

Chapter 4

Working with Layers

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Chapter 4

Working with Layers

Layers in ResSim are like transparencies laid one on top of the other, with static physical images such as roads, county and state boundaries, rivers, subbasins, etc., layered in the display as color pictures. Each of these images, along with its associated data, is a layer.

4.1 Understanding Layers

Layers are hierarchical. Primary (top level) layers include the **Time-Series Icon Layer** and the **Study Layer** (available only in the Watershed Setup Module), the **Stream Alignment Layer**, and **Map Layers**. These primary layers can contain component layers. For example, the Stream Alignment Layer contains the Stream Nodes, Stream Segments, and Stream Junctions. The Study Layer contains layers for all Reservoirs and other Projects, Computation Points, and Impact Areas contained within the Study.

4.1.1 Time-Series Icon Layer

The Time-Series Icon Layer includes all of the time-series icons for your watershed, and it allows you to separate different types of data in your map display. For example, a gage may report stage and precipitation (and compute flow from stage). If you create time-series layers named “Stage,” “Flow,” and “Precipitation,” you can then place each data set in the appropriate layer.

ResSim does not use Time-Series Icons for any program needs. Refer to the *CWMS User's Manual* (HEC, 2003a) for additional details about Time-Series Icons.

4.1.2 Study Layer

The Study Layer appears in the Watershed Setup Module only. The Study layer is comprised of all of the projects, impact areas, and computation points contained in the watershed.

The Layer Selector displays Study as a primary layer in the Layer tree. When you click on the root handle for the Study branch, there is a layer for Computation Points, Diversions, Names (labels for the projects, computation points, and impact areas), Reservoirs, Channel Modifications, Levees, Off Channel Storage, Other Projects, and Impact Areas. ResSim creates a layer for each of these items even before you have defined any projects, computation points, or impact areas.

4.1.3 Stream Alignment Layer

The Stream Alignment Layer contains the Stream Alignment representing the river system in the watershed. The Stream Alignment layer includes three component layers: Stream Nodes, Streams Segments (also referred to as stream elements), and Stream Junctions. This layer is available in all ResSim Modules but is only available for editing within the Watershed Setup Module.

4.1.4 Map Layers

ResSim can display various types of maps and elements in the geo-referenced map display area. These maps, displayed as map layers, are static physical images. Examples of map layers include roads, county and state boundaries, rivers, subbasins, etc. Some maps are static images, which display as color pictures in the display area. Map Layers are not interactive. Instead, you interact with data associated with schematic elements you place in your map display.

For a description of the map layer formats supported by ResSim, see “Importing Maps into ResSim” in Chapter 3, Section 3.4.1.

4.2 Exploring the Layer Selector

The **Layer Selector** is the main controller for the organization of the various layer types described above, including the Study Layer, Stream Alignment Layer, and Map Layers.

To access the Layer Selector from any module, from the **View** menu, select **Layers....**

The **Layer Selector** window, shown in Figure 4.1, opens as a separate frame that you can minimize to the Windows taskbar.

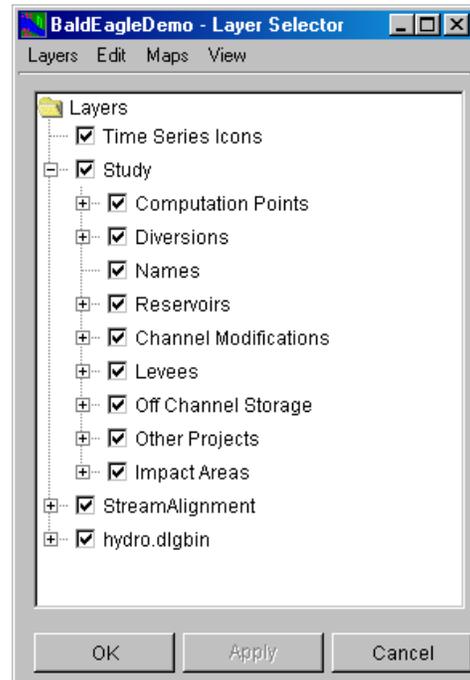


Figure 4.1 Layer Selector

4.2.1 The Layer Selector Menus

Menus in the Layer Selector offer a variety of tools to assist you in managing layers.

The **Layers** menu (Figure 4.2) offers a **Close** command to close the Layer Selector.



Figure 4.2
Layers Menu -
Layer Selector

The **Edit** menu (Figure 4.3) provides tools for rearranging layers, viewing and editing layer properties, and adding and reloading default toolbar buttons for access to individual layers.

To see all of the available commands in the Edit menu, you must first select a layer and activate **Allow Layer Editing**. When editing is enabled, a checkbox appears next to the menu item as shown in Figure 4.3.

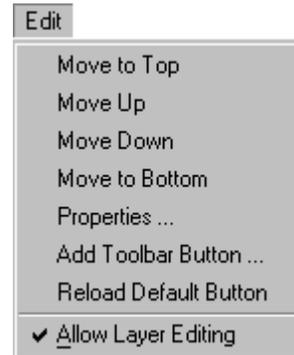


Figure 4.3 **Edit Menu -**
Layer Selector

Figure 4.4 shows the **Edit** menu as it appears with **Allow Layer Editing** turned off and with no layer selected.

Also note that the current position of an individual layer will determine which commands are available in the **Edit** menu. When a layer is already at the top, the **Move to Top** and **Move Up** options will be unavailable. Likewise, if a layer is at the bottom, the **Move Down** and **Move to Bottom** options will not be available.

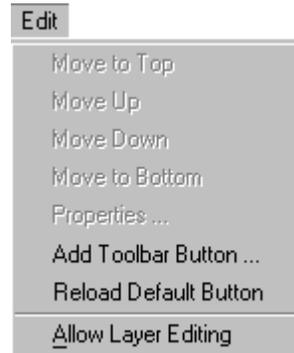


Figure 4.4 **Edit Menu -**
Allow Layer Editing
Turned Off and No Layer
Selected

The **Maps** menu (Figure 4.5) allows you to add and remove map layers. The **Map Display Coordinates** option opens the Geographic Region dialog box. These processes are described in “Adding a New Map Layer” in Chapter 3, Section 3.4.2. You must select a map layer to access the **Remove Map Layer** command.

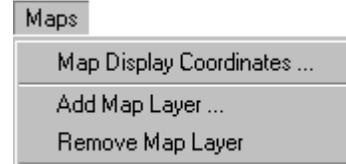


Figure 4.5 Maps Menu - Layer Selector

The **View** menu (Figure 4.6) gives you control over display of the Layer Selector. The **Expand** option expands the “tree” of a layer to display its sub-layers (same functionality as clicking on the layer’s plus- sign box in the tree). Once you have expanded a layer, Expand changes to **Collapse** to close the layer to show only the primary layer (same functionality as clicking on the minus-sign box in the tree). **Always on Top** keeps the Layer Selector on top of your desktop so you can leave it open while you work, if desired.

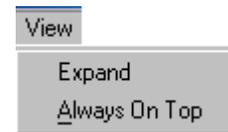


Figure 4.6 View Menu - Layer Selector

4.2.2 The Layer Selector “Tree”

The Layer Selector uses a tree metaphor for controlling the display and organization of layers in the watershed. The tree metaphor represents the hierarchical arrangement of layers in ResSim.

The top level of the tree is the Layers folder, which contains all of the layers in the watershed. Beneath the Layers folder is a tree branch for each primary layer, beginning with a plus/minus box, followed by a checkbox, then the layer name.

When you expand a layer (see “Controlling Layer Display”, Section 4.2.3), its sub-layers display. If no sub-layers exist, you will see a legend for the layer.

In following sections you will learn how to interact with layers in the Layer Selector by using the Menu items, shortcut menus, plus/minus boxes, checkboxes, and properties editors.

4.2.3 Controlling Layer Display

Beside each Layer branch is a plus/minus box, or root handle, that serves the same function as the **Expand/Collapse** options in the **View** menu. A plus means the layer can be expanded. You can click on a plus to expand a tree branch to display component layers; if no component layers exist, you will see a legend for the layer. When the root handle is a minus, you can click on it to collapse the tree branch. You can also expand and collapse layers by double-clicking them with your mouse. Figure 4.7 shows the Layer Selector with some of the layers expanded.

The checkbox turns the display of the layer on or off (checked indicates the layer is active in the display area).

When not checked, neither the primary layer nor the

components beneath it will display. When checked, the primary layer and all checked component layers will display; however, any unchecked component layers beneath it will not display.

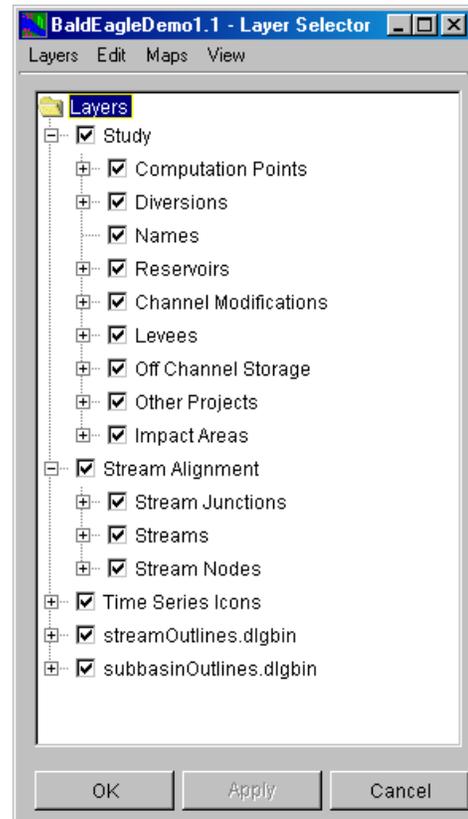


Figure 4.7 Layer Selector - Layers Expanded

4.2.4 Viewing Layer Legend

When you click on the root handle of a layer with no components, the legend for the map displays.

The type of legend displayed is determined by the various file formats. Figure 4.8 shows the legend for Reservoirs.

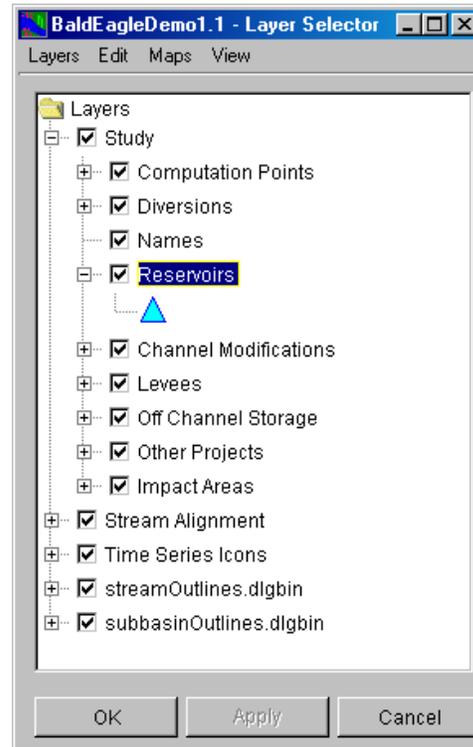


Figure 4.8 Layer Selector - Map Legend for Reservoirs

4.3 Controlling Layer Organization

The Layer Selector also controls how layers are arranged in the display area. When you add map layers to the watershed (see “Adding a New Map Layer” in Chapter 3, Section 3.4.2), the map layer is added to the bottom of the list of maps in the Layer Selector. You can use the Layer Selector to rearrange the order of the primary layers:

1. Select the layer you would like to move.
2. From the **Edit** menu, select **Allow Layer Editing**.
3. From the **Edit** menu, select **Move Up** to move the layer towards the front of the map display, or click **Move Down** to move the layer to the back.
4. To see your changes, click **Apply** (to keep the Layer Selector open) or click **OK** to close the Layer Selector.

Continue to change the position of each layer until the necessary map features are visible in the display area.

4.3.1 Configuring Toolbar Icons to Control Layers

In the Layer Selector you can also add controls to the Toolbar of the main window. Toolbar buttons provide a shortcut for turning layers on and off without having to open the Layer Selector. Toggling on and off the toolbar button functions the same as the checkbox in the Layer Selector. When the button is depressed, the layer is selected for display in the map panel. When the button is up, the layer is turned off in the display. This shortcut is useful when you might want to have frequent control over layers that are being displayed.

Additionally, right-clicking on the toolbar button gives you access to various properties editors and allows you to select and deselect layers being displayed. The options available from the shortcut menu depend upon the layer type.

If you hover your mouse over a Toolbar Button, a Tool Tip appears with a description of the button.

Adding toolbar buttons is an optional configuration step, and if you want to use toolbar buttons, you must configure them separately in each module. Toolbar buttons are saved when you exit the watershed, so you will only have to set them up once.

To add a toolbar button,

1. In the **Layer Selector**, select a layer in the tree.
2. From the **Edit** menu, select **Add Toolbar Button**. The **Toolbar Button Editor** opens, as shown in Figure 4.9.
3. The name of the layer appears by default in the **Tool Tip** field, but you can specify a more descriptive **Tool Tip** if desired.
4. From the **Icon** list, select an icon to represent the selected layer.
5. Select **OK** when you are done.



Figure 4.9 Toolbar Button Editor

The toolbar button then appears in the toolbar above the Display Area.

To remove a toolbar icon, select the layer in the Layer Selector, and then from the **Edit** menu, select **Remove Toolbar Button**. To quickly remove all toolbar buttons that you have defined, select **Reload Default Button** from the **Edit** menu in the Layer Selector.

4.3.2 Adding Map Layers

You will find it helpful to add maps to the watershed and the display area to provide a geographical reference for time-series icons, the stream alignment, and projects in your watershed.

To add map layers:

1. From the **Edit** menu of the **Layer Selector**, select **Allow Layer Editing**.
2. From the **Maps** menu, select **Add Map Layer...** This command opens a file browser to the default “maps” directory in the watershed directory hierarchy. You must first copy any maps you wish to use in the watershed to the “maps” directory for your watershed.
3. From the file browser, choose the map you wish to add.
4. Click **OK**.

The map name now appears in the Layer Selector as a new tree branch. See “Adding a New Map Layer” in Chapter 3, Section 3.4.2 for more information.

4.3.3 Removing Map Layers

To remove a layer from the map display, select the layer in the layer selector, and then select **Remove Map Layer** from the **Maps** menu.

4.3.4 Using Layer Selector Shortcut Menus

Shortcut menus in the Layer Selector offer commonly used commands that are also available in the Layer Selector's **Edit** and **View** menus. Figure 4.10 shows the shortcut menu for the Stream Alignment layer in the Layer Selector.

The **Expand** option expands the tree of a layer to display its component layers. **Collapse** closes the layer to show only the primary layer.

Move to Top, **Move Up**, **Move Down**, and **Move to Bottom** allow you to rearrange layers. The current position of an individual layer will determine which **Move** buttons are available.

Properties opens a **Properties** dialog box for the layer.

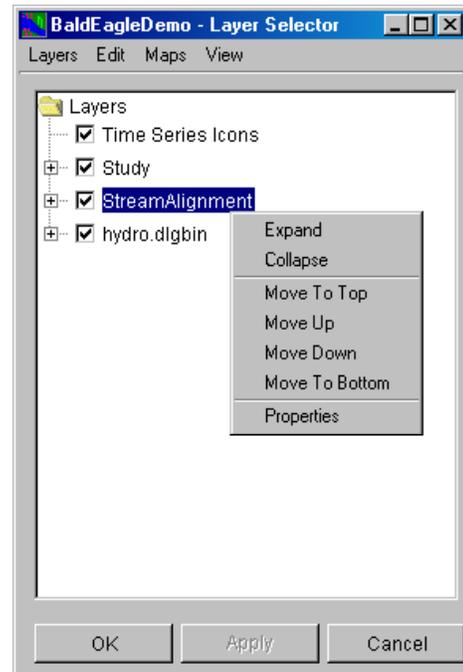


Figure 4.10 Layer Selector Shortcut Menu for the Stream Alignment Layer

For map layers that you add (Figure 4.11), the **Change Label** command is also available. The command allows you to change the name of the layer in the tree. Also, the **Show Legend** command expands the map layer tree to display the map legend. The option changes to **Hide Legend** when the layer is expanded, allowing you to close the branch view of legends.

Reminder: you must first activate **Allow Layer Editing** (in the **Edit** menu) before you can access many of the shortcut menu commands.

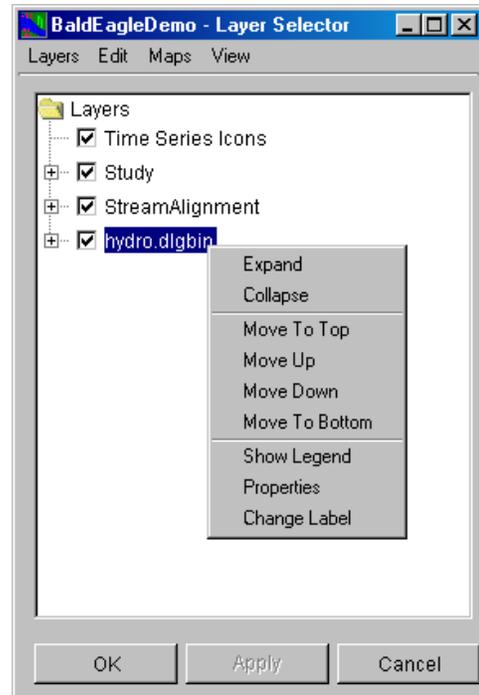


Figure 4.11 Layer Selector Shortcut Menu for a Map Layer

4.4 Viewing and Configuring Layer Properties

The **Layer Selector** provides three ways to view and configure layer properties. You can:

- Select a layer in the Layer Selector and then choose **Properties** from the **Edit** menu.
- Right-click on a layer in the Layer Selector and then select **Properties** from the shortcut menu.
- Double click on a layer in the Layer Selector.

Each of these techniques opens a **Properties** dialog box specific to the layer type; map layers also have additional dialog boxes for configuring properties. For information about configuring the Time-Series Icon Layer, refer to the *CWMS User's Manual* (HEC, 2003a).

4.4.1 Study Layer Properties

The Study Layer is available only in the Watershed Setup module. When you select **Properties** for the **Study** layer, the **Drawing Properties Editor** appears (Figure 4.12).

The Drawing Properties Editor has six tabs that allow you to view and edit properties of Reservoirs, Levees, Diversions, Channel Modifications, Computation Points, and Impact Areas in your watershed.

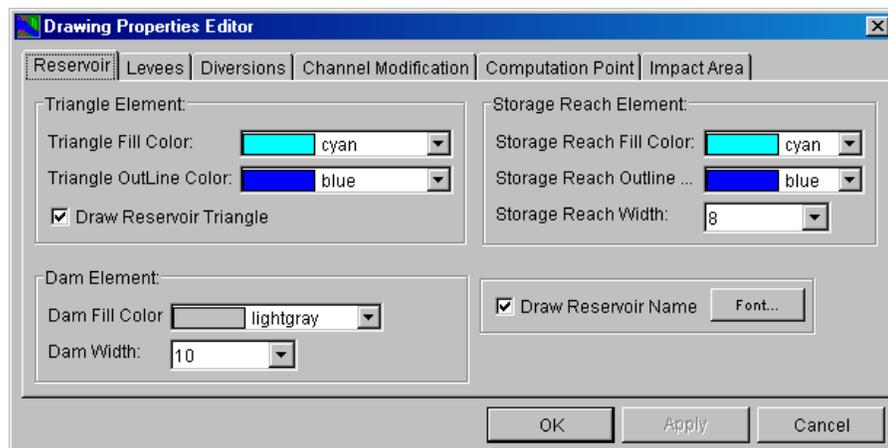


Figure 4.12 Drawing Properties Editor - Reservoir Tab

With the **Reservoir** tab selected (Figure 4.12), you can choose the **Fill** and **Outline Color** for the **Triangle** (which is the “visual” representation of the Reservoir) and the **Fill** and **Outline Color** and the **Width** of the **Storage Reach** (which represents the Reservoir reach along the stream alignment) of reservoirs in your watershed display. Also, you can choose the **Fill Color** and **Width** of the **Dam** element. When you select **Draw Reservoir Triangle** with a checkmark, the reservoir shape drawn in the Watershed Setup Module displays on the map; when it is not checked, the reservoir shape does not display. Likewise, **Draw Reservoir Name**, when checked, displays the reservoir name on the map and hides the name when unchecked. The **Font...** button for the **Reservoir Name** allows you to choose the text font for the name of the reservoir in the map display.

The **Levees** tab (Figure 4.13) allows you to edit the properties of levees in your watershed. You can specify the **Line Color** and **Levee Width**. **Draw Levee Name**, when checked, displays Levee names on the map and hides the names when unchecked. The **Font...** button for the **Levee Name** allows you to choose the text font for the name of the levee in the map display.

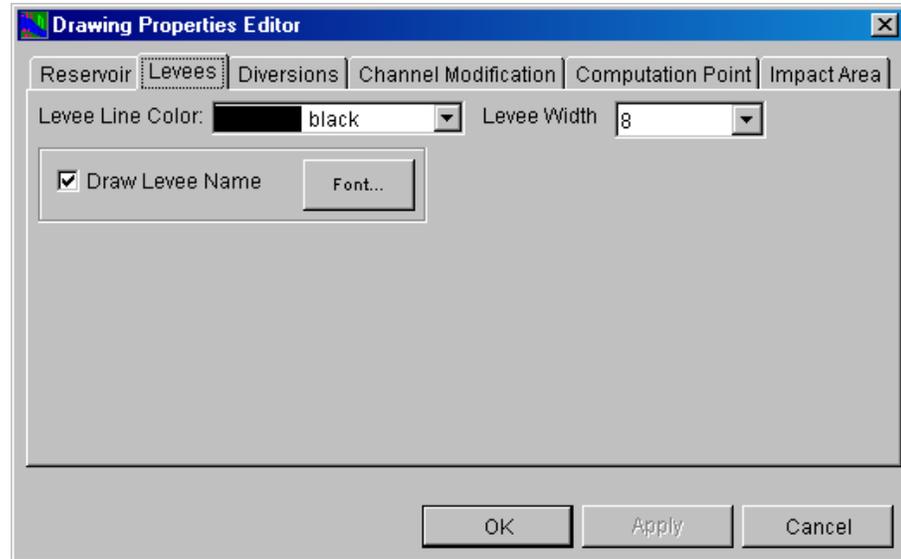


Figure 4.13 Drawing Properties Editor - Levees Tab

With the **Diversion** tab (Figure 4.14), you can select the **Line Color** and **Width** for the diversion. You can also select the **Fill Color** for the Diversion Arrowhead. The arrowhead colors can be different to indicate whether or not the diversion is **Connected** or **Disconnected** (e.g., Connected indicates that the diverted water remains in the system and Disconnected indicates that the diverted water is lost to the system). **Draw Diversion Name**, when checked, displays the Diversion names in the display area and does not display when the name is unchecked. The **Name Font...** button allows you to choose the text font for the name of the diversion in the watershed display area.

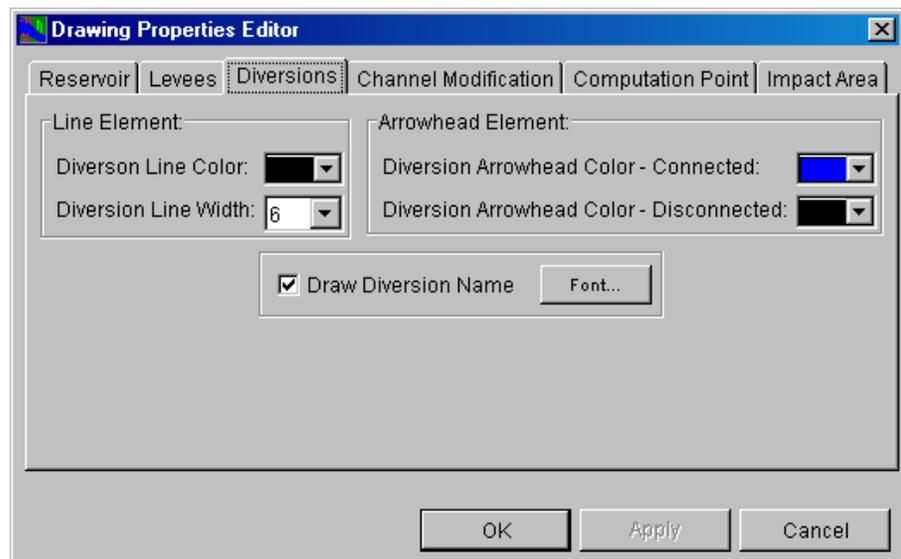


Figure 4.14 Drawing Properties Editor - Diversion Tab

The **Channel Modification** tab (Figure 4.15) allows you to select the **Line Color** and **Width** of the Channel Modifications. **Draw Channel Modification Name**, when checked, displays the Channel Modification names in the display area and does not display when the name is unchecked. The **Name Font...** button allows you to choose the text font for the names of Channel Modification points in the watershed display area.

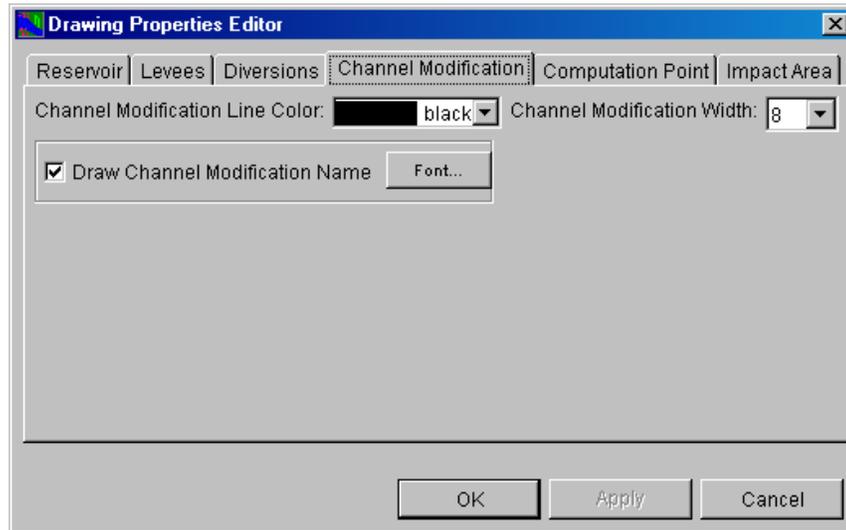


Figure 4.15 Drawing Properties Editor - Channel Modification Tab

The **Computation Point** tab (Figure 4.16) allows you to select the **Fill Color** and **Width** of the Computation Points. **Draw Computation Point Name**, when checked, displays the Computation Point names in the display area and does not display when the name is unchecked. The **Name Font...** button allows you to choose the text font for the names of Computation Points in the watershed display area.

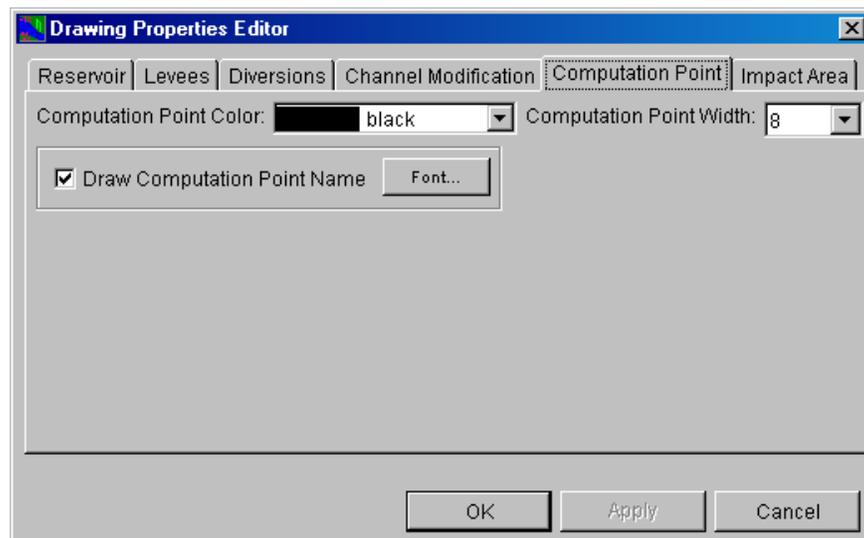


Figure 4.16 Drawing Properties Editor - Computation Point Tab

The **Impact Area** tab (Figure 4.17) allows you to display or hide the Impact Area name for your watershed. **Draw Impact Area Name**, when checked, displays Impact Area names on the map and hides the names when unchecked. The **Name Font...** button allows you to choose the text font for the names of Impact Areas in the watershed display.

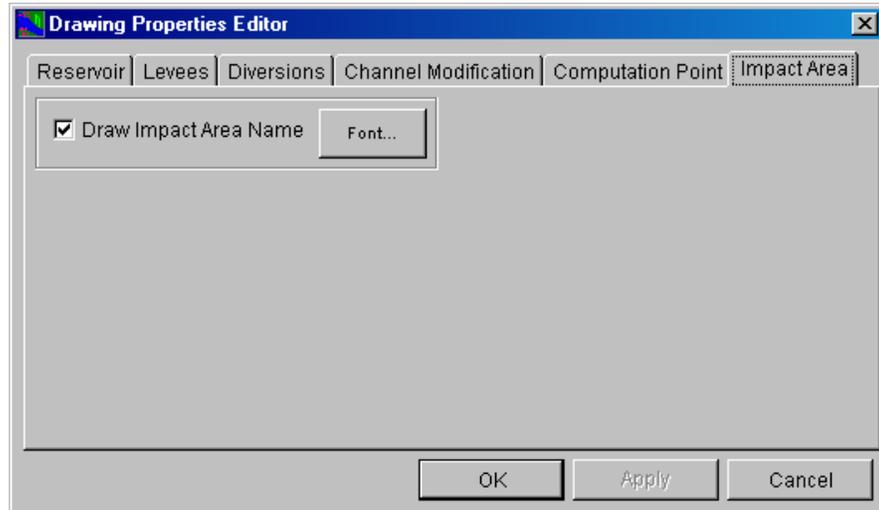


Figure 4.17 Drawing Properties Editor - Impact Area Tab

4.4.2 Stream Alignment Layer Properties

When you select **Properties** for the Stream Alignment layer, the **Stream Alignment Properties Editor** (Figure 4.18) appears.

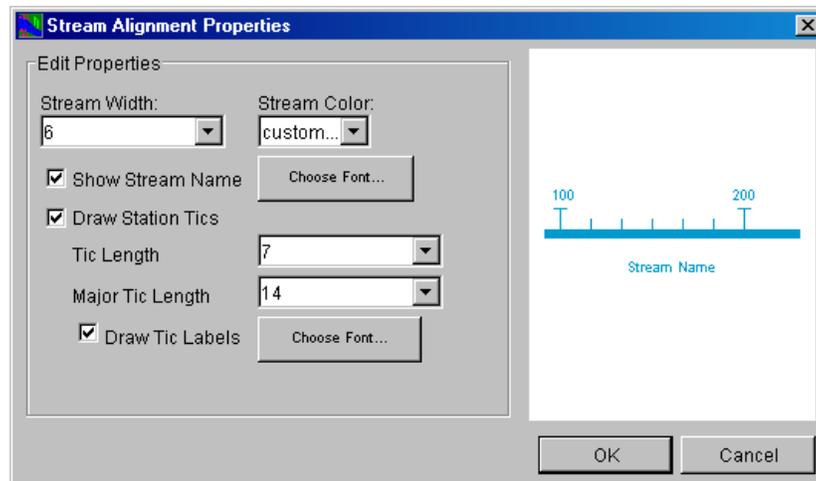


Figure 4.18 Stream Alignment Properties Editor

The **Stream Alignment Properties Editor** allows you to specify **Stream Width** and **Stream Color** in your watershed display. **Show Stream Name**, when checked, displays stream names on the map and hides the names when unchecked. The first **Choose Font** button allows you to choose the text font for the names of streams in the map display. When **Draw Station Tics** is checked, station tics display on the map, and you are able to specify the **Tic Length** and **Major Tic Length**. **Draw Tic Labels**, when checked, displays Tic labels on the map and hides the labels when unchecked. The second **Choose Font** button allows you to specify the text font for the Tic Labels. When **Draw Station Tics** is unchecked, Station Tics do not display on the map and the Tic Length, Major Tic Length, Draw Tic Labels, and Choose Font options are not available.

The Stream Alignment Properties Editor's preview pane allows you to view your changes before applying them.

4.4.3 Map Layers Properties

Map layers can be any of a number of formats supported by ResSim, including ArcView® Shapefiles, AutoCAD® DXF files, raster images, U.S Geological Survey (USGS) Digital Line Graphs (DLG) files, USGS Digital Elevation Model (DEM) files, ASCII NET TIN files, and ArcInfo® DEM files. Hence, when you select Properties for a map layer, the editor that opens is specific to the type of map.

For example, if the map layer you wish to configure is a USGS Digital Line Graph map layer, the **Properties** command opens the **USGS Digital Line Graph Editor** (Figure 4.19).

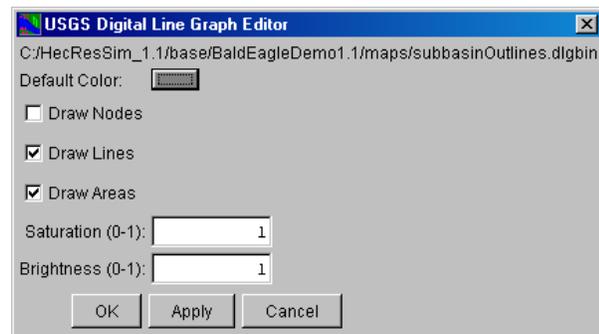


Figure 4.19 USGS Digital Line Graph Editor for Digital Line Graph (DLG) Map Layer

With this Map Layers Properties Editor, you can specify the default **Color** of the map and choose whether or not **Nodes**, **Lines**, and **Areas** display in the watershed. You can also set the **Saturation** and **Brightness** of the display. The directory location of the map file in your ResSim watershed is shown at the top of the dialog box.

Appendix C describes additional map layer editors available in ResSim.

