



# BARC Pre-processing

Using the BARC for BAER Support



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*These exercises are written for ArcGIS 9.x. Some steps may vary slightly if you are working in ArcGIS 8.x*

## Objective

- To prepare your GIS workspace and data for BARC editing.

## Required Data

- hayman\_0621\_0800\_perim\_utm\_nad83.shp
- hayman\_20020623\_30m\_utm.img
- hayman\_20010520\_30m\_utm.img
- cheesman\_reservoir.shp

## Introduction and Overview of Procedure Steps

There are several pre-processing steps that are important to complete before you begin systematic edits to the BARC to create your Burn Severity Layers. This exercise will introduce you to the following pre-processing steps:

1. Load Your Pre- and Post-fire Images and the ICS Fire Perimeter
2. Make a Copy of the ICS Fire Perimeter and Edit If Necessary
3. Create Water Bodies Layer
4. Create Clouds and Unknown Areas Layers

### I. Load Your Pre- and Post-fire Images and the ICS Fire Perimeter

1. Launch ArcMap from the Windows Desktop or from the Start menu: **Start | Programs | ArcGIS | ArcMap**.
2. Click the **Add Data** button on ArcMap's main toolbar.
3. Navigate to your **Data** folder and select **hayman\_20020623\_30m\_utm.img**, **hayman\_20010520\_30m\_utm.img**, and **hayman\_0621\_0800\_perim\_utm\_nad83.shp**. Use the CTRL key to make multiple file selections in a single Add Data operation.
4. Click **Add** in the **Add Data** dialog to load the image into ArcMap.
5. Right-click **hayman\_20020623\_30m\_utm.img** and select **Properties** from the pop-up menu.
6. Select the **Symbology** tab in the Layer Properties dialog (if it isn't already selected), and set the RGB band combination to **6,4,3—RGB**. Also, check the box next to **Display Background Value...** to remove the black background.
7. Click **Apply** and **OK**.
8. Repeat steps 5-7 for **hayman\_20010520\_30m\_utm.img**.
9. Right-click on **hayman\_0621\_0800\_perim\_utm\_nad83.shp** in the **Table of Contents** and select Properties from the Pop-up menu.
10. Select the **Symbology** tab in the **Layer Properties** dialog. Click the **Symbol** icon and set the fol-



*It is possible that the pre- and post-fire images may be delivered as a three-band image. If this is the case, the bands are probably already set up to display as TM 6,4,3—RGB.*



*When editing an ICS perimeter, you should never — unless told otherwise — decrease its size. You should only increase the extent of the perimeter when you are sure the fire burned beyond what the ICS perimeter shows.*

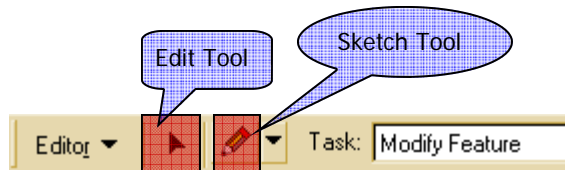
lowing parameters in the **Symbol Selector** dialog:

11. **Fill Color:** *No Color*
12. **Outline Width:** *1.5*
13. **Outline Color:** *Black*
14. Click **OK** in the **Symbol Selector** dialog
15. Click **Apply** and **OK** in the **Layer Properties** dialog.
16. Right-click on the perimeter in the Table of Contents and choose **Zoom To Layer**. Turn off **hayman\_0621\_0800\_perim\_utm\_nad83.shp** in ArcMap's **Table of Contents**, and examine the fire. Experiment with different band combinations if you choose too. You are working with pre and post-fire Landsat 5 TM images.
17. Click the **Save As...** button on ArcMap's main toolbar, navigate to your **Outputs** folder, specify a filename for your ArcMap Document, and click **Save** to save your ArcMap session. It is a good idea to save your ArcMap Document periodically as you complete pre-processing and editing steps to your BARC.

## II. Make a Copy of the ICS Fire Perimeter and Edit If Necessary

*Upon closer examination of the ICS fire perimeter (**hayman\_0621\_0800\_perim\_utm\_nad83.shp**), you should notice that it does not quite match the burn scar visible on the TM image. You'll begin by making a copy of the ICS fire perimeter, and then you'll edit it to match the burn scar on your image.*

1. Right-click on **hayman\_0621\_0800\_perim\_utm\_nad83.shp** in the **Table of Contents** and select **Data | Export Data**.
2. Specify **hayman\_per\_062302.shp** as the filename (normally you would specify a filename containing the date you are making edits to your copy of the ICS fire perimeter), and save the new Shapefile in your **Outputs** folder. Ensure that you are exporting all features and that you are using the same coordinate system as the original Shapefile. Click **Yes** when asked if you want to add the exported data to ArcMap as a layer.
3. Right-click on **hayman\_per\_062302.shp** in the **Table of Contents** and select **Properties** from the Pop-up menu.
4. Set up the viewing properties (symbolology) of the perimeter as you did in the first section of this exercise.
5. Compare **hayman\_per\_062302.shp** with the post-fire image by zooming in and panning around the fire perimeter.
6. On the western edge of the fire perimeter (about one-third of the way up from the southern-most portion of the perimeter) you'll notice there is a small area that is burned beyond the ICS fire perimeter. You will edit your copy of the ICS fire perimeter to match what you see in the post-fire image for this portion of the fire perimeter.
7. Click **Editor | Start Editing** on the **Editor** toolbar. If a dialog pops up asking which folder holds



*Make sure that the post-fire image is listed ABOVE the pre-fire image in ArcMap's Table of Contents, and that the post-fire image is turned on before you begin editing vertices in your fire perimeter shapefile.*



*You may have access to a local water bodies layer, or you may have to create one by heads-up digitizing from the imagery.*

- the perimeter you want to edit, select your outputs folder.
- Set the **Task** to **Modify Feature** and the **Target** to **hayman\_per\_062302.shp** on the Editor toolbar.
  - Click **Selection | Set Selectable Layers** on ArcMap's main menu.
  - Turn off all layers listed in the **Set Selectable Layers** dialog—except for **hayman\_per\_062302.shp**.
  - Click **Close** in the **Set Selectable Layers** dialog to dismiss it when finished.
  - Double-click on the polygon feature in your fire perimeter (**hayman\_per\_062302.shp**) using the **Edit Tool** on the **Editor** toolbar. The perimeter will become selected and you will see all the vertices that make up the polygon.
  - Move vertices with the **Edit** Tool as needed to match **hayman\_per\_062302.shp** to the actual burned area visible on the post-fire image. You'll notice that as you move the **Edit Tool** cursor over a vertex, the pointer symbol changes to a four-pointed symbol. Each time you move a vertex, make certain that your Edit Tool cursor has changed to this four-pointed symbol. Otherwise, you might move the entire polygon—BE VERY CAREFUL!!!
  - Click **Editor | Save Edits** to save your edits to **hayman\_per\_062302.shp**. Save often!!!
  - Find any other significant burned areas that are outside your fire perimeter Shapefile and adjust them in the same manner.
  - Note: You may find that the **Reshape Feature** tool is easier for perimeter adjustments. Try both methods to become familiar with multiple ways to edit polygons.

### III. Prepare Water Bodies Layer

*Now you will identify significant water bodies and prepare them for later addition to your soil burn severity. Once you have a suitable water bodies layer, you will need to perform the following steps to prepare it for subsequent processing. For this exercise, you will use an existing Shapefile we obtained from a local unit.*

- Add **cheesman\_reservoir.shp** to your ArcMap Document. Save a copy (name it **cheesman\_reservoir.shp**) to your outputs folder, display it in the current ArcMap Document, and remove the original.
- Right-click on **cheesman\_reservoir.shp** in the **Table of Contents** and select **Open Attribute Table** from the pop-up menu.
- Click **Options | Add Field** in the **Attribute Table**.
- Set the following parameters in the **Add Field** dialog:
  - Name:** *Soil\_BS*
  - Type:** *Text*
  - Length:** *10*
- Click **OK** in the **Add Field** dialog.



9. Right-click on the **Soil\_BS** field heading in the **Attribute Table** and select **Calculate Values** from the pop-up menu.
10. Click **Yes** when asked if you want to do a calculate outside an edit session.
11. Type **"WATER"** (be sure to include the double-quotes) in the lower window of the **Field Calculator** dialog.
12. Click **OK** in the **Field Calculator** dialog to populate the **Water** field.
13. Close the **Attribute Table** when finished by clicking the **X** on the top right of the table.

#### IV. Create Unknown and Cloud Areas Layers

*Our final pre-processing steps are to create shapefiles that represent clouds and cloud shadows, and unknown areas.*

1. Launch ArcCatalog, navigate to your **Outputs** folder, and click **File | New | Shapefile** from ArcCatalog's main menu.
2. Set the following parameters in the **Create New Shapefile** dialog:
  3. **Name:** *Unknown*
  4. **Feature Type:** *Polygon*
5. Click the **Edit** button in the **Spatial Reference** section of the **Create New Shapefile** dialog.
6. Click **Select** in the **Spatial Reference Properties** dialog.
7. Select the following parameters using the **Browse for Coordinate System** dialog:
  8. Projected Coordinate Systems
  9. UTM
  10. NAD 1983
  11. NAD 1983 UTM Zone 13N.prj
12. Click **Add** in the **Browse for Coordinate System** dialog.
13. Click **Apply** and **OK** in the **Spatial Reference Properties** dialog.
14. Click **OK** in the **Create New Shapefile** dialog.
15. Add your new Unknown shapefile to your ArcMap document by the **Drag-and-Drop** method—select it in ArcCatalog and drag **Unknown.shp** onto ArcMap's **Table of Contents** (drop it at the top of the list).
16. Close ArcCatalog.
17. Zoom-in to the area on the eastern edge of the perimeter. For this exercise, we will need to map severity for part of the fire that was not included in the post-fire imagery due to satellite orbit path.
18. Click **Editor | Start Editing** from the **Editor** toolbar.
19. Set **Task** to **Create New Feature** and **Target** to **Unknown.shp** on the **Editor** toolbar.
20. Ensure that all layers in the **Table of Contents** are turned off except for **Unknown.shp**, your post-fire image, and your perimeter. It is ok to go outside the fire perimeter. We will mask (clip) our final layer to the perimeter later.



In reality, the Soil Burn Severity (or Vegetation Burn Severity) for this area would need to be mapped by hand by team specialists. The hand mapping would be digitized into this shapefile you just created, and patched into the overall Burn Severity Later. For this exercise, we have done the mapping for you.



*Areas beneath clouds and cloud shadows will need to be mapped by hand since the reflectance value on the BARC is representing clouds and shadows instead of actual ground conditions. Once you have the hand mapped portion, this will need to be digitized and 'patched' into the burn severity layer. We will go over this later. Other examples of areas you will need to map by hand are areas that burned after the image was acquired. Obviously, these will show up as Very Low-Unburned on the BARC.*

21. Select the **Sketch Tool** on the **Editor** toolbar and digitize the area missing between the imagery and the fire perimeter. Remember, a single-click starts a polygon, and a double-click closes the polygon.
22. Click **Editor | Stop Editing** on the **Editor** toolbar when you've finished digitizing the unknown areas.
23. Click **Yes** to save your edits when prompted.
24. Right-click on **Unknown.shp** in the **Table of Contents** and select **Open Attribute Table** from the pop-up menu.
25. Click **Options | Add Field** in the **Attribute Table**.
26. Set the following parameters in the **Add Field** dialog:
  27. **Name:** *Soil\_BS*
  28. **Type:** *Text*
  29. **Length:** *10*
30. Click **OK** in the **Add Field** dialog.
31. Right-click on the **Unknown** field heading in the **Attribute Table** and select **Calculate Values** from the pop-up menu.
32. Click **Yes** when asked if you want to do a calculate outside an edit session.
33. Type **"UNKNOWN"** (be sure to include the double quotes) in the lower window of the **Field Calculator** dialog.
34. Click **OK** in the **Field Calculator** dialog to populate the **Unknown** field.
35. Close the **Attribute Table** when finished.

### Challenge Step (optional)

*Identify and code additional burned areas as 'Clouds'.*

1. Find the area on the prefire image that shows a cloud and its shadow. (HINT: West of Cheesman Reservoir).
2. Create a polygon within the **Unknown.shp** file for this burned area the same way you did for the Unknown layer.
3. Code its Soil\_BS as "CLOUDS".