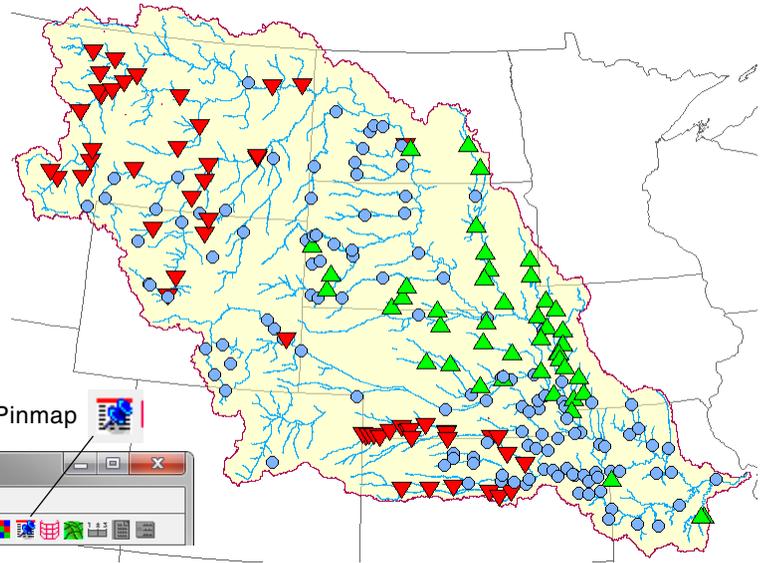


Database Pin Mapping

A *pinmap* in TNTgis is a layer that displays point location information directly from a database table (or set of related tables) that include coordinate values. Other attributes for each location can be used to select locations for display, to designate the drawing style for the location symbols, and to provide labels to display next to the location symbols.

Any database table in a TNTgis Project File can be used for pin mapping as long as it includes map coordinates for each record. You can choose a table in a main-level database (not associated with a spatial object) or from a database subobject of a vector, CAD, shape, or raster object. (A polygon or line database can be the basis of a pin map with pins placed at locations such as polygon centroids or line midpoints). The selected table can contain information stored in the Project File itself or can link to an external database such as Access, PostgreSQL, MySQL, or Oracle, or to an Excel spreadsheet file. Because a pinmap layer is created dynamically from the source table(s) each time it is displayed, any updates in the table information are automatically reflected in the pin map display. Pin maps are therefore especially useful for displaying location-specific information from an external database that is frequently updated.



Add Database Table Pinmap



Pin map of stream gaging stations in the Missouri River watershed, USA. The pins are styled by query based on trends in annual streamflow from 1960 to 2011. Triangle symbols pointing upward (green) mark stations with increasing streamflow during the period, while those pointing downward (red) had decreasing annual streamflow. Blue circles mark stations with no clear trend. Station locations and trend attributes are in different tables related by station number. Tables were imported into TNTgis from spreadsheet files provided by the United States Geological Survey (Scientific Investigations Report 2014-5053).

Pin markers can be styled using predefined symbols or with custom symbols you design. Scripts can be used with pinmap layers to select records for use, to set the map coordinates, and to set different pin styles based on attributes, among other options. The pinmap script environment also includes symbols and symbol functions that allow you to create pie chart and bar graph symbols that depict quantitative information from multiple fields in the database (see the Technical Guide entitled *Scripts for Pin Map Layers*).

You can select a database table for pinmap display from the Display Manager using the *Add Database Table Pinmap* icon button or by selecting *Add / Layer / Database Pinmap* (the latter option is available if a display group is open). After you select a database table, the Pinmap Layer Controls window opens so you can set the parameters for the pinmap layer. This window includes a set of tabbed panels: *Object*, *Points*, *Symbol*, *Script*, and *DataTip*.

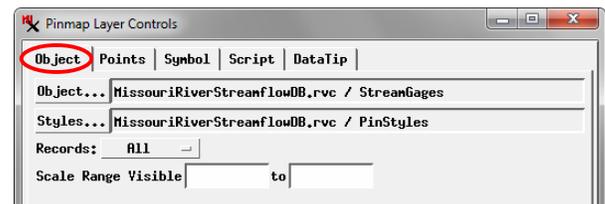
Object Tabbed Panel

The *Object* tabbed panel is open by default when the Pinmap Layer Controls window opens. The *Object* text field shows the name of the Project File containing the database object and the name of the table that was selected. Press the *Object* pushbutton to select a different database and/or table.

Press the *Styles* pushbutton to designate a style object to use for the pin symbols. You can choose an existing style object

or create a new style object in the current Project File in which you can add or create point symbols to use for the pins (see the *Symbol* section).

The *Records* menu provides two options, *All* and *By Script*. Choose *All* to map all of the records in the selected table, or *By Script* to use a selection query (entered on the *Script* tabbed panel) to choose the records to use.



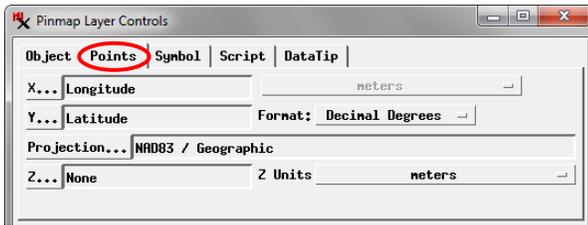
Use the controls on the *Object* tabbed panel to set the style object, records to use, and scale range for the pinmap.

The *Scale Range Visible* fields set minimum and maximum map scale numbers to define a scale range in which the layer is visible in the View. You can enter the full scale fraction (such as 1:10000) or just the denominator of the scale fraction (e.g., 10000). To return a field to the default setting of Unlimited, enter 0. For more information on scale ranges see the TechGuide entitled *Display Layers, Elements and Groups by Scale*.

Points Tabbed Panel

Controls on the *Points* tabbed panel set the spatial parameters (continued)

for the pinmap layer. In order to map spatial positions for the table records, you must specify source fields for spatial coordinates and the coordinate reference system to which they refer. Press the X and Y pushbuttons to specify the sources for the coordinate values. The selection window opened by these buttons presents a list of the available fields in the selected table. Choose the field containing the designated coordinates and press [OK]. The field to the right of each pushbutton shows the name of the selected field.



Use the controls on the Points tabbed panel to set the spatial parameters for the pinmap layer.

If the coordinates reference a projected (planar) coordinate system, use the menu to the right of the X coordinate controls to select the appropriate distance unit (default is meters). If the coordinates are Latitude / Longitude, they must be stored in or converted to decimal degrees in order to be used. Use the Format menu if necessary to choose the format of the stored coordinates so they can be automatically converted to decimal degrees. For example, if the selected fields have values in decimal degrees preceded by a letter indicating the direction (e.g. N 40.8079, W 96.6750), choose the H Decimal Degrees format).

The By Script option in the selection windows for X and Y coordinates lets you include code on the Script tabbed panel to calculate the coordinate values from field values that are not in directly useable form. For example, in some water quality data distributed by the U.S. Geological Survey, the identifier for each record concatenates the latitude and longitude values (in degrees, minutes, and seconds) of the sample point. A script is required to parse the field contents, separate the latitude and longitude values, and convert them to decimal degrees (see the TechGuide entitled *Scripts for Pin Map Layers*).

Because database tables do not store any georeference information, you must specify a coordinate reference system that the X and Y values refer to. Press the Projection pushbutton to open the Coordinate Reference System window to choose the reference system.

You can include Z values in the pin map if you wish show these values in DataTips or pin labels or to view the layer as an independent 3-dimensional object in 3D perspective views. Use the Z pushbutton to choose the field containing the Z values, and choose the appropriate units from the Z Units menu.

Symbol Tabbed Panel

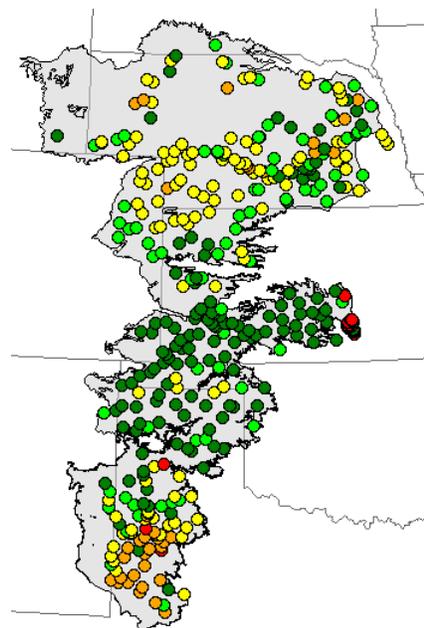
The Symbol tabbed panel provides controls for choosing pin symbols and optional labels to be shown next to the symbols.

Symbols: The Symbol menu provides the choices All Same, By Script, and Image Thumbnail (for tables containing geotagged images). To use the same marker for all of the pin locations, choose the All Same option and press the Style pushbutton to open the Edit Style window to select a point symbol and other style options. You can choose from a number of predefined point symbols. If you have selected a Style object on the Object tabbed panel, you can also select any of the symbols provided in the object or use the Style Editor to create and save point symbols for use with the pinmap. See the TechGuide entitled *Creating Styles for Points* for information on point styles.



Set the pin symbol and label parameters on the Symbol tabbed panel.

Choosing the By Script option from the Symbol menu allows you to use code on the Script tabbed panel to set the symbol, color, and scale for the pins. You can use a script to vary the symbol, color, or scale based on attributes in the records (see the pinmap illustrations on the previous page and below). Special symbols are also provided for pin map style scripts to create pie chart and bar graph symbols to depict numeric information from a number of fields in the table. For more information about style scripts for pin maps, see the TechGuide entitled *Scripts for Pin Map Layers*).



Pinmap of groundwater sample locations in the High Plains Aquifer (gray shading), central USA. All pins use the same symbol with a variable color that is set by script based on arsenic concentration range (in micrograms / liter):

- dark green: ≤ 3
- green: > 3 to ≤ 5
- yellow: > 5 to ≤ 10
- orange: > 10 to ≤ 50
- red: > 50

Point coordinates and arsenic concentration values are in separate tables related by sample station number.

For tables containing geotagged images, the Image Thumbnail option sets the image thumbnail as the pin symbol. Image thumbnail symbols are shown at a fixed size regardless of the View scale, with the screen size of the symbol matching the thumbnail size in raster cells. For more information see the TechGuide entitled *Pinmap Digital Photos*.

(continued)

Labels: You can use the contents of any string or numeric field in the table to provide labels in the View for the pins. Press the Label pushbutton to open a selection window that lists the available fields in the table, along with the options None and By Script. Choose None to turn off labels if a label field has been previously selected.

Press the Base Style pushbutton to open the Edit Styles window to specify the text style (font, size, scale, and color) to use for the labels (see the TechGuide entitled *Setting Text Styles*). Choose a position for the labels relative to the pin symbol from the Label Position menu. The Default option places the labels to the right of the pin symbol, but you can choose a specific position for the label using other menu options: Upper Left, Upper Center, Upper Right; Left Center, Centered, Right Center; Lower Left, Lower Center, Lower Right.



Pinmap of school locations with labels showing the school name. You can choose the font, style, color, and position for pin labels.

Choose By Script from the Label source selection window to generate label text using code entered in the Script tabbed panel and/or to set label positions and orientations. For example, you can use a script to concatenate text from multiple fields, to create a multiline label listing several attribute values, or to change the orientation of the labels. For more information about label scripts see the TechGuide entitled *Scripts for Pin Map Layers*.

Script Tabbed Panel

The Script tabbed panel can be used to specify a number of custom features for the pin map display:

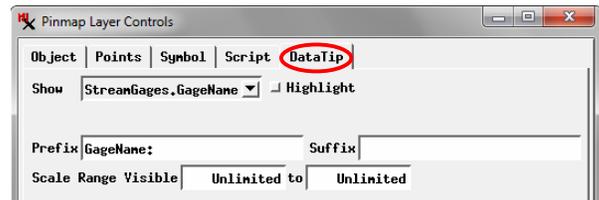
- selection of records by attribute
- X and Y coordinates
- assignment of pin symbol, color, or size by attribute
- custom pie chart or bar graph symbols
- label text, position, and orientation

The Script tabbed panel includes a text pane for entering the script as well as menus used for editing, inserting items, checking script syntax, and saving the script to a separate file. The script code entered in the script panel is applied only if the corresponding By Script option is selected in the controls on the other tabbed panels. See the TechGuide entitled *Scripts for Pin Map Layers* for more information.

DataTip Tabbed Panel

The DataTip tabbed panel provides controls for setting the content and appearance of the optional pop-in DataTip shown for the pins.

The Show menu provides the options None and Select Attribute; choosing the latter option opens a Select Table/Field window in which you can choose a field in the table to provide the DataTip text. That table.field reference is then added to the Show menu. Turn on the Highlight toggle button next to the Show menu to highlight the pin in color while the DataTip is shown.



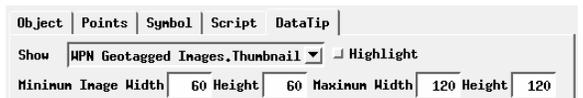
Set the source, prefix and suffix text, and scale range for the pinmap DataTips on the DataTip tabbed panel.

Use the Prefix and Suffix text fields to enter text to be shown before and after the DataTip value. The Prefix text defaults to the name of the field selected as the DataTip source.

The controls shown immediately below the Show menu vary depending on the type of field you choose as the DataTip source. A Units menu is shown and active if you choose a numeric field for which units have been set. Choose a different unit from the menu to convert the field values to the designated unit for the DataTip; the abbreviation for the selected unit is set as the default suffix. The Decimal Places field sets the number of decimal places to be shown in the value for any units used.



If you choose an image or thumbnail field from a geotagged image table as the DataTip source, numeric fields are shown below the Show menu to allow you to constrain the screen size of the image in the DataTip. You can set the Minimum Image Width and Height and the Maximum Width and Height. All values for these fields are in screen pixels.



The Scale Range Visible fields let you limit the range of map scales over which the DataTip is displayed. For example, you may wish to not show DataTips when the View is zoomed out beyond a certain scale.

