



Create a Bare Ground Layer



Remote Sensing For Ranger Districts Using Image Analysis For ArcGIS

Document Updated: June, 2005



Why should you use a DOQ for this technique?

Bare ground areas are easy to identify on DOQs (they are generally highly reflective on DOQs).

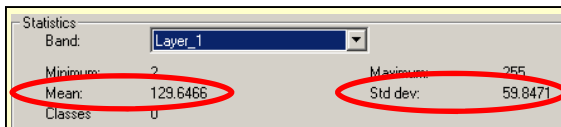


Figure 1. Note the location of the **Mean** and **Std dev** (Standard Deviation) in the **Source** tab.



*Ensure the Spatial Analyst extension and toolbar are enabled: 1) Select **Tools | Extension** from ArcMap's Main Menu and check **Spatial Analyst**, 2) select **View | Toolbars** from ArcMap's Main Menu and check **Spatial Analyst**, and 3) dock the **Spatial Analyst** toolbar if necessary.*



Why is it important to set your Working Directory?

The Working Directory specifies the output file location when performing analyses. This is especially important when using the Raster Calculator.

Objective

- To create a bare ground layer from DOQs (Digital Orthophoto Quads)

Required Data

- A DOQ

Introduction and Overview of Procedure Steps

A bare ground layer is a thematic layer that identifies locations of bare ground, such as bare soil, rock outcrops, and unpaved roads. The goal of this document is to describe how to create a bare ground layer from a DOQ in ArcMap. The topics include:

- Calculate a Bare Ground Threshold Value
- Set Your Working Directory
- Create a Bare Ground Layer Using the Raster Calculator

I. Calculate a Bare Ground Threshold Value

- Launch **ArcMap** from the **Start** menu (**Start | Programs | ArcGIS | ArcMap**).
- Select the **Add Data** button from **ArcMap's Standard** toolbar.
- Navigate to and select your **DOQ**.
- Select **Add** to load your **DOQ** into **ArcMap's Table of Contents**.
- Double-click on your **DOQ's** file name in the **Table of Contents**.
- Select the **Source** tab from the **Layer Properties** dialog.
- Write down the following parameters from the **Statistics** section of the **Source** tab (Figure 1):
 - Mean:** _____
 - Std dev:** _____ (for standard deviation)
- Calculate the following **Bare Ground Threshold Value: Mean + (Std dev * 1.5^a) =**

 - ^a = This is the **Threshold Value Factor**. You multiply this number to your standard deviation. We will describe this more later, but for now just use 1.5 in your calculation.
- Close the **Layer Properties** dialog.

II. Set Your Working Directory

- Ensure the **Spatial Analyst** toolbar and extension are enabled (see note to left).
- Select **Spatial Analyst | Options** from the **Spatial Analyst** toolbar.
- Ensure the **General** tab is open in the **Options** dialog (if not, select the **General** tab).
- Click the **Yellow Folder** button associated with the **Working Directory** (Figure 2).



Create a Bare Ground Layer

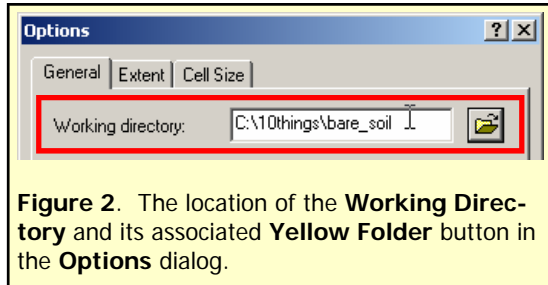


Figure 2. The location of the **Working Directory** and its associated **Yellow Folder** button in the **Options** dialog.

5. Navigate to an appropriate directory in the **Choose a Working Directory** dialog.
6. Select **OK** in the **Choose a Working Directory** dialog.
7. Select **OK** in the **Options** dialog.

III. Create a Bare Ground Layer Using the Raster Calculator

1. Select **Spatial Analyst | Raster Calculator** from the **Spatial Analyst** toolbar.
2. Enter the following expression in the **Formula Area** of **Raster Calculator** (Figure 3):

$$\text{BG_layer}^a = \text{con}([\text{yourDOQ}]^b > \text{yourBGTV}^c, 1, 0)$$
 - ^a = your new **Bare Ground Layer File Name**
 - ^b = your **DOQ File Name**
 - ^c = your **Bare Ground Threshold Value** (from Section I, step 8)
3. Click **Evaluate**. Your new, thematic **Bare Ground Layer** will automatically display in the **Data View** once the process has completed.
4. Inspect your results.
5. Repeat process until you get satisfactory results.

Figure 3. The **Raster Calculator**.

*This expression is a conditional statement. It says that if your DOQ's pixel value is greater than your **Bare Ground Threshold Value**, then that pixel is classified as **1** indicating bare ground; if the pixel value is less than your **Bare Ground Threshold Value**, the pixel is classified as **0** indicating no bare ground.*



*After inspecting your initial bare ground layer, feel free to experiment how much bare ground you are capturing. Set the **Threshold Value Factor** higher (to capture less bare ground—e.g., 1.75) or lower (to capture more bare ground—e.g., 1.25), and calculate a new **Bare Ground Threshold Value**. Use the new **Bare Ground Threshold Value** in a new **Raster Calculator** expression.*

