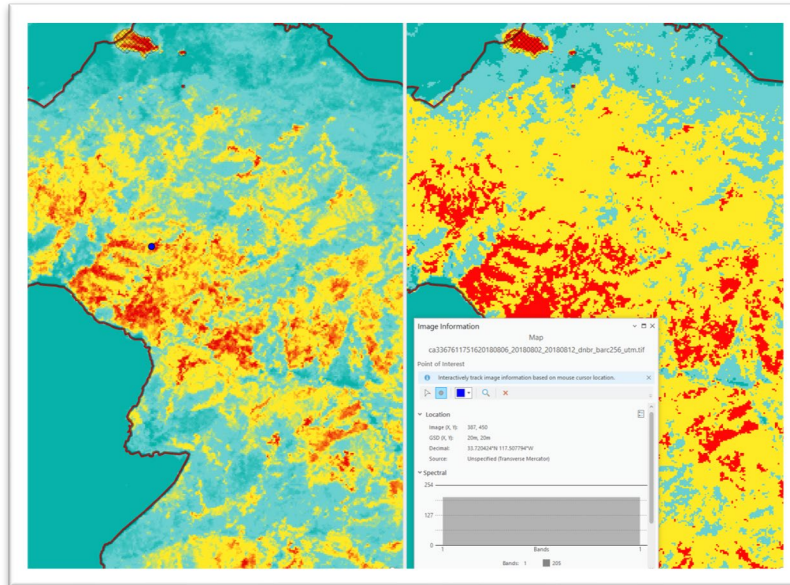


Exercise 4: Exploring the BARC



Overview

In exercise 2, you ran through one, straightforward way to visualize and explore the BARC data. This exercise demonstrates additional ways to explore the burn severity data provided in the BARC package. As with many tasks in GIS, there are many ways to explore and process the GIS data so that you can better understand the data and spatial trends across your area of interest. In this exercise, you will perform several visualization techniques using the BARC256 data.

Required Software

- ArcGIS Pro

Required Data

Note: While it is recommended to use the clipped and masked version of the BARC products (denoted with a “cm”) for creating the soil burn severity products. Using these clipped products helps to maintain alignment with original imagery used to derive the BARC products. In this exercise you will use the non-clipped products to explore and visualize data inside *and* outside the fire perimeter.

- ca3367611751620180806_20180802_20180812_burn_bndy_utm.shp (Burned Area Boundary)
- ca3367611751620180806_20180802_20180812_dnbr_bar256_utm.tif (BARC256)
- ca3367611751620180806_20180802_20180812_dnbr_bar4_utm.tif (BARC256)
- ca3367611751620180806_20180802_s2b_refl_utm.tif (pre-fire Sentinel 2 image)
- ca3367611751620180806_20180812_s2b_refl_utm.tif (post-fire Sentinel 2 image)
- Holy_sbs_final.tif (final SBS raster output from Exercise 2)

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Part 1. Exploring the BARC256 using Classified Symbology

In exercise 2, you adjusted the BARC256 by manually changing values using unique symbology which allows you to select the colors for individual integer values. This is a great approach for integer datasets such as the BARC256 which have a relatively limited number of values and may be the best approach for you. This exercise will present an alternative approach which allows for slightly quicker changes in thresholds when the existing threshold values are known.

A. Start ArcGIS Pro and Add the Data

1. Open an ArcGIS Pro project and add the following layers:

- Holy_sbs_final.tif
- ca3367611751620180806_20180802_20180812_burn_bndy_utm.shp
- ca3367611751620180806_20180802_20180812_dnbr_bar256_utm.tif
- ca3367611751620180806_20180802_s2b_refl_utm.tif
- ca3367611751620180806_20180812_s2b_refl_utm.tif

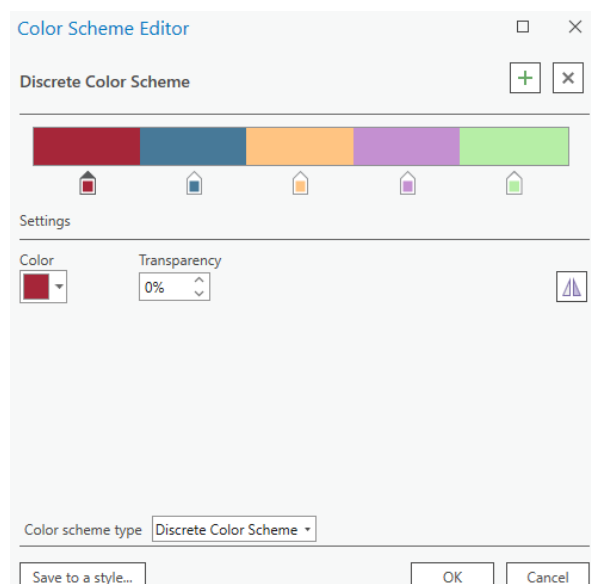
Note: The Holy_sbs_final.tif dataset was created at the end of exercise 2. If you did not complete that exercise, you can use the file in the **catch_up_data** folder.

2. Symbolize the burn boundary layer with no fill.

B. Resymbolize the BARC256 using Classified Symbology

The BARC256 will come into your map symbolized with a pre-defined color map using the thresholds for the original BARC4. In exercise 2, you changed the symbology to a **Unique** symbology that allowed you to manually change the colors for each integer value. In this exercise, you will use a **Classify** symbology to achieve the same effect.

1. Right click on the **BARC256** raster in the **Contents** pane and choose **Symbology** to open the symbology pane.
2. From the **Primary symbology** dropdown menu, choose **Classify**.
3. The symbology will default to a Natural Breaks (Jenks) method with 5 classes. Change the number of classes to **4**.
4. We will create a new color scheme to apply the color vision deficit 508-compliant BARC color scheme. Open the dropdown menu for the **Color scheme**. At the bottom of the dropdown menu, click **Format Color scheme** to open the color scheme editor.
5. At the bottom of the **Color Scheme Editor** window choose **Discrete Color Scheme** from the Color scheme type dropdown. This will change the color scheme at the top of the window.



6. The color scheme will show 5 colors by default. You will only need 4 colors for the 4 classes in the BARC color scheme.

Click the **X button** next to the plus button near the top of the **Color Scheme Editor** window to remove one color from the color scheme.

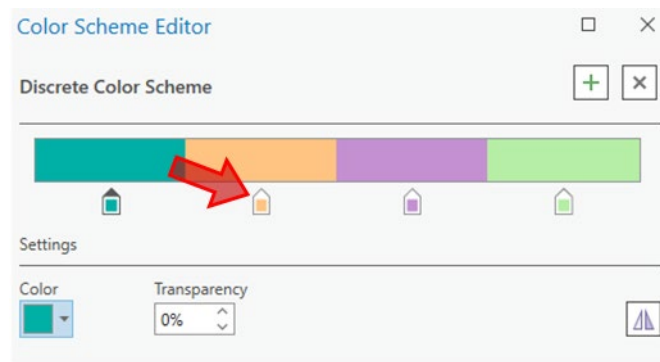


7. In the settings section, open the **color** dropdown menu by clicking on the down arrow next to the color swatch for the selected color from the color scheme. If you had previously saved the BARC colors during exercise 2, they will appear under **Favorites section** above the default color palette. Choose the darker teal blue for the left most color in the color scheme.

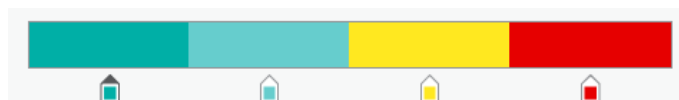
Note: if you don't have the default colors in your favorites, choose **Color Properties** under the default color palette to open the **Color Editor** window. The RGB values are provided below for each color in the default BARC color scheme.

- Unburned/Low:** Darker Teal Blue – RGB Code: Red = 0, Green = 175, Blue = 166
- Low:** Lighter Teal Blue – RGB Code: Red = 102, Green = 205, Blue = 205
- Moderate:** Yellow – RGB Code: Red = 255, Green = 232, Blue = 32
- High:** Red – RGB Code: Red = 230, Green = 0, Blue = 0

8. Click the arrow under the second color in the color scheme to change the settings for that color in the color scheme at the top. Repeat the previous step, choosing the next color from the BARC color scheme (lighter teal blue).



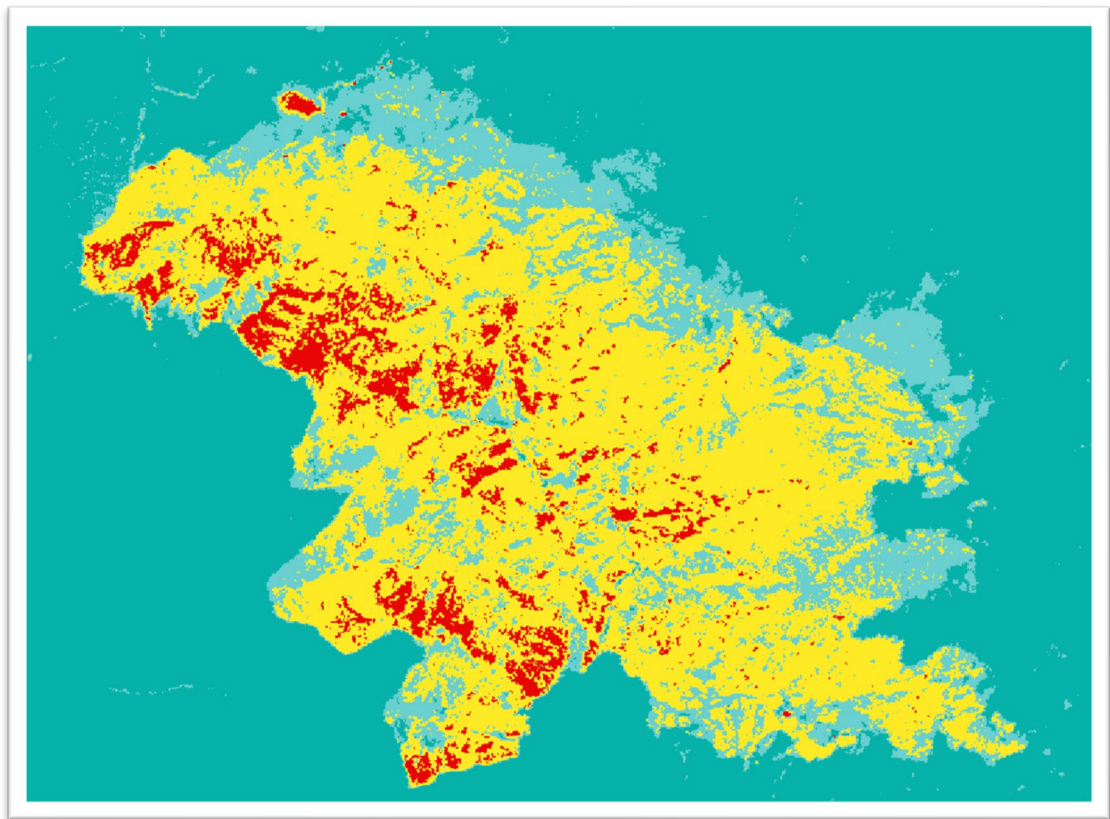
9. Repeat the same steps to apply the yellow to the third color in the color scheme, and red to the fourth color in the color scheme. When you are finished, your color scheme should look similar to the one below.



10. When you are finished applying the colors to the **Discrete Color Scheme**, click the **Save to a style...** button at the bottom of the Color Scheme Editor window. Choose a name for the color scheme, such as "BAER Soil Burn Severity Colors" and click **OK**.

11. Click **OK** to accept your changes to color scheme in the **Color Scheme Editor** window.
12. The colors will be applied to each class in your data defined by the Upper value in the range of values in the **Classes** tab in the Symbology pane.
13. Change the Upper value for each class to coincide with the default thresholds from the BARC. After typing in the new value for the Upper value, click **Enter** key to apply
 - i. Unburned/Low Threshold = 77
 - ii. Low/Moderate Threshold = 122
 - iii. Moderate/High Threshold = 191

Note: If the table disappears while editing the values, **do not panic**. Click the **+ 0.0** button to the upper right of the table and the table will reappear.
14. The **BARC256** should now display exactly the same as the **BARC4** raster. Toggle the visibility between the two layers to verify that they appear the same.



15. You can now change the upper value for any of the **Classes** in the **BARC256** to quickly see the effect of changing that threshold for the final soil burn severity data.

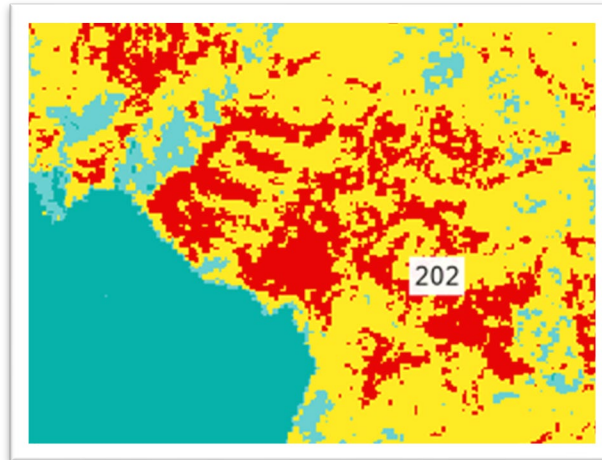
Note: In exercise 2, you used the **Reclassify** geoprocessing tool to apply the new thresholds to a temporary soil burn severity raster. The **Reclassify** tool will default to the classes defined in the symbology for the layer when the layer is selected as the input for the tool saving an extra step of applying those values in the tool parameters.

Part 2: Displaying values in the BARC256

Now that we have applied the Classify symbology to the BARC256, we can further explore the data through the use of various methods that will display the underlying values in the BARC256.

A. Displaying values using MapTips

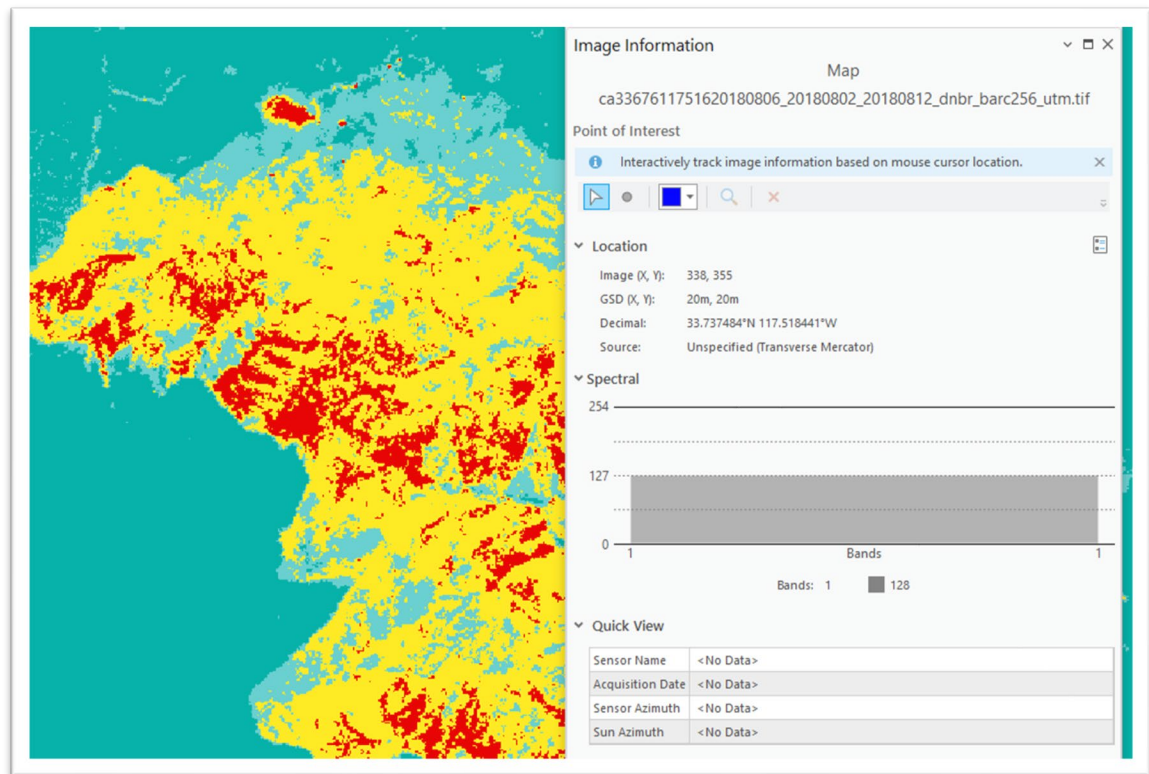
1. Double click on the **BARC256** layer in the **Contents** pane to open the layer properties window.
2. Click on the **Display** category on the left side of the **Layer Properties** window.
3. Toggle the checkbox **On** for the **Show MapTips** option.
4. Click OK to close the **Layer Properties** window and apply your changes.
5. Hover your cursor over the **BARC256** data in the map window.
6. After a brief pause, the value for the pixel under your cursor will appear in the map window without having to use the identify tool.



B. Displaying values using the Image Information pane

In the previous step, you turned on MapTips to show the value under your cursor in the map window. This is useful for seeing values without having to use the identify tool, however, it can be a bit slow when moving your cursor around to different areas. In this step, you will explore your data using the **Image Information** tool.

1. Make sure that the **BARC256** raster is selected in the Contents pane. In the ribbon at the top of the ArcGIS Pro window, choose **Imagery**.
2. In the **Tools** section of the **Imagery** ribbon menu, choose **Image Information**.
3. The **Image Information** pane will display. The image information pane interactively tracks image information based on the mouse cursor location.
4. Move your cursor around the map. Note how the information displaying in the **Image Information** pane tracks changes in the cursor location in the **Location** section and values in the **Spectral** section. There is a bar graph that displays the value under the cursor in relation to the low (0) and high (254) values for the dataset. The value under the cursor displays under the graph for Bands. In this case, we only have a single band in our **BARC256** image.



(Optional) Load the pre-fire and post-fire reflectance images into your map and see how the information shown in the **Image Information** window changes for a multiband image. Be aware that the tool does not know that the reflectance images use 3, 2, 1 for the Red, Green, and Blue bands for the satellite image.

C. Displaying values using Labels

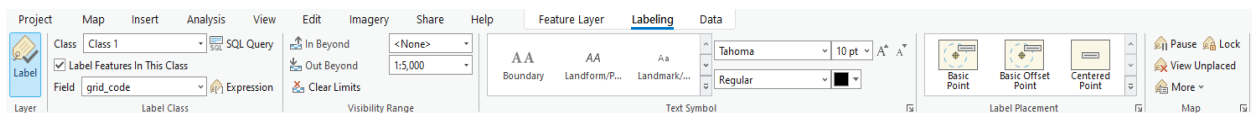
You may be familiar with using labels when working with vector data. Raster data does not allow for the same ability to display labels. In this exercise, you will convert the raster data stored in the **BARC256** to points in order to display the values from the BARC256 on the map.

Note: this approach is not optimal for visualizing data over large areas, but may be useful for assessing severity thresholds in specific smaller areas of interest.

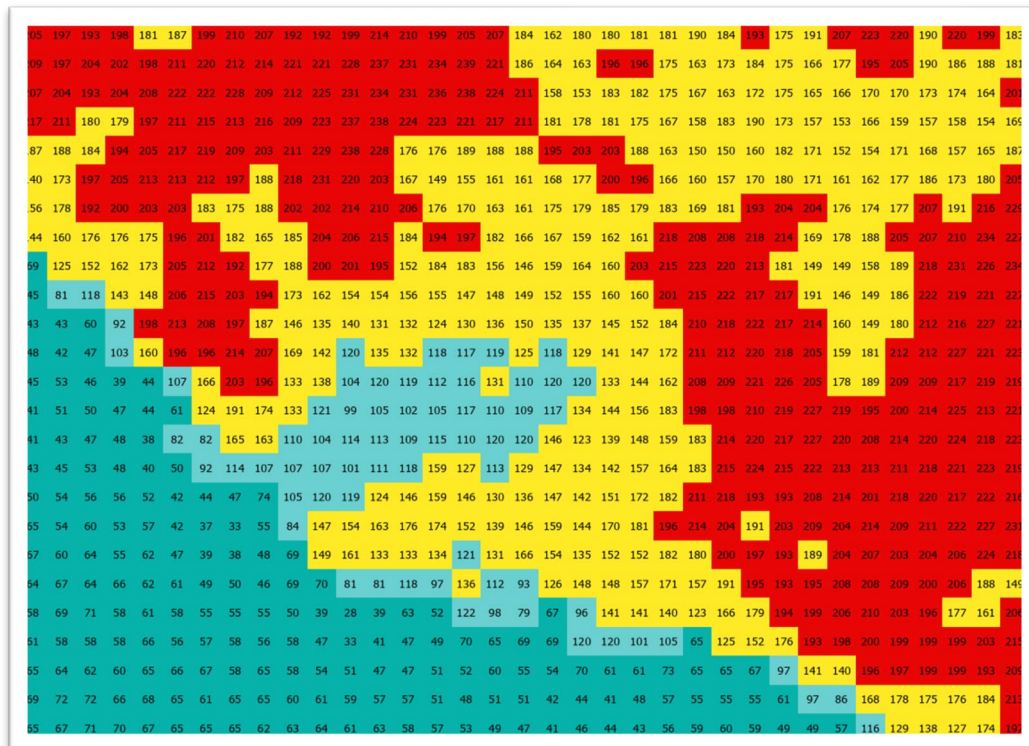
1. Open the **Geoprocessing** pane by clicking the **Tools** button from the **Analysis** menu item on the ribbon.
2. Search **Raster to Point** in the search bar at the top of the **Geoprocessing** pane.
3. Choose the **BARC256** raster as the input raster. The tool will default to Value as the **Field** parameter.
4. Choose an location and name the output **Holy_BARC256_LabelPts** for the output point feature class.
5. Click **Run** to run the tool. Note: depending on the size of the fire, this step may take some time and the resulting point feature class can become excessively large.
6. Since there can be an excessive number of pixels in a typical BARC256, the points themselves are not useful to visualize. Change the symbology properties to turn off the



- display of the points. Right click on the Holy_BARC256_LabelPts feature class and choose **Symbology** to open the symbology window.
7. In the **symbology** window, click on **Properties** to open the properties tab.
 8. Change the color to **No Color** and the outline width to **0**.
 9. Click **Apply** to apply your changes. The points should disappear from the map view.
 10. Making sure that the layer visibility is still toggled on. Select the **Holy_BARC256_LabelPts** layer in the **Contents** pane.
 11. On the ribbon, choose **Labeling**. Note: if labeling does not appear in the ribbon, the points layer may not be selected in the **contents** pane.
 12. Since we are potentially displaying a large number of labels, it is important to set the visibility range for the labels to display. For the **Out Beyond** option in the **Visibility Range** section in the **Labeling** menu on the ribbon, choose 5,000 from the dropdown menu. This will prevent labels from displaying unless the map is zoomed in to 1:5,000 scale or greater.
 13. Change the labeling field to **grid_code** in the **Label Class** section.
 14. Change the label placement to **Centered Point** in the **Label Placement** section.
 15. Click **Label** from the **Layer** section on the far-left side of the ribbon.



16. Zoom in your map to a specific area of interest making sure to zoom in closer than 1:5,000 scale. Depending on your zoom level, the display may take a while to refresh and show the labels.





Part 3: Exploring severity patterns in the BARC256 through Advanced Symbolology









In the first part of this exercise, you displayed the BARC256 by applying a classified symbology. In this section, you will use advanced symbology using a **Stretch** symbology to approximate a classified symbology with color blending between values in different severity classes to better visualize variability in severity in the BARC256.

A. Resymbolize the BARC256 using a stretch symbology

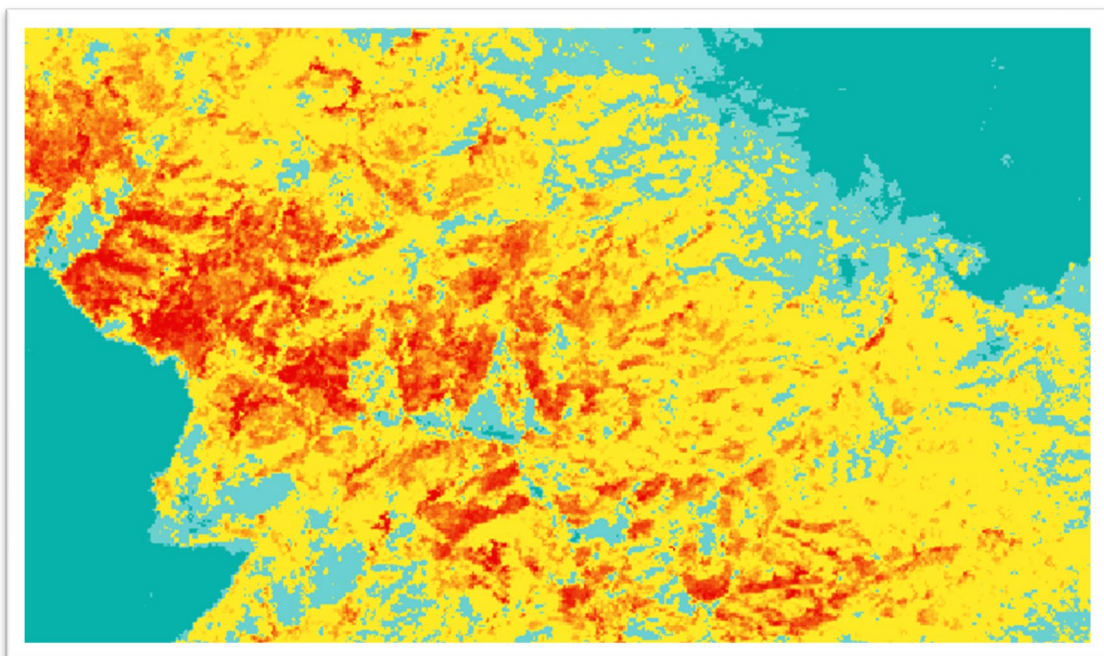
1. Copy the **BARC256** layer by holding the **control** key and dragging the layer above the existing layer in the **Contents** pane. A line should appear above the current layer name showing where the new layer will be copied in the drawing order contents.
2. Right click on the new **BARC256** layer that you just copied, and choose **symbology** to open the symbology pane. The **Primary Symbology** should be **Classify** from the previous step. Change this to **Stretch** from the dropdown.
3. The symbology will default to a black to white stretch using a **Standard Deviation** stretch type. Change the stretch type to **Minimum Maximum**.
4. Change the color scheme to the **BAER Soil Burn Severity Colors** color scheme that you created in the previous step. The symbology may not change at this time. That is okay.
5. Click on the **Advanced Labeling** tab in the lower part of the Symbology pane.

6. Change the **Number of Intervals** parameter to **7**. You should see a table of 8 values between 1 and 254. The same colors should be repeated for the first and second rows, third and fourth rows, fifth and sixth rows, and seventh and eighth rows respectively according to the color scheme at the top of the **Symbology** pane.
7. Click **Apply** at the bottom of the table that appears.

8. Starting from the 7th row first and moving up to the 2nd row, change the values to the following:

Color	Value	Label
	1	1
	77	77
	78	78
	121	121
	122	122
	190	190
	191	191
	254	254

9. Click **Apply** again. The BARC256 should look exactly like the BARC4.
10. Change the value for the seventh row in the table corresponding to the first red row. Change the value from 191 to 220 and click Apply.
11. The colors between 190 and 220 will show on a gradient between yellow and red. This is useful in seeing the spatial variability between specific ranges in values in the BARC256.
12. Expand this gradient to include values between 160 and 220 by changing the value in the sixth row from 190 to 160. You will now see how the severity transitions between moderate values (defined by values between 120-160) and high (defined by values between 220-254) values.
13. Compare the BARC256 with the BARC4 and the final soil burn severity raster you created in exercise 2. Along with sampled field data, this visualization technique can help augment where revisions are needed in the severity class thresholds from the BARC.





Using what you learned from previous parts of this exercise, explore values in the transition between moderate and high classes. Remember, you should be able to hover your cursor to see the **MapTips** for the values in the **BARC256**. You can also reopen the **Image Information** pane to see the values as you move your cursor across the map. Additionally, you can zoom in to a small area to make the **Labels** appear from the label point feature class that you created.

Congratulations! You have successfully completed this exercise.