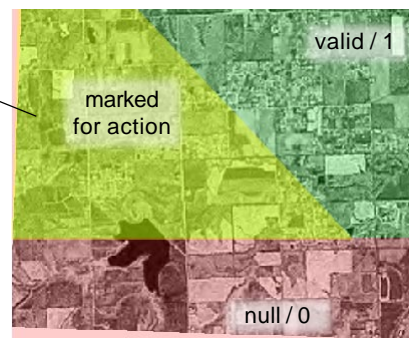# Create and Edit Null Masks and Mask Rasters

The Mask Editor in TNTmips allows you to edit and save a null mask subobject for a target raster object or set of matching raster objects (such as bands in a multispectral image), or to edit and save an independent mask raster object. The Mask Editor is available as a standalone process from the TNTmips menu (Image / Utilities / Edit Mask). It is also available for use in the Spatial Display process and other processes that provide a View of the input raster object (such as Watershed, Viewshed, Raster Extract, and others). You can access the Mask Editor in these processes by right-clicking on the raster layer entry in the Display Manager (Layer Manager) or the View sidebar and choosing Edit Mask from the pop-up menu. A null mask created or edited within Spatial Display or other processes is immediately applied within that process. Likewise, after saving a newly created or edited binary mask raster object, you can immediately select it for use in that or other processes.
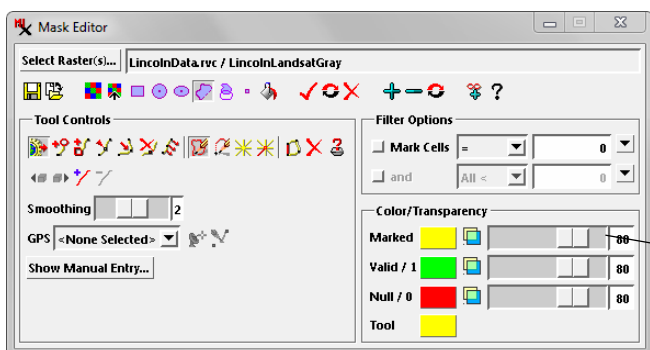
> Binary raster masks are used in the TNT products in several ways to determine which areas of a raster object are *valid* or *invalid (null)* for display or processing. A raster object can have a *null mask* subobject that automatically indicates the no-data areas in the raster. When you display or process a raster object, you can also manually specify an independent mask raster object to use to limit the area displayed or processed.

indicate the current status of different areas of the mask (see illustration below). Null mask areas currently set as *valid* (value = 1 for mask raster objects) are shown by default in green, while areas that are currently *null* (value = 0 for mask raster objects) are shown by default in red. Making any change to the mask requires at least two steps. First you must *mark* a particular area or areas using one of the mask editing tools described below. Marked areas are shown by default in yellow.

The Mask Editor uses transparent color overlays to indicate the status of different areas of the mask: valid / 1 shown by default in green, and invalid / 0 shown by default in red. Areas you have marked for action are shown by default in yellow. You can use the Highlight Color / Transparency controls to change any of the color and transparency settings.

Once you have marked one or more areas, you can use one of the toolbar buttons to perform the desired action, such as *Set Marked Cells as Valid / 1* or *Set Marked Cells as Null / 0* (see illustration below). You can invert the marked area using the *Invert Selection* icon button or clear this overlay without making changes to the mask by using the *Clear Marked Cells* icon button. The *Invert Marked Cells in Mask* button inverts the mask values for just the marked areas.

The mask initially shown in the Mask Editor may have all cells designated as valid; this is always the case when a new null mask has been created. For a mask in this state, the first area you mark is treated in a special way. If you choose the action *Set Marked Cells as Valid / 1*, the marked cells are retained as valid and all other cells are set as invalid (see illustration in the section Mark by Drawing or (continued)

Null Mask for Single or Multiple Matching Raster Objects

You can use the Mask Editor to create and/or edit a null mask subobject for one or multiple matching raster objects, such as bands in a multispectral image. In the standalone Mask Editor, you can use the Select Raster button to choose a single raster object or multiple raster objects that have matching line-column dimensions and cell size. When you open the Mask Editor in the Display process for a raster layer, all rasters used by the layer (e.g., a three-raster RGB display) are automatically selected, but you can use the Select Raster button to choose additional matching raster objects.

If the selected raster (or raster set) has a null mask, it is automatically loaded and overlaid on the raster in the View. If no null mask is found, a temporary null mask is created automatically. When you save the null mask using the Save icon button, it is automatically saved as a subobject to all of the selected raster objects.

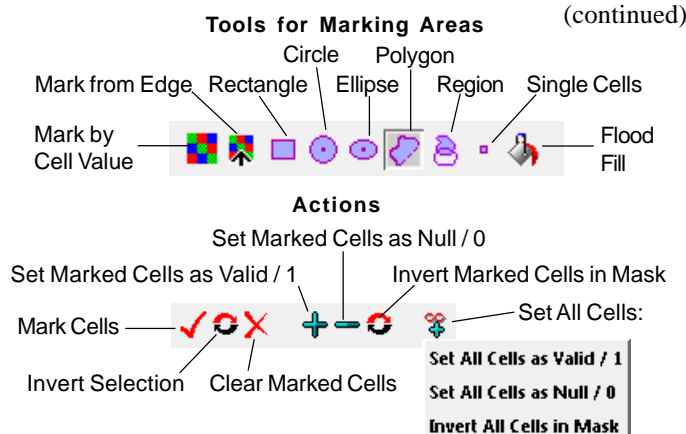### Independent Mask Raster Objects

You can also edit and save an independent binary mask raster object using the Mask Editor. If the target raster you select in the Mask Editor is a binary raster, you edit the input raster itself (rather than a null mask subobject). You can use the Mask Editor's Layer Manager (or the Display Manager in the Display process) to select and display a matching raster for reference while editing the mask. When you are finished editing the mask raster, press the Save icon button to name the output. (While editing a null mask, you can use the Save As icon button to save it as an independent raster object.)

Color Overlays and Marking for Action

The Mask Editor creates transparent color overlays in the View to


Tools for Marking Areas

Actions

by Region). This makes it easy to use a region, drawing tool, or cell value range to designate valid/invalid areas in one initial step. Actions on subsequent marked areas *only* apply to the marked area.

Global Actions
You can make global changes to the current mask without regard to marked areas by pressing the Set All Cells icon button to show a menu with options to set all cells as either valid or null or to invert all cells in the mask (see illustration on the previous page).

Mark by Cell Value
The Mark by Cell Value tool is used in conjunction with the Filter Options controls to mark all cells of a certain value or range of values anywhere in the target raster. To activate the Filter Options, turn on the Mark Cells toggle button (see illustration below). You then choose a comparison operator (=, <>, <, <=, >, >=) from the combobox and enter a numeric value (or choose Minimum or Maximum from the combox to the right of the numeric field). Press the Mark Cells icon button to apply the designated filter settings. Using just the top line of Filter Options controls you can thus mark all cells equal to a single value or a range relative to a single value. To use a second value to limit a range, turn on the *and* toggle button on the second line of the Filter Options controls, choose an operator, and enter a value. You can set values and choose operators to mark an *inside range* (range between the two values) or an *outside range* (all values outside the indicated range).

Choose comparison operator   Enter value...

... or choose the Minimum   range
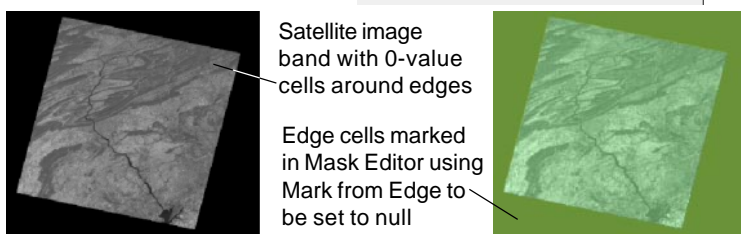or Maximum value   marked
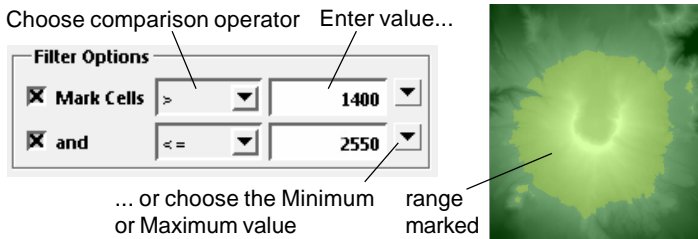
When the parent raster of the null mask is a three-component color composite (such as RGB color), the operator menus in the Filter Options are modified to provide two choices for each operator, *all* or *any*. Choosing the *all* version of the operator requires that the cell values in all three raster components meet the comparison criterion in order to mark the cell, whereas the *any* version marks the cell if any of its component values meet the criterion.

All =
Any =
All <>
Any <>
All <
Any <
All <=
Any <=
All >
Any >
All >=
Any >=

Mark from Edge
The Mark from Edge tool is also used with the Filter Options controls. It allows you to mark all cells of the designated value or value range that are contiguous with the edge of the raster. This tool is very useful for marking 0-value (non-image) cells around the edges of projected satellite images so they can be set as null while preserving any valid 0-value cells within the interior of the image (see illustration below).

Satellite image band with 0-value cells around edges

Edge cells marked in Mask Editor using Mark from Edge to be set to null

Mark by Drawing or by Region
The Mask Editor provides several standard drawing tools for manually defining areas: rectangle, circle, ellipse, and polygon. When you choose a drawing tool, the controls for the tool (if any) are automatically shown in the Tool Controls pane on the Mask Editor window. Use the left mouse button to draw, adjust, and reposition the shape in the View. You can also activate the Region tool and use its associated Tool Controls to select and use a region object to define an area, as illustrated below. The selected region is automatically added to the View. To mark the area outlined by an area drawing tool or region, right-click in the View or press the Mark Cells icon button.

(1) With the Mark by Region tool selected, press the Add button in the Tool Controls to select a pre-existing region.
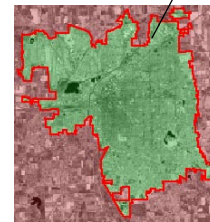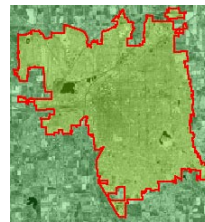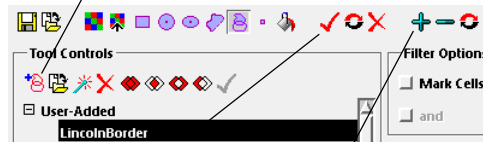
Region being used to define the valid/invalid areas of a null mask in which all areas are initially valid. The area outside the region is automatically set as invalid (only as part of the initial action on the mask).

(2) mark region area   (3) Set Marked Cells as Valid / 1

When you use the area drawing tools or a region to designate mask areas, you can activate and set the Filter Options to also apply cell value criteria to your spatial selection when marking areas.

The Mark Single Cells selection provides a point tool that you can use to mark individual image cells for assignment. The Tool Controls for this option also allow you to choose an active GPS input as the source for the point coordinates. The Filter Options are not available with this tool.

Mark by Flood Fill
The Mark by Flood Fill tool allows you to mark areas of contiguous cells that have a uniform or nearly uniform value. Left-click in the View to place the cursor to indicate the starting location and its cell value (which is shown in the Tool Controls panel). Adjust the Tolerance slider (or enter a value next to the slider) to specify the range of raster values greater than or less than the start value that will be marked in the set of contiguous cells. Turning on the Fill Holes toggle fills any holes within the marked set.
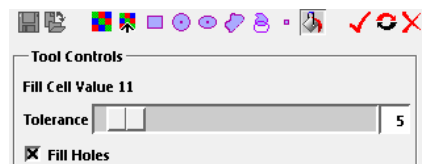
Tolerance = 0   Tolerance = 3, no fill holes   Tolerance = 3, fill holes