Margins, and the Printer Margins dialog (Figure J.15) opens. From the Printer Margins dialog, adjust the left, right, top, and bottom margins.

| Left | 1. | in |
|--------|----|----|
| Right | 1. | in |
| Тор | 1. | in |
| Bottom | 1. | in |

Figure J.15 Printer Margins Dialog – HEC-RAS

- Additional Options: From the Additional Options panel in Figure J.13, the user can choose to Print Grey Headings, Print Grid Lines, include Page Numbers, and set the Starting Page.
- **Table Options:** From the **Table Options** panel in Figure J.13, set the **Max Font Size** and choose whether to print the **Entire Table** or a **Selected Range** of the table.

J.3.7 HEC-FIA

The **HEC-FIA Result Reports** are printable, and the reports can be exported to an ASCII text file. From the HEC-FIA reports, click **Print**, the **Properties** dialog (Figure J.10) will open. See Section J.2.4 for further details on printing these reports. To export to an ASCII text file, click **Save To File** and the **Table Export Options** dialog (Figure J.9) will open. See Section J.2.3 for further details on exporting these reports.