

Raster Riser for ArcGIS 10.0

Reference Manual and Tutorial



Version: 1.0

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Install files: RasterRiser.esriAddIn

Author: Richard A Nava
United States Geological Survey, Flagstaff
Astrogeology Science Center
E-mail: mava@usgs.gov

Description: Provides a sorting list for manually ordering mosaic dataset rasters in ArcMap. Rasters in the mosaic dataset appear in a sorting list with drag-and-drop functionality that allows the user to “rise” or “sink” individual images, or groups of images, inside an edit session. The tool includes navigation, spatial selection and search tools to facilitate raster “rising” and “sinking”.

Requirements: ArcGIS Desktop 10.0

Manual update: November 1, 2011

The screenshot displays the ArcGIS Desktop interface with the Raster Riser tool active. The main map view shows several grayscale mosaic dataset rasters overlaid on a map, with yellow numbers (13, 15, 17, 21, 24, 25) identifying individual rasters. A cyan selection box highlights a group of rasters. The Raster Riser tool window on the left contains a list of rasters with their names and Object IDs (OID). The Footprint table at the bottom provides detailed metadata for the selected rasters.

OBJECTID*	Name	MinPS*	MaxPS*	CenterX	CenterY	RASTER_RISER_S	RASTER_RISER_V
2	B02_010473_1584_XN_21S008W	0	100000	-499797.22484	-1267101.959783	-1.025000e+017	0
17	P14_006689_1588_XN_21S008W	0	100000	-525927.37635	-1248662.846504	-9.750000e+016	0
24	P21_009339_1586_XN_21S009W	0	100000	-537724.19583	-1261453.584128	-9.250000e+016	0
1	B01_010117_1585_XI_21S009W	0	100000	-551976.466457	-1265768.531067	-8.750000e+016	0
25	P22_009550_1585_XN_21S009W	0	100000	-567944.818057	-1262613.861824	-8.250000e+016	0
12	P02_002008_1558_XI_24S009W	0	100000	-590881.334885	-1418428.125232	4.250000e+016	0
21	P18_007902_1579_XN_22S010W	0	100000	-593850.826205	-1301178.752226	-7.750000e+016	0
13	P03_002285_1562_XI_23S010W	204.3907	100000	-584479.199323	-1393132.338065	-7.750000e+016	0

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Installation Instructions

1. Double-click the **RasterRiser.esriAddIn** file.
2. Select **Install Add-In** from the ESRI ArcGIS Add-In Installation Utility (**Fig. 1.1**).
3. Click **OK** on the **Installation Succeeded** dialog to finish the installation.

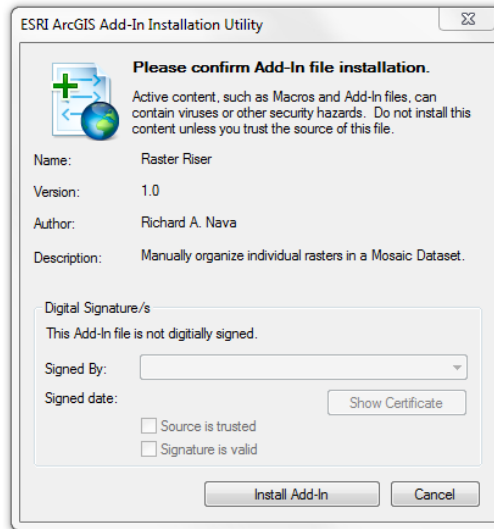


Figure 1.1. Select Install Add-In on the ESRI ArcGIS Add-In Installation Utility dialog.

Troubleshooting: If the Add-In cannot be installed, make sure to check administrative options from: Customize > Add-In Manager > Options panel.

Adding to ArcMap

Once the Add-In has been installed:

1. Open **ArcMap**.
2. Look for the **Raster Riser toolbar** somewhere on the screen.
 - a. If the toolbar has not appeared automatically: click on **Customize > Toolbars** and make sure **Raster Riser** is checked.

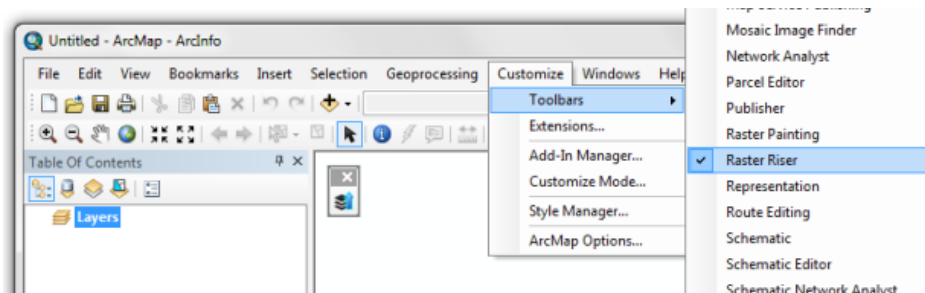


Figure 2.1. If the toolbar doesn't show up the first time you open ArcMap, click on Customize > Toolbars, and make sure **Raster Riser** is checked.

Toolbar Description

The **Raster Riser toolbar** holds a single command button:


Name	Description
 Raster Riser	Show/Hide the Raster Riser window.

Table 3.1. Name and description of toolbar components.

Raster Riser Window

The *Raster Riser* window contains **two** different toolbars: the toolbar at the **top** holds sorting, reordering, and flagging tools, while the **bottom** one is the search toolbar. Rasters in the mosaic dataset are listed in the middle section of the window. Here, each raster is represented by a row displaying its **name** and **Object ID (OID)**.

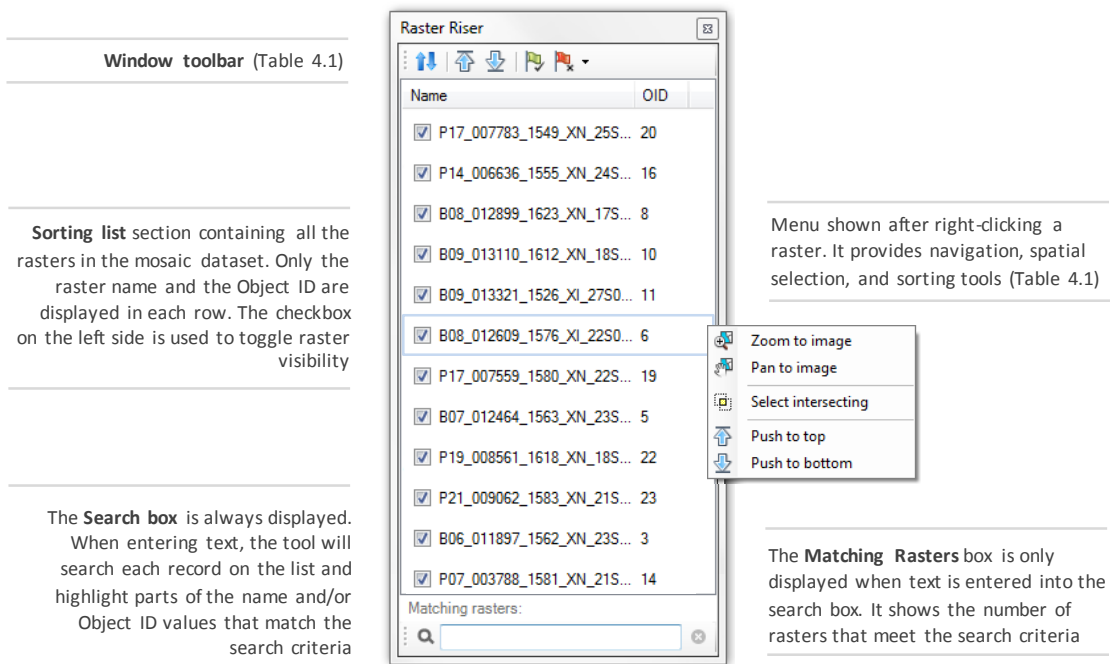






Figure 4.1. Brief overview of the *Raster Riser* window and its controls.

Name	Description
 Sort by field	Select a field to sort rasters by.
 Push to top	“Rise” the selection to the top of the sorting list.
 Push to bottom	“Sink” the selection to the bottom of the sorting list.
 Flag	Flag the current selection. Names and OIDs for flagged images appear in bold font.





	Clear Flag	Clear flags for the current selection.
	Zoom to image	Zoom to the image clicked (right-click).
	Pan to image	Pan to the image clicked (right-click).
	Select intersecting	Select images that intersect the image clicked (right-click).

Table 4.1. Name and description of tools within the *Raster Riser* window.

The Mosaic Dataset

A **mosaic dataset** is a **data model** within the geodatabase used to manage a collection of raster datasets (images) stored as a catalog and viewed as a mosaicked image. When you add a mosaic dataset to ArcMap, it is added as a **mosaic layer** that appears in the table of contents as a special group layer with a minimum of three layers: **Boundary**, **Footprint**, and **Image** (Fig. 5.1).

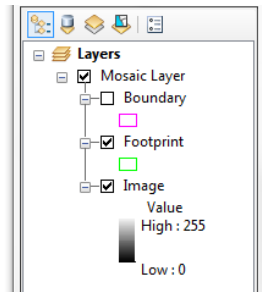


Figure 5.1. Mosaic layer in the ArcMap Table Of Contents.

Boundary layer

The Boundary layer displays the boundary of the mosaic dataset. By default, boundary is the **extent** of all the raster datasets, defined by their **footprints**, within the mosaic dataset.

Footprint layer

The Footprint layer displays the footprints for each raster within the mosaic dataset. From the Footprint layer, you can open the **attribute table** for the mosaic dataset (Fig. 5.2). This table displays a list of all the rasters in the mosaic dataset and many of their properties, such as the minimum and maximum pixel sizes that are used to display each raster in the mosaicked image. It may also contain additional fields, often derived from metadata that can be used when querying the mosaic dataset, such as acquisition date.

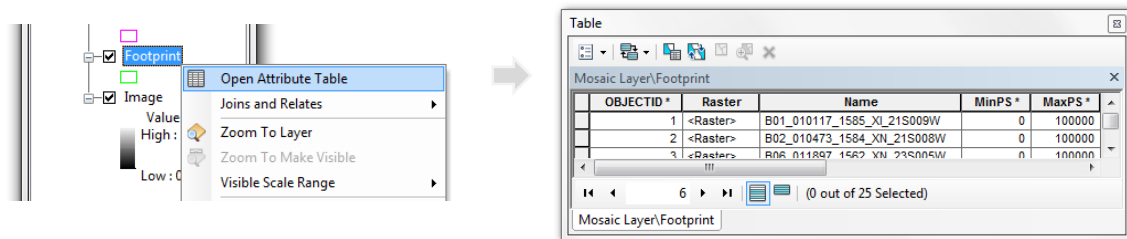


Figure 5.2. The Footprint layer contains the attribute table for the mosaic dataset. It displays a list of all rasters and many of their properties.

Image layer

The Image layer controls the **rendering** of the mosaicked image similarly to a raster layer. You can modify the **display properties**, such as the stretch, RGB band combination, resampling, and mosaic method.

How Raster Riser Works

Raster Riser makes it simple to organize images in a mosaic by manually dragging and dropping them along a **sorting list**. In the background, the toolset makes use of the mosaic layer capability to display images based on **attribute table field** values. A field is created inside the **Footprint layer attribute table (RASTER_RISER_S)**, which is populated with numeric values representing the **weights** of images relative to each other; the ones with lower values (e.g. -10) appear higher in the list and on the map. As you drag images up or down the **sorting list**, a new weight is assigned to them, and the map display is updated to reflect the changes.

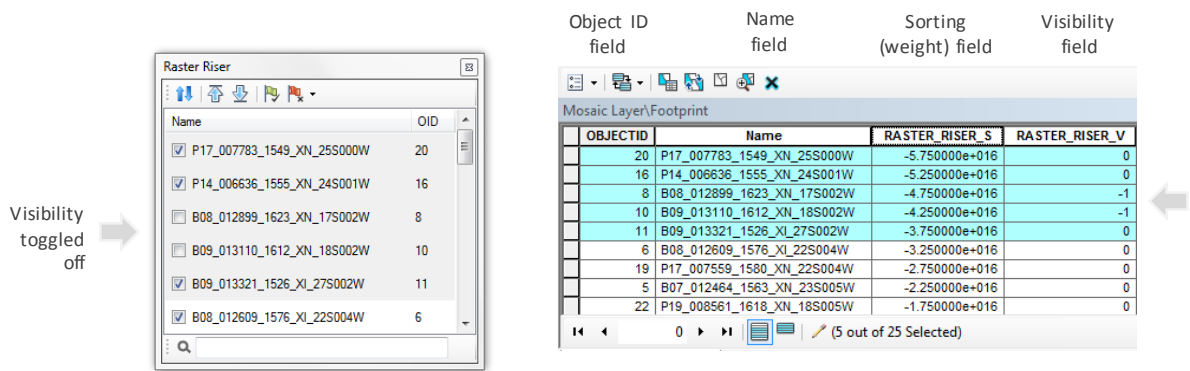


Figure 6.1. Relationship between the *Raster Riser* window and the Footprint attribute table. The *Raster Riser* window is in sync with the RASTER_RISER_S field in the attribute table. Visibility of rasters is controlled by the RASTER_RISER_V field. When a raster is turned off, it will get a value of -1 and will not be displayed on the map.

Visibility of images in the mosaic is changed in a similar way. When you begin sorting the mosaic, the toolset adds a **definition query** to the **mosaic layer** → RASTER_RISER_V <> -1. At first, all images are visible, but once you turn any of them off, the toolset will update the RASTER_RISER_V visibility field in the **Footprint layer attribute table** with a value of -1. This tells the mosaic layer not to display that particular image.

Mosaicking Tutorial Using Raster Riser

The following is a step-by-step mosaicking tutorial using *Raster Riser* and images obtained from the *Mars Reconnaissance Orbiter (MRO) Context Camera (CTX)*. These are single-band, black-and-white, 8-bit images, but the process is still applicable to any image type.

IMPORTANT: The instructions outlined in steps 1 and 4 (below) are **necessary** to fully take advantage of the functionality built into *Raster Riser*.

Overview

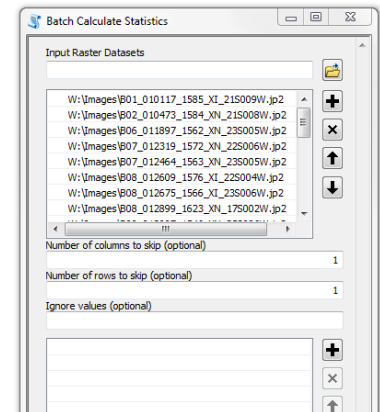
1. Preparing input rasters
2. Creating the mosaic dataset
3. Excluding NoData areas
4. Configuring the mosaic dataset for use in Raster Riser
5. Reordering rasters using Raster Riser
6. Removing unwanted rasters from the mosaic dataset
7. Exporting the mosaic

1. Preparing input rasters

Before we create the mosaic dataset, we want to **prepare** the rasters that will be mosaicked by calculating their **statistics** and **pyramids**. **Statistics** are required for a mosaic dataset to perform geoprocessing operations or certain tasks, such as applying stretches or color corrections. **Pyramids** are used to improve performance. Since we will be displaying every raster in the mosaic dataset at once, scale-dependent, down-sampled versions of each raster will allow for faster display during ordering.

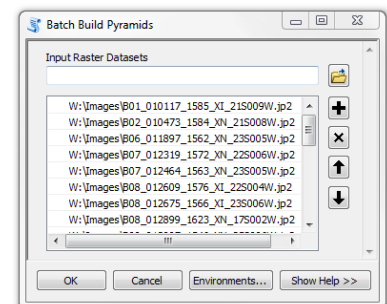
Calculate statistics

- a. Using ArcCatalog (or the Catalog window within ArcMap)...
- b. Make sure that all rasters to be included in the mosaic dataset live at a single location.
- c. Open the **Batch Calculate Statistics** geoprocessing tool located under: Data Management > Raster > Raster Properties.
- d. Click on the folder icon next to the **Input Raster Datasets** field.
- e. On the **Input Raster Datasets** dialog:
 - Navigate to the location where the rasters live.
 - Select all the rasters (using **Shift + Click** or **Ctrl + Click**).
 - Click **Add**.
- f. Accept the defaults and click **OK**.



Build pyramids

- a. Open the **Batch Build Pyramids** geoprocessing tool located under: Data Management > Raster > Raster Properties.
- b. Click on the folder icon next to the **Input Raster Datasets** field.
- c. On the **Input Raster Datasets** dialog:
 - Navigate to the location where the rasters live.
 - Select all the rasters (using **Shift + Click** or **Ctrl + Click**).
 - Click **Add**.
- d. Click **OK**.

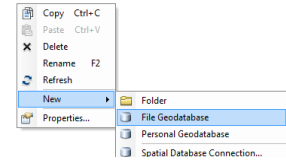


2. Creating the mosaic dataset

Mosaic datasets **must** live inside a geodatabase. We will be using a **File Geodatabase** in this tutorial.

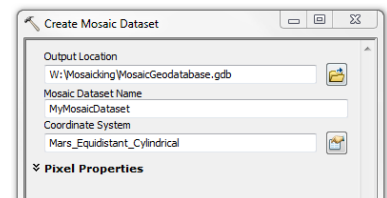
Create File Geodatabase

- a. In ArcCatalog (or using the Catalog window inside ArcMap), inside the folder where the geodatabase will be created:
 - Right-click > New > **File Geodatabase**.
 - Enter a new **name**.



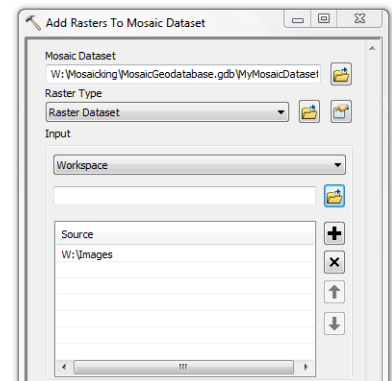
Create Mosaic Dataset

- a. Inside the geodatabase > Right-click > New > **Mosaic Dataset...**
- b. On the **Create Mosaic Dataset** dialog:
 - Enter a name in the **Mosaic Dataset Name**.
 - Specify a **Coordinate System**.
 - Accept other defaults, and Click **OK**.



Add rasters to Mosaic Dataset

- a. Right-click the mosaic dataset > **Add Rasters...**
- b. On the **Add Rasters To Mosaic Dataset** dialog:
 - **Raster Type** → Make sure **Raster Dataset** is selected.
 - **Input** → Select **Workspace**.
 - Click on the folder icon to navigate to a folder > Select the folder > Click **Add**.
 - Make sure **Update Overviews** is **unchecked**.
 - Click **OK**.



NOTE: See *Advanced Options* for handling duplicate rasters.

3. Excluding NoData areas

Areas in a raster containing NoData values can be excluded from a raster by using the **Footprint layer**. Footprints contain the **outline** of each raster within the mosaic dataset. In the case of CTX rasters, the extent of raster data is not rectangular as suggested by the file extents. It is, in fact, contained within a **skewed rectangle** in the dataset, and the other pixel values surrounding this skewed rectangle are **NoData** values (**Fig. 7.1**).

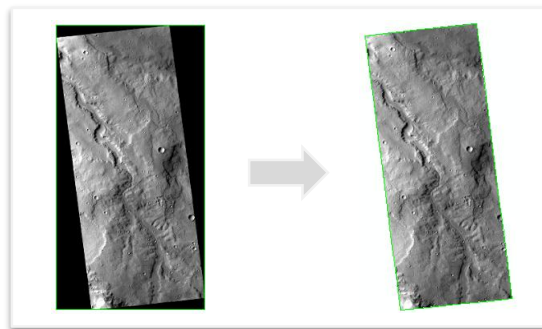
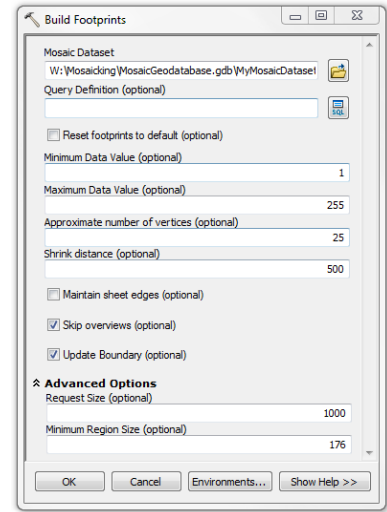


Figure 7.1. Example of an image with NoData values excluded using the Footprint layer.

Re-build footprints

- a. Open the **Build Footprints** geoprocessing tool located under: Data Management > Raster > Mosaic Dataset.
- b. On the **Build Footprints** dialog:
 - Click on the folder icon next to the **Raster Dataset** > Navigate to the mosaic dataset > Select it > Click **Add**.
 - Make sure the **Minimum Data Value** is set to **1**.
 - **Maximum Data Value** → **255**.
 - **Approximate number of vertices** → **25**.
 - **Shrink distance** → **500** (see notes below).
 - **Maintain sheet edges** → **unchecked**.
 - **Skip overviews** → **checked**.
 - **Update Boundary** → **checked**.
 - Under the **Advanced Options** section: set the **Request Size** to **1000** and the **Minimum Region Size** to **176** (see notes below).
 - Click **OK**.



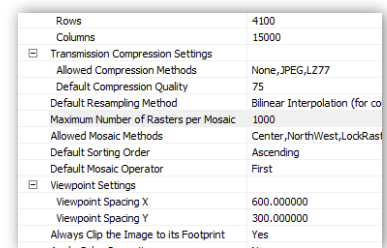
NOTES: The *Shrink distance* value should be in the units of the mosaic dataset; it is used to counteract effects of lossy compression around data edges. Also, ESRI recommends a *Request Size* of 1000 for skewed data areas. CTX-specific testing indicates that the *Minimum Region Size* can be computed from $R \times 0.176 \rightarrow 1000 \times 0.176 = 176$. This simple formula can be used if the *Request Size* is changed.

4. Configuring the mosaic dataset for use in Raster Riser


When ordering images using *Raster Riser* it is best if we look at **all rasters** at once. A mosaic dataset, by default, has settings for the faster display of images. These settings include the number of rasters to display at once, and the scales at which images are displayed. We want to **change** these two settings so we are able to work with the mosaic as a whole, regardless of the scale level of our map.

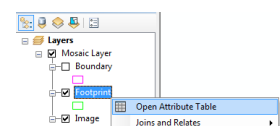
Change maximum number of raster per mosaic


- a. Open ArcCatalog (or using the Catalog window inside ArcMap)...
- b. Right-click the mosaic dataset: Properties > Defaults tab.
 - Set the **Maximum Number of Rasters per Mosaic** (under **Image Properties**) to the **total number** of rasters in your mosaic dataset.
- c. Click **OK**.

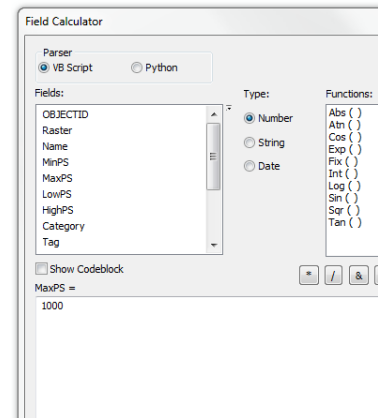


Change maximum pixel resolution for all rasters in the mosaic dataset

- a. Open a **new** ArcMap document and add the mosaic dataset using the **Add Data** button  located on the **Standard** toolbar.
- b. Right-click the **Footprint** layer on the **Table Of Contents**, and select **Open Attribute Table**.

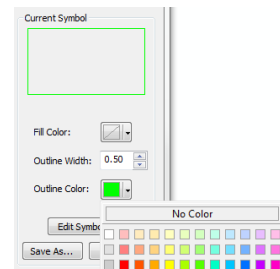


- c. On the Footprints attribute table:
 - Right-click the **MaxPS** field and select **Field Calculator...**
 - On the **Field Calculator** dialog, inside the **MaxPS =** box: type in a high number (since this tutorial is based on CTX rasters, enter **1000**).
- d. Click **OK**.
- e. Repeat the above step for the **MinPS** field, but enter a value of **zero**.
- f. Zoom to the extent of the mosaic dataset by clicking the **Full Extent** button  located on the **Tools** toolbar. All rasters should now be visible on the map.



Change the symbology of the Footprint layer and display labels (optional)

- a. Right-click the **Footprint layer** and click **Properties**.
- b. Under the **Symbology** tab:
 - Click once on the **Symbol** being used to bring up the **Symbol Selector** dialog.
 - On the **Symbol Selector** dialog select an **Outline Color** of **No Color**.
 - Click **OK**.
- c. Under the **Labels** tab:
 - Check the **Label features in this layer** checkbox.
 - Select the **OBJECTID** field on the **Label Field** drop-down menu.
 - Change the color and size of the label as needed.
 - Click **OK**.
- d. Click **OK**.



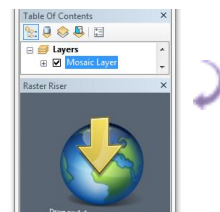
5. Reordering rasters using Raster Riser

Now that the mosaic dataset has been configured to be used with *Raster Riser*, we'll go through the workflow of using the toolset.

Start editing the mosaic dataset


- a. Drag the **mosaic layer** from the **Table Of Contents** and drop it onto the **Raster Riser** window.

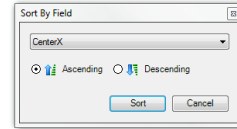
An **edit session** is started **automatically** and the *Raster Riser* window is populated with all the rasters in the mosaic layer.



Sort rasters by a specific field (optional)

Rasters in the *Raster Riser* window can be reordered at any time by a particular field in the **Footprint layer** attribute table. When the new sorting is applied to the dataset, rasters on the map will be displayed in the same order as the *Raster Riser* sorting list. To sort the rasters by a field:

- Click on the **Sort by field** button  located at the top of the *Raster Riser* window to show the **Sort By Field** dialog.
- Select a field from the drop-down menu.
- Select either **Ascending** or **Descending**.
- Click **Sort**.



Select rasters

Rasters in the *Raster Riser* window are in **sync** with the map, so whatever **selection** you make on the map, will also be set on the *Raster Riser* window, and vice-versa. You can use generic selection tools available in ArcMap to select **groups** of rasters from the map. To select a raster on the *Raster Riser* window, you may simply click on it. A group of rasters can be selected by holding the shift or control keys while clicking on individual rasters.

Raster Riser also offers the **Select intersecting** tool. This is a **spatial selection** tool that can be accessed by right-clicking any raster in the sorting list.

Rise and Sink rasters

The sorting list in the *Raster Riser* window provides drag-and-drop functionality to **reposition** individual rasters (or groups) along the sorting list. To reposition a selection:

- Drag** the selection **on top of another raster** and let go to finish.

When dragging the selection, *Raster Riser* is aware of the **drag direction**. If you drag the selection **up**, the raster that you drop the selection on will be **shifted down** to the end of your selection. If you drag the **selection down**, the raster you drop the selection on will be **shifted upwards**, on top of your selection (**Fig. 7.2**).

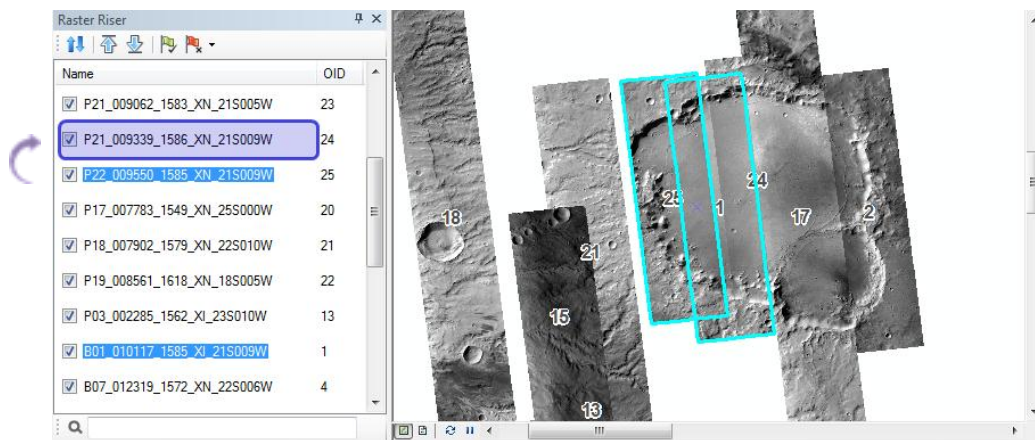



Figure 7.2. The *Raster Riser* window is in sync with the map. Whatever selection is made on either one, will be reflected on the other. Rasters are repositioned along the list by selecting them, dragging, and dropping them on top of another raster on the list. Since *Raster Riser* is aware of drag direction, the rasters shift accordingly. In this example, rasters 25 and 1 are selected and dragged on top of raster 24. The resulting sequence will be: 23, **25**, **1**, 24, 20, 21, etc.

Another way of repositioning rasters is to use the embedded tools in the *Raster Riser* window, namely the **Push to top** and **Sink to bottom** tools . These tools are available at the top of the window, and can also be accessed by right-clicking inside the sorting list.

Flag rasters

Flags are a way to keep track of rasters that are **not** part of a **selection**. For example, when you select a group of rasters and want to keep track of all of them while working with **other** rasters in the sorting list.

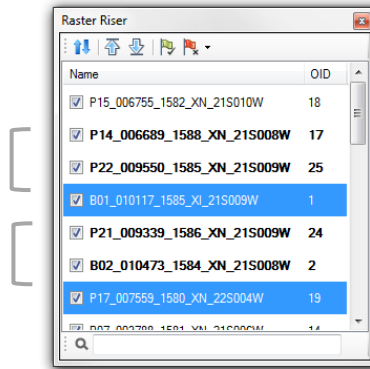


Figure 7.3. Flagged rasters are set in bold font. Other selections can be made.

Toggle raster visibility

Rasters on the map can be turned off by unchecking the box next the raster name on the sorting list. Doing so will assign a value of -1 to the **RATER_RISER_V** field on the attribute table (**Fig. 7.4**). Instructions for removing rasters that are turned off using this method are outlined in section 6. **Removing unwanted rasters from the mosaic dataset.**

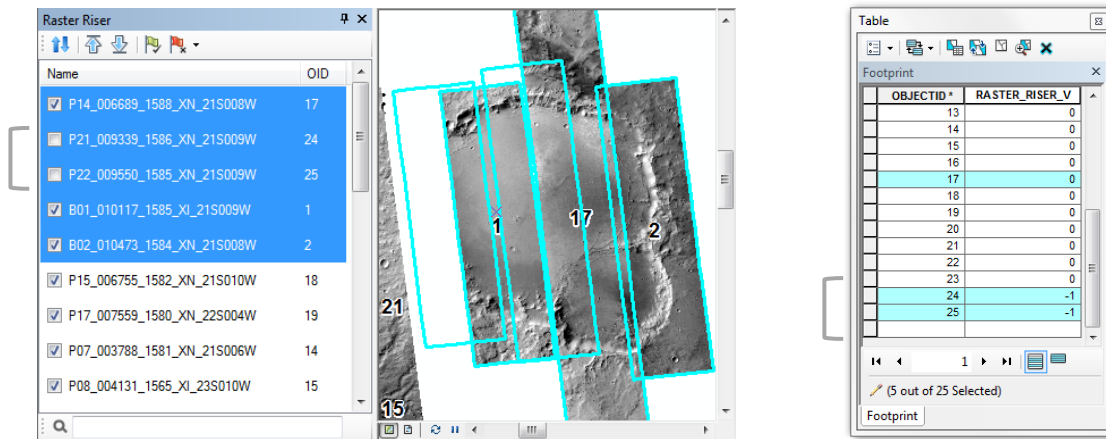


Figure 7.4. Example showing visibility toggled off for two rasters in a selection. The checkboxes for rasters 24 and 25 have been unchecked, the actual rasters are no longer displayed on the map, and their record in the Footprint layer attribute table has been updated with a value of -1.

Search the sorting list

To **search** for a particular raster **Name** or **Object ID**, begin entering text inside the **Search box** located at the bottom of the *Raster Riser* window. Rasters that contain the text entered in this box will be dynamically **highlighted** on the sorting list. The number of rasters that meet the search criteria will appear on the **Matching**

rasters section, on top of the **Search box**. To clear highlighted items, simply empty the **Search box**, or click on the **Clear search** button that appears to the right (**Fig. 7.5**).

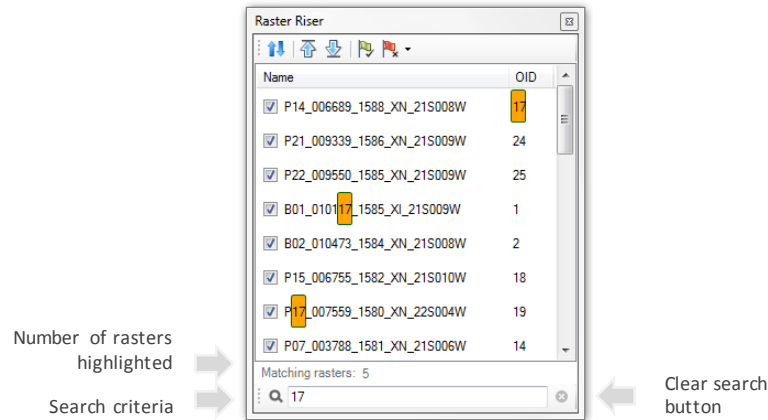


Figure 7.5. Search example with search criteria of "17". *Raster Riser* highlights every occurrence of the text entered in the search box and displays the number of rasters that match it.

Stop editing the mosaic dataset

So far, the changes we've made to the mosaic layer are **temporary**. When you **stop** an edit session, you can save any changes you have made with *Raster Riser*, or you can quit editing without saving. You can also **save** the edits you have made at any time by clicking **Save Edits** on the **Editor** menu. This keeps the edit session active. To stop the edit session:

- Click on the **Editor** menu located on the **Editor** toolbar, and click **Stop Editing**.
- If you have made any edits since the last time you saved edits, click **Yes** to save them. Clicking **No** discards the edits.

Once the edit session is stopped, the *Raster Riser* window will be cleared of all rasters.

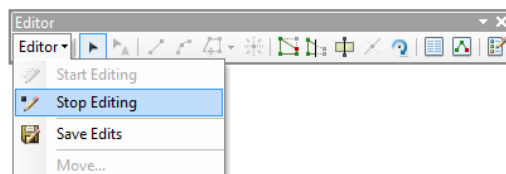

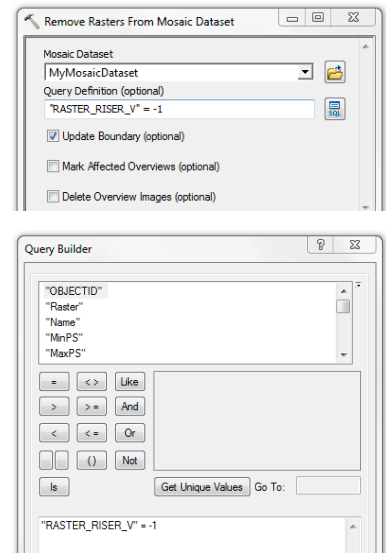


Figure 7.6. Go to the Editor Toolbar; click the Editor menu, and select Stop Editing to finish sorting the mosaic.

6. Removing unwanted rasters from the mosaic dataset

Rasters that are turned off on the *Raster Riser* sorting list can be removed after the edit session is ended by using the **Remove Rasters From Mosaic Dataset** geoprocessing tool. To remove rasters turned off using *Raster Riser*:

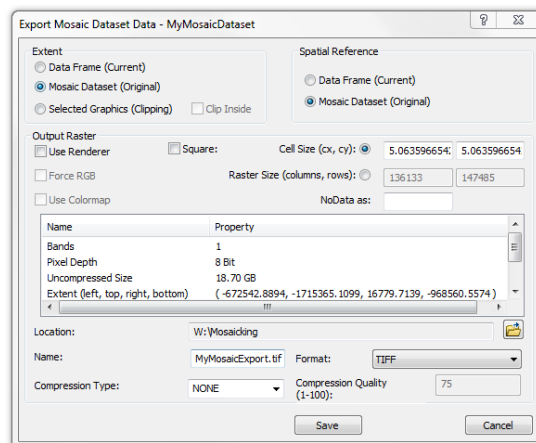
- Open the **Remove Rasters From Mosaic Dataset** geoprocessing tool located under: Data Management > Raster > Mosaic Dataset.
- Navigate to, or select the **Mosaic Dataset**.
- Click on the **SQL** button  next to the **Query Definition** field.
- On the **Query Builder** dialog:
 - Enter: **"RASTER_RISER_V" = -1** in the box located beneath the **Get Unique Values** button (keep the quotes).
 - Click **OK**.
- Make sure the **Update Boundary** is checked.
- Mark Affected Overviews** → **unchecked**.
- Delete Overview Images** → **unchecked**.
- Click **OK**.



7. Exporting the mosaic

As mentioned before, *Raster Riser* only takes advantage of the mosaic layer capability to display rasters in the mosaic dataset by a particular field. The easiest way to make changes permanent is to **save the map**, and simply keep using the mosaic layer as a dynamic display of the mosaic. Another way is to export the mosaic layer to a **Raster Dataset** (an image file). This process will actually **stitch together** all the images in the order they appear on the map to generate a **single image**. To do this:

- On the ArcMap **Table Of Contents**: right-click the mosaic layer **Image layer** and select **Export Data...**
- On the **Export Mosaic Dataset Data** dialog:
 - Make sure the **Extent** is set to that of the **Mosaic Dataset**.
 - Spatial Reference** → **Mosaic Dataset**.
 - Set the **Location** where the mosaic dataset will be exported by clicking on the folder icon on the **Output Raster** section.
 - Enter a **Name** for the exported mosaic.
 - Select a **Format** (e.g. TIFF).
 - Click **Save**.



Uninstalling Raster Riser

ArcMap

1. From the top menu select: **Customize > Add-In Manager**.
2. On the **Add-In Manager** window: select the **Raster Riser** Add-In and click **Delete this Add-In** (Fig. 8.1).
3. Click **Yes** on the **Delete Add-In** window to confirm.
4. Close the **Add-In Manager** window by clicking **Close**.
5. The Add-In will not be present the **next time** you open ArcMap.

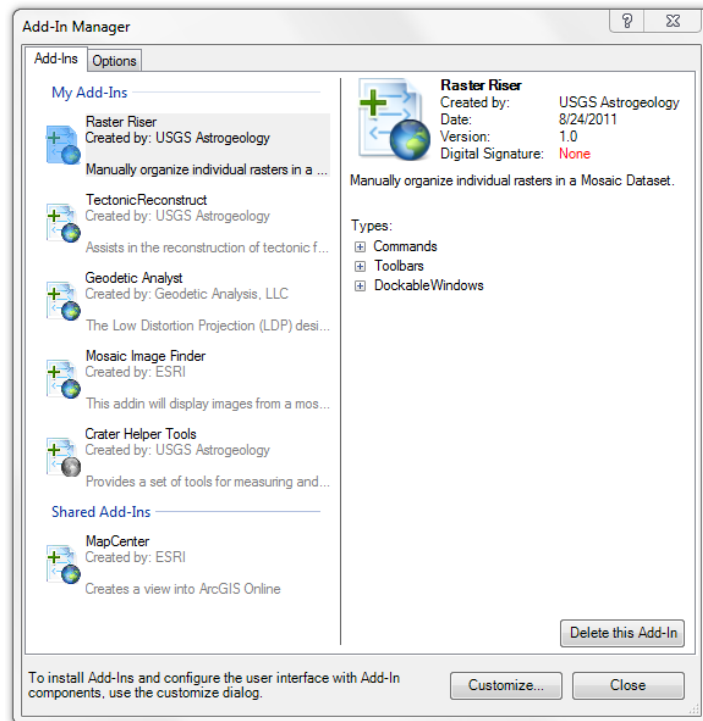


Figure 8.1. The 'Add-In Manager' is used to uninstall *Raster Riser* in ArcGIS 10.0.

Contact Info:

Please email any bugs, comments, and feedback to:

rnav@usgs.gov