



Locational Editing of The BARC



Using the BARC for BAER Support

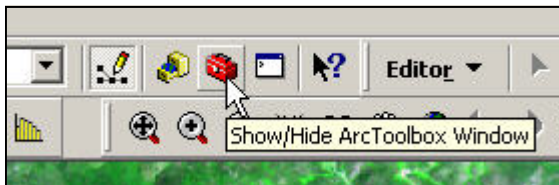
Document Updated: March, 2006



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



Always set up your raster analysis environment before proceeding with any raster spatial analysis!!



Objective

- Locational editing of the BARC.

Required Data

- hayman_20020623_30m_utm.img
- hayman_per_062302.shp
- hayman_bs1
- add_burn_soilbs.shp
- cheesman_reservoir.shp
- Field_Edits.shp

Introduction and Overview of Procedure Steps

Locational editing of the BARC is the second of two general phases of GIS editing required to produce your Burn Severity Layers. This exercise will introduce you to locational editing of the BARC:

1. Update your new 4-class burn severity layer with water, clouds, and hand-mapped areas
2. Prepare your burn severity layer for vector conversion
3. Vector conversion of your burn severity layer & vector edits
4. ArcGIS workspace cleanup

I. Update Your New 4-class Burn Severity Layer with Water and Hand-mapped Areas

*Now you are ready to merge any water bodies and hand-mapped areas (e.g., clouds, additional burn, etc.) into your Burn Severity GRID before vector conversion. **Set up your raster analysis environment in Spatial Analyst using your perimeter as your analysis mask and extent.***

1. Load the post-fire image (**hayman_20020623_30m_utm.img**) and your latest 4-class burn severity layer (**hayman_bs1**) to an ArcMap document.
2. Add **add_burn_soilbs.shp** to your ArcMap Document. This represents an area on the eastern edge of the fire not covered by the Landsat image, and thus had to be mapped manually by the BAER team. It was created with an attribute field called Soil_BS and was populated by the mapper. This file is an updated version of the **Unknown** file you already created.
3. Add **cheesman_reservoir.shp** to your ArcMap Document.
4. In ArcToolbox (see graphic at left for help on opening ArcToolbox), navigate to **Analysis Tools | Overlay | Union**.



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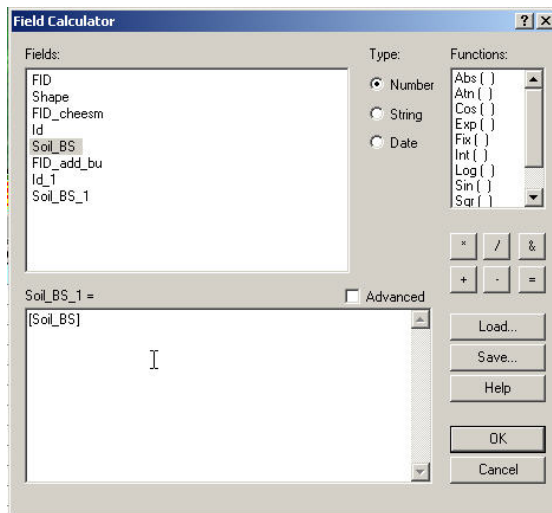
5. In the Input Feature Layer drop down, add the two vector feature layers listed in steps 2 and 3 as input layers.
6. Name the output feature class to be saved **add_lakes_bs.shp**.
7. Click Finish to perform the Union.

*Now you have a layer that contains the water bodies and hand-mapped additional burned areas. The attributes from all input layers are retained during a UNION operation and now you'll have two Soil_BS fields. **Soil_BS** will have the call from Cheesman Reservoir and **Soil_BS_1** will have the calls from the add_burn_soilbs.shp Shapefile. The following steps will get them in the same field.*

8. Open the attribute table of **add_lakes_bs.shp** and click Options | Select by Attributes...
9. Select the feature in the attribute table that has nothing in the **Soil_BS_1** field ("Soil_BS_1" = "")
10. Back in the attribute table, right-click over the **Soil_BS_1** field and click Calculate Values... Press Yes when prompted.
11. Once in the Field Calculator, click on the **Soil_BS** field. Your screen should look something like the graphic at the left. Press **OK**. This will populate the empty field in **Soil_BS_1** with the value found in **Soil_BS**. The **Soil_BS_1** field now has all your burn severity labels for water bodies and unknown areas.
12. In the main toolbar in ArcMap, click on **Selection | Clear Selected Features**.

You are almost ready to convert this to a raster so you can merge it with the Soil Burn Severity GRID that you created when you adjusted and reclassified the BARC256. First we need to convert the text values in the Soil_BS_1 attribute item into a numeric value, since Spatial Analyst and GRID functions only work with numeric values.

13. In the attribute table of **add_lakes_bs.shp**, add a field named GRIDCODE of type Short Integer.
14. Click on **Options | Select By Attributes...** and double click on "Soil_BS_1" from the list of available fields. Press the = button and then click on the Get Unique Values button.
15. Double-click on the severity code so that you now have a string that looks like "**Soil_BS_1**" = **'Low'**.
16. Click Apply. Back in the attribute table, right-click on the GRIDCODE heading and choose Calculate Values...
17. The GRIDCODE values for each Burn Severity class are as follows (you'll need to do this for each severity class):
 - Very Low or Unburned = 1
 - Low = 2
 - Moderate = 3
 - High = 4





Locational Editing of The BARC



WATER = 88
UNKNOWN = 99

Now we will convert *add_lakes_bs.shp* to a raster layer. This process creates a GRID (raster layer) with the Burn Severity codes for the four classes, plus the code for areas of WATER or UNKNOWN—if you have any.

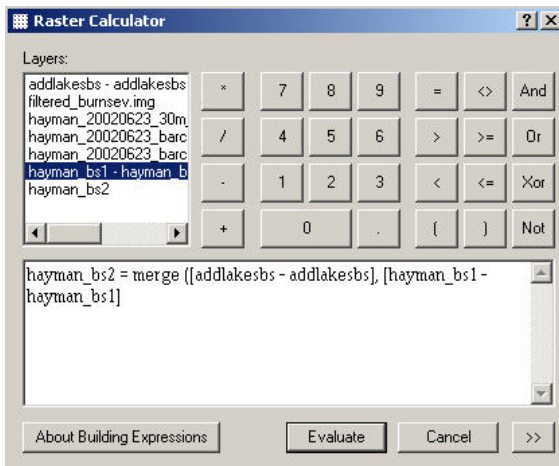
18. Click **Spatial Analyst | Convert | Features to Raster** on the **Spatial Analyst** toolbar.
19. Set the following parameters in the **Features to Raster** dialog:
 20. **Input Features:** *add_lakes_bs.shp*
 21. **Field:** *GRIDCODE*
 22. **Output Cell Size:** *30*
 23. **Output Raster:** *addlakesbs* (write the file to your **Outputs** folder as a GRID)
20. Click **OK** in the **Features to Raster** dialog to begin the conversion process.
21. Symbolize **addlakesbs** with the Burn Severity class colors described earlier in this exercise.

Now we will 'patch' in the water bodies and hand-mapped areas into the BARC. You will merge the two raster layers together to replace the areas in the BARC where there are clouds, water, or additional burned areas that you have mapped, with the values from your new raster layer—*addlakesbs*. The remainder of the BARC will remain unchanged.

22. Add **hayman_bs1** to your ArcMap Document if necessary.
23. Click **Spatial Analyst | Raster Calculator** on the **Spatial Analyst** toolbar.
24. Type **hayman_bs2 = merge (** in the expression window on the Raster Calculator dialog.
25. Double-click on **addlakesbs** in the **Layers** window.
26. Place a **comma** and then a **space** in the expression window—after **addlakesbs**.
27. Double-click on **hayman_bs1** in the **Layers** window.
28. Place a **)** in the expression window on the **Raster Calculator** dialog to close the parentheses and complete the expression. Your expression should look something like the graphic at left.
29. Click **Evaluate** in the **Raster Calculator** dialog to evaluate your raster expression and generate the output GRID you specified — **hayman_bs2**.

This creates a new Burn Severity GRID called *hayman_bs2* with all the water bodies and unmapped areas updated. The attribute table has a field called *VALUE* that contains *GRIDCODE* 1 through 4 for the Burn Severity classes, plus 88 for WATER and 99 for UNKNOWN (if you have any).

30. Symbolize **hayman_bs2** with the appropriate Burn Severity class colors (Layer Properties | Symbology | Categories | Unique Values).



The order of the input GRIDs in the parenthesis is critical. The first layer takes precedence, and it will pass its values to the output grid except where there is NODATA. In NODATA areas it will take the values from the GRID in second place.

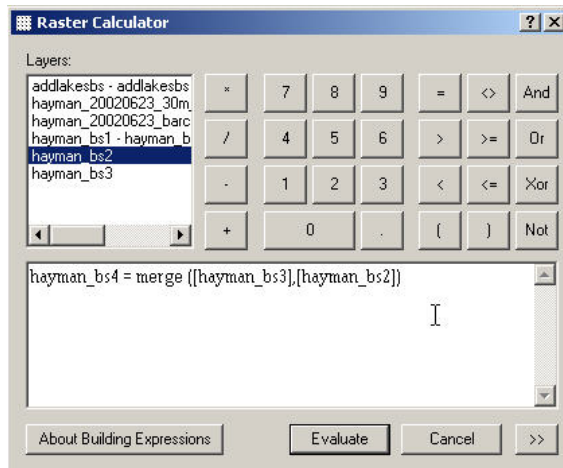


A 5x5 majority filter on Landsat-derived data (i.e. the BARC256) will smooth areas smaller than about 5 acres (5x5 = 25 pixels; 900 sq. meters / pixel = 22,500 sq. meters = 5.56 acres)

VII. Prepare Your Final Burn Severity Layer for Vector Conversion

The new final Burn Severity Layer with all the water bodies and unmapped areas coded correctly can be used directly in raster-based erosion and runoff models. For use in simple GIS analyses, such as reporting acres of Soil Burn Severity by ownership, you will want to convert your Burn Severity Layer into a vector layer (Shapefile). Before we convert it to a Shapefile, we need to generalize it in order to reduce some of its 'salt & pepper' appearance, and minimize the number of single-celled polygons.

1. Click **Spatial Analyst | Neighborhood Statistics** on the **Spatial Analyst** toolbar.
2. Set the following parameters in the **Neighborhood Statistics** dialog:
 3. **Input Data:** *hayman_bs2*
 4. **Field:** *Value*
 5. **Statistic Type:** *Majority*
 6. **Neighborhood:** *Rectangle*
 7. **Neighborhood Settings:** *5 x 5*
 8. **Units:** *Cell*
 9. **Output Cell Size:** *30*
 10. **Output Raster:** *hayman_bs3* (write the file to a folder as a GRID)
11. Click **OK** to begin the process.
12. Symbolize **hayman_bs3** with the appropriate Burn Severity class colors.
13. Turn off all the other layers in your ArcMap Document.
14. Zoom-in and pan around **hayman_bs3**. You will notice that there are some holes in **hayman_bs3**—a few white cells on the boundary between severity classes that have no data where the neighborhood statistic found no majority. We will fill in the missing cells with the values from **hayman_bs2** by running another MERGE function.
15. Click **Spatial Analyst | Raster Calculator** on the **Spatial Analyst** toolbar.
16. Type **hayman_bs4 = merge (** in the expression window on the Raster Calculator dialog.
17. Double-click on **hayman_bs3** in the **Layers** window.
18. Place a **comma** and then a **space** in the expression window—after **hayman_bs3**.
19. Double-click on **hayman_bs2** in the **Layers** window.
20. Place a **)** in the expression window on the **Raster Calculator** dialog to close the parentheses and complete the expression. See graphic at left.
21. Click **Evaluate** in the **Raster Calculator** dialog to evaluate your raster expression and generate the output GRID you specified— **hayman_bs4**.
22. Symbolize **hayman_bs4** with the appropriate Burn Severity class colors.
23. Turn off all other layers in your ArcMap Document.
24. Zoom-in and pan around **hayman_bs4**. You will see that the holes in **hayman_bs3** have been

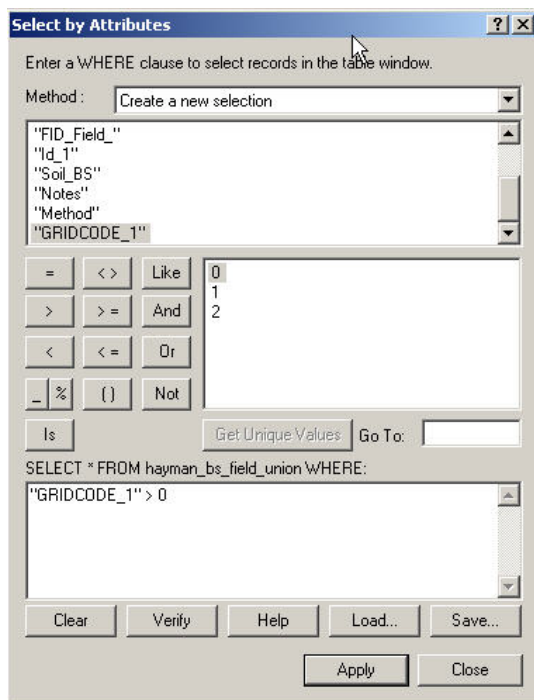




filled with Burn Severity values from **hayman_bs2**.

VIII. Vector Conversion of Your Burn Severity Layer & Vector Edits

1. Use the **Spatial Analyst** toolbar to convert **hayman_bs4** (your Burn Severity Layer—properly generalized and filled) to a polygon Shapefile.
2. **Spatial Analyst | Convert | Raster to Feature**
3. **Input Features:** *hayman_bs4*
4. **Field:** *Value*
5. **Output geometry type:** *Polygon*
6. **Uncheck** the “Generalize Lines” box
7. **Output Features:** *hayman_burnseverity.shp*
8. Add the **Field_Edits.shp** Shapefile to your ArcMap document. This file represents some field mapping done by BAER team members throughout the burn scar that need to be burned into your burn severity layer. This process is the same as burning in clouds or water bodies — we’re going to focus on how to do it in a vector environment this time.
9. Open the **Field_Edits.shp** attribute table and add a field called GRIDCODE and populate the values appropriately (see page 2 if you need more help). Now both your burn severity Shapefile and the field edits Shapefile have GRIDCODE fields.
10. In ArcToolbox, navigate to **Analysis Tools | Overlay | Union**. As inputs, select **Field_Edits.shp** and **hayman_burnseverity.shp**. Name your output file **hayman_bs_field_union.shp** and press OK.
11. Open the attribute table of **hayman_bs_field_union.shp** and examine it. You have a GRIDCODE field with all the original burn severity calls. In the GRIDCODE_1 field, you have the values that need to be burned into your burn severity map. If a value exists in GRIDCODE_1, you need to transfer it over to GRIDCODE.
12. In the attribute table, select **Options | Select by Attributes....** Type in an expression that selects features from the Field_Edits Shapefile (ones that need to overwrite the existing severity calls). *[Hint: Look at graphic on left]*
13. In the attribute table, click on the **Selected** button (next to the **All** button) to display only features that match your query.
14. Right-click over the GRIDCODE field (**not** the GRIDCODE_1 field) and click on **Calculate Values....**
15. In the list of fields in the Field Calculator, click on the **GRIDCODE_1** field and press **OK**. This process just overwrote the GRIDCODE value from hayman_burnseverity.shp with those in Field_Edits.shp. The **GRIDCODE** field is now your master burn severity field.
16. Populate the **Soil_BS** field with text according to the **GRIDCODE**. Symbolize the Shapefile with the appropriate colors to get a better feel for the final burn severity layer.
17. **Delete** any unnecessary fields (FID_Hayman, ID, FID_Field_, ID_1, Notes, Method, GRIDCODE_1)





During the Union operation, one of the Field_Edits polygons extended beyond the fire perimeter. We will clip the final burn severity layer to the perimeter.

18. Add **hayman_per_062302.shp** to your document if necessary.
19. In ArcToolbox, navigate to **Analysis Tools | Extract | Clip**. The “Input Features” is **hayman_bs_field_union.shp**. The “Clip Features” is your perimeter. Save the output to **hayman_final_soil_bs.shp**.
20. Save your ArcMap Document.

VIV. Raster Conversion of Your Final Burn Severity Layer

Many models require the input of a raster dataset, so we'll convert the final soil burn severity layer to a raster GRID. Rasters also display better in ArcScene, which we'll get to later. This is the last conversion!

1. Click **Spatial Analyst | Convert | Features to Raster** on the **Spatial Analyst** toolbar.
2. Specify the following parameters in the **Features to Raster** dialog:
 3. **Input Features:** *hayman_final_soilbs.shp*
 4. **Field:** *GRIDCODE*
 5. **Output Cell Size:** *30*
 6. **Output Raster:** click the open folder button and specify *haymansoibs* for the filename. Click **Save**.
7. Click **OK** in the **Features to Raster** dialog to begin the raster conversion. Your GRID will automatically be added to ArcMap's **Table of Contents** when the conversion process is finished.

X. ArcGIS File Clean-up

1. Use ArcCatalog to **delete** all your **intermediate** GRIDS and Shapefiles—be sure you only **delete** files that you no longer need!