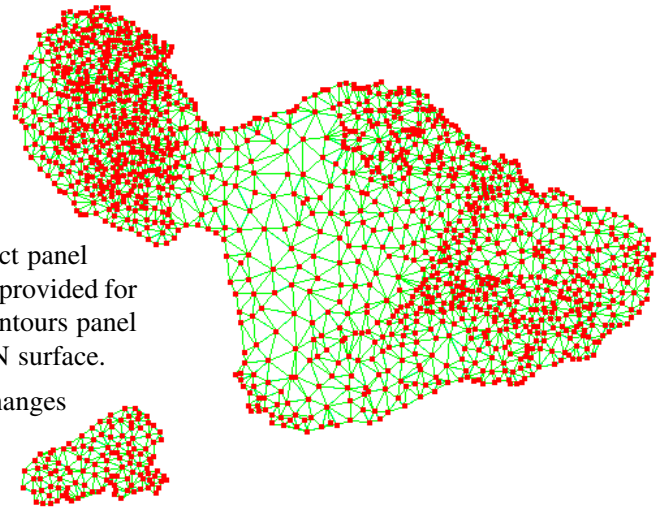# TIN Layer Controls

The TIN Layer Controls window provides access to display settings for Triangulated Irregular Network (TIN) layers, which are used to represent numeric values at point locations as a three-dimensional surface. You can open the TIN Layer Controls window by left-clicking on the layer's icon button in the Display Manager or by right-clicking on the layer name and choosing Controls from the popup menu.

The layer controls are organized in a set of tabbed panels. The Object panel provides settings that pertain to the entire layer. A tabbed panel is also provided for each of the TINelement types: Nodes, Edges, and Triangles. The Contours panel provides controls for displaying contour lines generated from the TIN surface.

After changing display settings, press the Apply button to apply the changes to the View while the Layer Controls window remains open. Press the OK button to apply the changes and close the window. The Close button cancels any changes in settings not already applied and closes the window.

Object Panel

The Object tabbed panel is exposed by default when the TIN Layer Controls window opens (see illustration to the right).

Object: The Object field shows the filename and object name of the object being displayed. Press the Object pushbutton to open the Select Object window to select a different TIN object to assign to the current display layer.
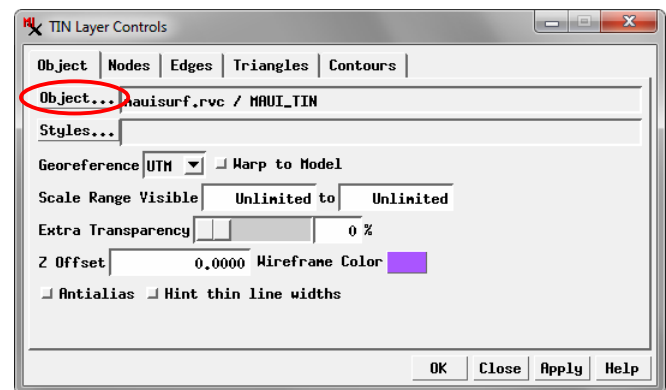
Styles: Press the Styles pushbutton to select a style subobject of the current object or a main-level style object in a Project File as a source of styles to use to display the elements. Style subobjects of a spatial object are primarily used to store style information for elements in that object with All Same styles that utilize symbols or patterns. Styles assigned to elements by attribute can be stored in a style subobject of the style assignment table, which is independent of the style object selected on the Object panel. See the Technical Guide entitled *Managing Styles* for more information about style objects.

Georeference: The Georeference menu defaults to the georeference subobject that was last used. If the object has more than one georeference subobject (not recommended), you can use the Georeference menu to choose the desired georeference to use for the display.

If the object has control point georeference, turn on the *Warp to Model* toggle button to use the object-to-map coordinate transformation model stored with the georeference information when rendering the layer in the View.

Scale Range Visible: The Scale Range Visible fields let you limit the range of map scales over which the layer is displayed. For example, you may wish to hide a detailed layer when the View is zoomed out beyond a certain scale.

You set up scale control by specifying a minimum (field on the left) and maximum (field on the right) map scale. The mini-

Object panel on the TIN Layer Controls window.

mum map scale controls how far out you can zoom and still show the layer, while the maximum map scale controls how far you can zoom in.

The Scale Range Visible fields by default are initially set to Unlimited, in which case the layer is shown at all map scales. You can change both scale limits, just one, or neither. To set a map scale for either field, you can enter the full scale fraction (e.g., 1:10000) or just the denominator of the scale fraction (e.g., 10000); the resulting map scale fraction is then shown in the field. To reset a map scale field to Unlimited, enter 0. For more information about scale ranges, see the TechGuide entitled *Display Layers, Elements and Groups by Scale*.
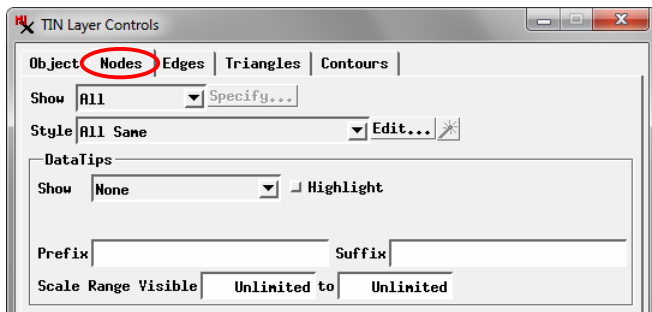
Extra Transparency: Use the Extra Transparency slider and numeric field to set a transparency percentage for the entire layer (all elements). Transparency applied to the entire layer is in addition to any transparency set for particular element styles, such as partially-transparent triangle fill colors. Layer transparency can also be adjusted using the Transparency controls in the View window sidebar (see the TechGuide *Easily Vary Transparency for Any Layer*). Each transparency control is updated when the setting on the other control is changed.

Z Offset: A TIN object has 3D coordinates and so defines its own surface in 3D perspective views. However, a TIN can also be displayed along with a separate terrain layer (DEM raster or terrain tileset). The value in the Z Offset field sets the vertical offset (in meters) of the TIN layer from the surface determined by the terrain layer. This setting can be used to "float" the 3D TIN surface above the terrain (and any other layers draped on that terrain surface; see the *3D Perspective Visualization* tutorial).

The *Wireframe Color* button shows the mesh color used for the layer in wireframe display in the 3D View. Press the color button to open a Choose Color window to select a different wireframe color.

Antialias and Hint: Turning on the *Antialias* toggle button applies antialiasing to triangle edges to reduce the stairstep effect on diagonal lines in the View. Antialiasing is applied to any line that has a width of less than 1.5 pixels on screen. Turning on the *Hint thin line widths* toggle applies partial transparency to lines that would be less than one pixel wide on screen at the current scale. The degree of transparency is proportional to the intended scaled width of the lines. For information and illustrations of antialiasing and hinting see the TechGuide entitled *Enhanced Line Rendering*.
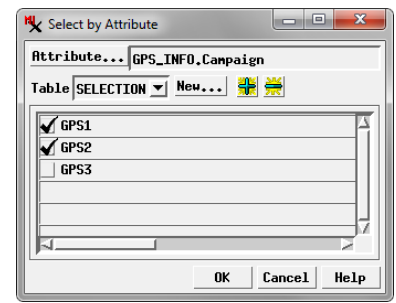

Nodes tabbed panel

Common Controls for Nodes, Edges, & Triangles

Many of the controls for individual element types are the same or similar on the Nodes, Edges, and Triangles tabbed panels. These common controls are described in this section; refer to the illustration of the Nodes tabbed panel above.

Show: The Show menu provides choices governing which elements of that element type to display. The options are All, By Attribute, By Map Scale, and By Query. Choosing an option other than All activates the *Specify* button next to the menu.

The *By Attribute* option lets you display only elements that have selected values in a specified database attribute field. After choosing this option from the Show menu, pressing the Specify button prompts you to choose a table and field containing the desired attribute, then opens the Select by Attribute window (see illustration at the top of the next column). The selected table.field reference is shown in the text field next to the *Attribute* button (which you can press to select a different table and field). If the elements are displayed using styling by attribute, the field on which the styles are based is selected by default.

The scrolling list in the Select by Attribute window shows all of the attribute values in the specified field; turn on the checkbox for each value whose elements are to be displayed. *Select All* and *Deselect All* icon buttons are provided above the list.

Select by Attribute window

The *Table* combobox shows the name of the table in which the attribute selections are recorded. If you are using the "style by attribute" field, the associated style table is selected by default. If you are using a different attribute field, a selection table is created to record the element selections. You can create and save more than one selection table; all available selection tables are listed on the Table combobox.

The *By Map Scale* option on the Show menu lets you set scale ranges for groups of elements by attribute value; the display scale in the View then determines which of these elements are displayed. Pressing the Specify button after selecting this option opens the Scale Ranges window, which is described and illustrated in the TechGuide entitled *Display Layers, Elements and Groups by Scale*.

The Specify button for the *By Query* option from the Show menu opens the Script Editor window so you can enter a selection query to specify the elements to display. Examples of selection queries are provided in the *Building and Using Queries* tutorial.

Style: The Style menu provides choices for styling the elements; the options include All Same, New - By Attribute, New - By Theme, and By Script. Press the *Edit* button next to the menu to set up the styles.

When you select *All Same*, pressing the Edit button opens the Style Editor with style controls for the relevant element type. The style you create or select is applied to all of these elements.

Choose *New - By Attribute* to set up different styles for different values in a specified attribute field. Styles can be created and assigned to attribute values manually or using an automated procedure. Associations between attribute values and styles are saved in a style assignment table. The names of any previously-created style assignment tables are automatically listed in the Style menu. For information on setting up styling by attribute see the TechGuides entitled *Style By Attribute: Manual Assignment* and *Style By Attribute: Automatic Style Generation*.

The *New - By Theme* style option lets you assign elements to a specified number of theme classes, each with its own drawing style, based on the values in a numerical attribute field. The class range boundaries can be set automatically or manually, and you can specify color and size spreads to automatically generate drawing styles. After you save a theme for an ele-

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ment, the name of the theme appears as an option on the Style menu. For information about theme maps see the TechGuide entitled *Theme Mapping Geometric Elements* and the *Theme Mapping* tutorial.
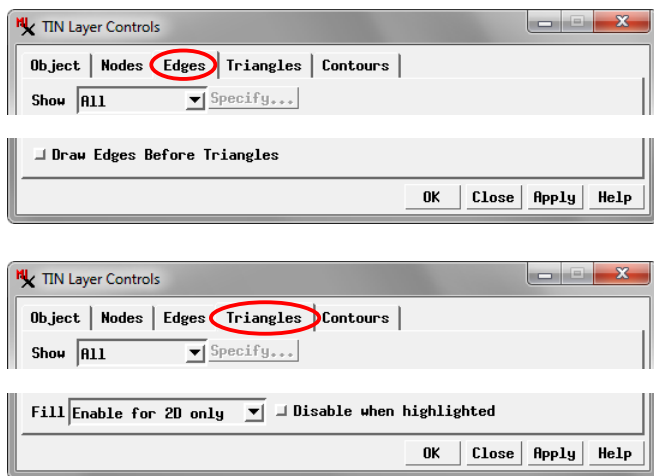
The *By Script* style option lets you use a script to set drawing styles based on element attributes and to use CartoScripts to create custom cartographic renderings for point and line elements. For more information see the *Building and Using Queries* tutorial for examples of simple style scripts and the *Using CartoScripts* tutorial.

When the By Script style option is selected, the *Convert Script to Table* icon button is active to the right of the Edit pushbutton. This button allows you to convert the style specifications in the script to saved styles and style associations. When you press the icon button, you are prompted to select the database field on which the script styles are based. The procedure then interprets the color, dimension, and scale specifications in the style script, creates the equivalent styles, and creates a style assignment table relating a style to each unique value in the specified database field. This procedure can interpret values assigned to the predefined style variables that are listed in the Variables group in the Script Reference window. It cannot convert style scripts that use CartoScript functions.

DataTips: Use the DataTips controls on each element panel to specify an attribute field as the source for information to show in the View when the cursor is paused over or near the element. You can also set Prefix and Suffix text and set the DataTips to appear over a limited range of map scales. For more information on these controls see the TechGuides entitled *DataTips* and *DataTip Highlighting of Geometric Elements*.

Specific Controls for Edges and Triangles

Several element-specific controls are found on the Edges and Triangles tabbed panels; these controls are illustrated below.

Element-specific controls on the Edges and Triangles tabbed panels

A triangle element is made up of bordering edge elements, and edge elements and triangle borders can be styled separately.

The default drawing order for TIN layers draws the triangle elements before the edge elements. This means that styled edge elements may be drawn on top of triangle borders. Turn on the *Draw Edges before Triangles* toggle on the Edges tabbed panel to reverse this drawing order and draw the triangles over top of the edges.
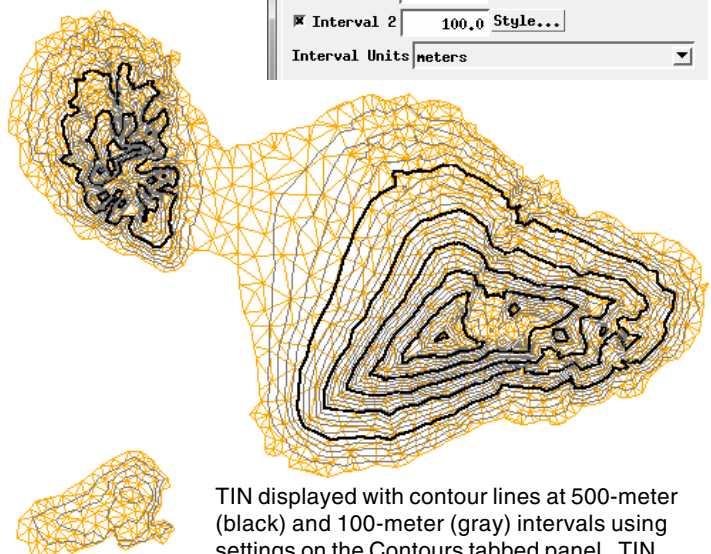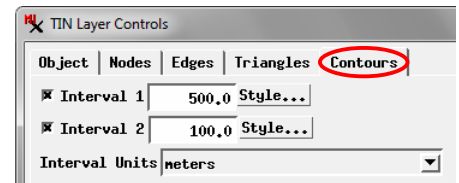
The *Fill* menu on the Triangles tabbed panel sets the circumstances in which triangle fills can be drawn in the View window. The options are Enable for 2D only (provided to speed rendering in 3D perspective views), Enable for 2D and 3D, and Disabled.

Turning on the *Disable when highlighted* toggle disables filling for a filled triangle that is highlighted during the DataTip event (as set by the Highlight toggle in the DataTips controls). See the TechGuide entitled *DataTip Highlighting of Geometric Elements*.

Contours Panel

The controls on the Contours tabbed panel allow you to better visualize the surface represented by the TIN by dynamically creating and drawing *contour lines*, which are lines of equal elevation value. You can show major and/or minor contours by turning on the Interval 1 and/or Interval 2 toggle buttons, respectively, and setting interval values in the respective numeric fields to set the elevation difference between adjacent contours in the interval group. The value in the Interval 1 field must be an integer multiple of the Interval 2 value. If you change one interval value such that this is not the case, the other interval value is automatically updated using the last-used interval ratio.

Choose the distance units to use to create the contours from the Interval Units menu. Press the Style pushbutton next to the Interval fields to open the Style Editor with controls for setting a line style for the contours (see the TechGuide entitled *Creating Styles for Lines*).

TIN displayed with contour lines at 500-meter (black) and 100-meter (gray) intervals using settings on the Contours tabbed panel. TIN edges are shown in orange.