Lesson 3 - Processing a Multi-Layer Yield History

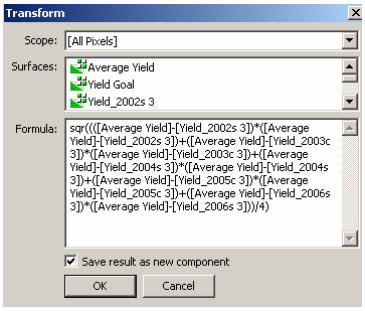
Exercise 3-4

Objective: Develop yield-based management zones.

1. **File-Open *Project_3-3.map***.

2. Double click the ***Average Yield*** surface component in the **Project** pane. Expand the map by pressing the **Maximize** button at the top right corner of the map window. Click the **Zoom To Fit** icon.

3. From the **Surface** menu select **Transform**. In the popup **Transform** dialog box delete the existing formula in the **Formula** box. Open ***Formula_3_4.txt*** text file (available for downloading). Select and copy the ***Standard Deviation Map Formula***. Paste it in the **Formula** box. Check the box next to **Save result as new component**. Click **OK**.

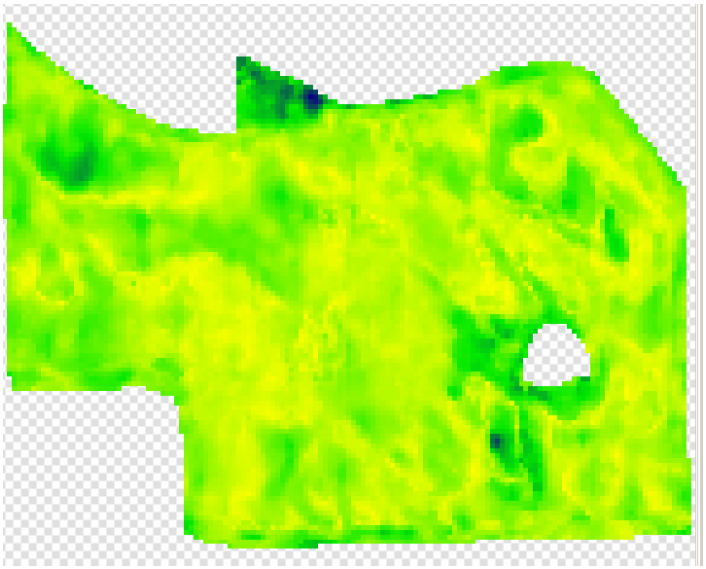


4. Right click the new ***Average Yield 2*** component and select **Rename**. In the popup **Rename** dialog box type ***StDev Yield*** in the **Change to** box. Click **OK**.

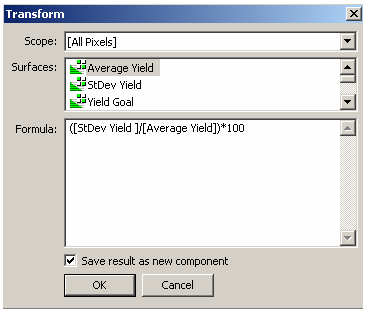
5. Double click the ***StDev Yield*** surface component in the **Project** pane. Expand the map by pressing the **Maximize** button and click the **Zoom To Fit** icon.

6. From the **View** menu select **Display options**. In the popup **Display options** dialog box click the **Apply** icon and the **Reverse** icon. Click **OK**.

   *The **Standard Deviation map** is shown below. The blue color indicates a relatively high year-to-year normalized yield variance.*



7. From the **Surface** menu select **Transform**. In the popup **Transform** dialog box, delete the existing formula in the **Formula** box. Double click the ***StDev Yield*** component in the **Surfaces** box, add "*/*", double click the ***Average Yield*** component in the **Surfaces** box, and finally add "****100***" at the end of the new formula. Check the box next to **Save result as new component**. Click **OK**.

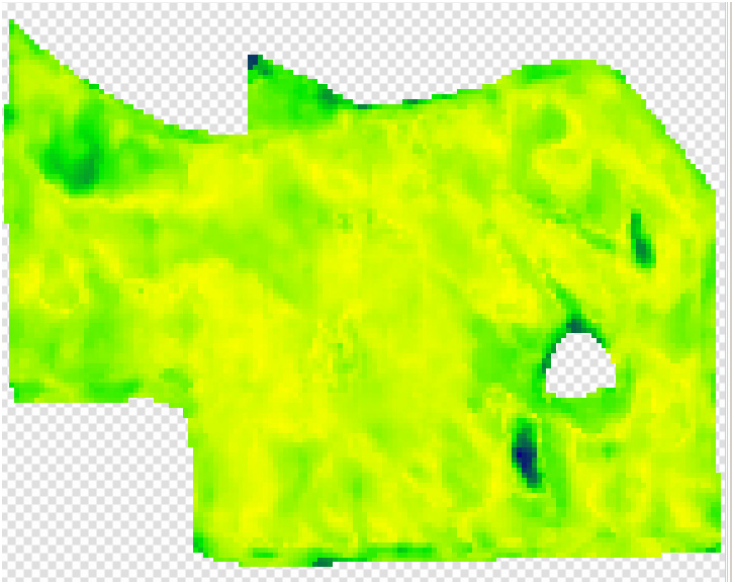


8. Right click the ***StDev Yield 2*** component and choose **Rename**. In the popup **Rename** dialog box type ***CV Yield*** in the **Change to** box. Click **OK**.

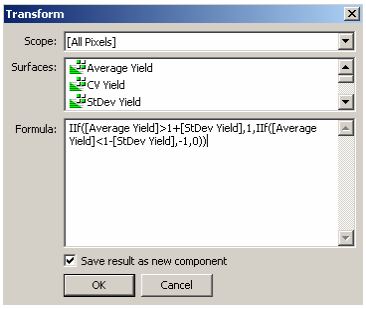
9. Double click the ***CV Yield*** surface component in the **Project** pane. **Maximize** the map and click the **Zoom To Fit** icon.

10. From the **View** menu select **Display options**. In the popup **Display options** dialog box click the **Apply** icon and the **Reverse** icon. Click **OK**.

    *The map of the **Coefficient of Variability** (shown below) can be used for yield classification. However, the yield classification process described below relies on an analysis comparison of the difference between average normalized yield and against the standard deviation (SD) of a normalized yield.*



11. From the **Surface** menu select **Transform**. In the popup **Transform** dialog box, delete the existing formula in the **Formula** box. Go back to the ***Formula_3_4.txt*** file, copy ***Yield Classes Formula*** and paste it into the **Formula** box. Check the box next to the **Save result as new component**. Click **OK**.



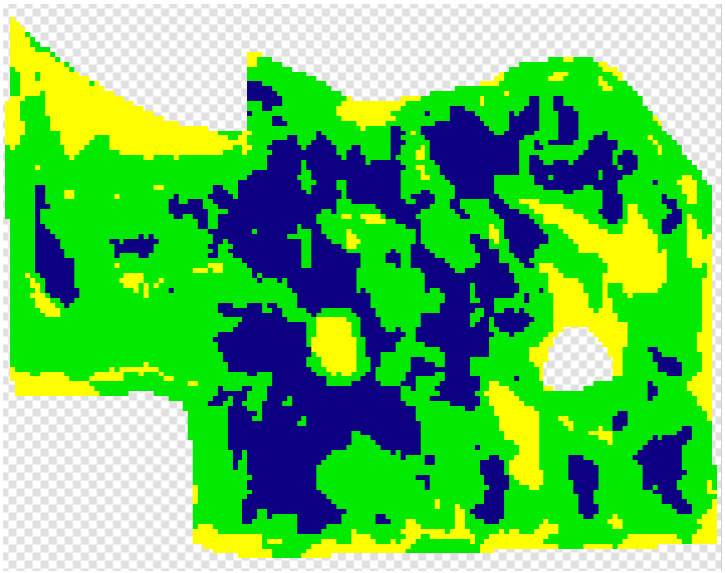
The classification formula states that: 1) if average normalized yield is greater than 1+SD, the pixel of the surface should be labeled as "always high yielding"; 2) if average normalized yield is less than 1-SD, the pixel should be labeled as "always low yielding"; 3) otherwise the pixel should be labeled as "average or variable yield".

12. Right click the ***CV Yield 2*** component and choose **Rename**. In the popup **Rename** dialog box type ***Yield Classes*** in the **Change to** box. Click **OK**.

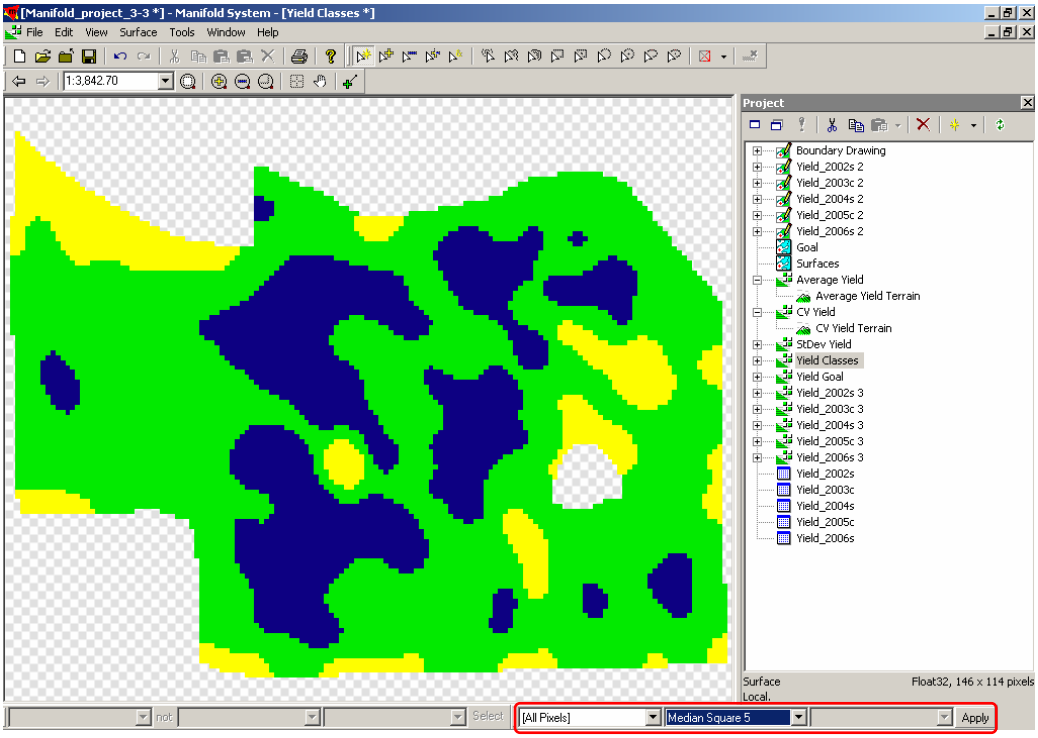
13. Double click the ***Yield Classes*** surface component in the **Project** pane. **Maximize** the map and click the **Zoom To Fit** icon.

14. From **View** menu select **Display options**. In the popup **Display options** dialog box click the **Apply** icon and the **Reverse** icon. Click **OK**.

This map shows all the pixels separated into the three colored classes.

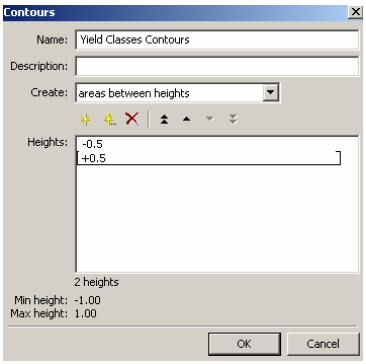


15. To make yield classes more confounded, the following transformation can be accomplished. In the **Transform Toolbar** select ***All Pixel*** for the **Target box** and ***Median Square 5*** for the **Operator box.** Click **Apply** three times.

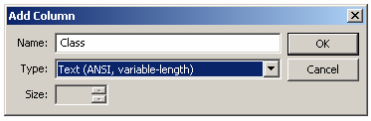


Other smoothing options could be attempted as well. The benefit of the median filter is that it does not reduce the spread of the data, but simply allows the most frequently apparent values to be assigned to the neighbor pixels.

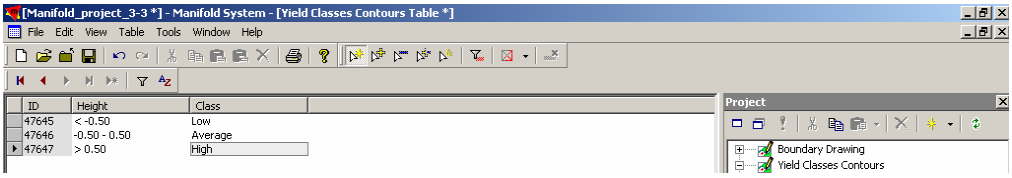
16. From the **Surface** menu select **Contours**. In the popup **Contours** dialog box double click on ***-1*** in the **Heights** box and type ***-0.5.*** Double click ***00*** and type ***+0.5***. Click **OK**. *This is one way to separate -1, 0 and 1 into three distinct groups.*



17. Double-click the ***Yield Classes Contours*** table component in the **Project** pane. From the **Table** menu select **Add-Column**. In the popup **Add Column** dialog box type ***Class*** in the **Name** box and select **Text (ANSI, variable length)** in the **Type** box, Click **OK**.



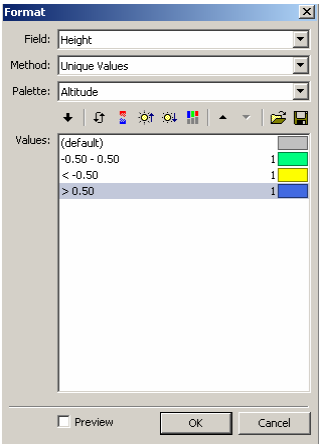
18. In the ***Class*** column, double click the first, the second and the third rows and enter ***Low, Average*** and ***High***, respectively.



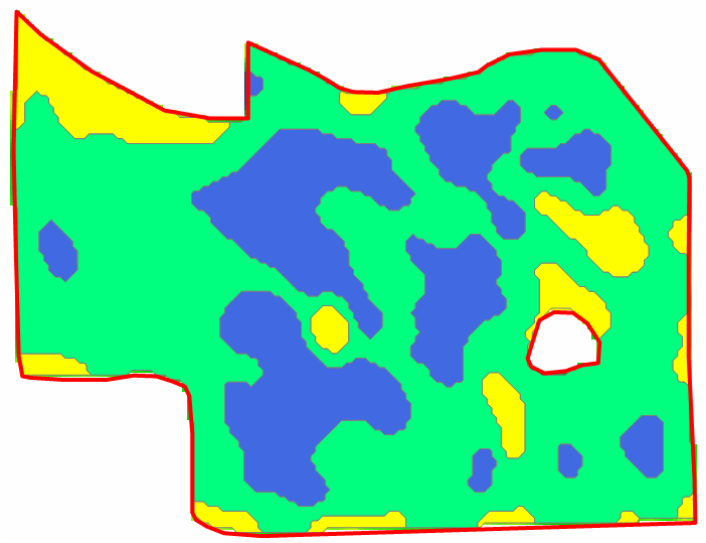
19. Right click any empty location in the **Project** pane and select **Create-Map**. In the popup **Create Map** dialog box, type ***Classes*** in the **Name** box and check both checkboxes next to ***Boundary Drawing*** and ***Yield Classes Contour*** and ***Yield Goal.*** Click **OK**.

20. Double click the ***Classes*** map component in the Project pane. **Maximize** the map and click the **Zoom To Fit** icon. Click the ***Yield Classes Contours*** tab.

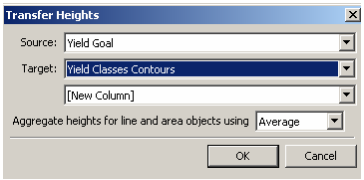
21. Click the **Area Background** icon and click ***Theme***. In the popup **Format** dialog box select ***Class*** in the **Field** box. Double click the gray rectangle next to ***-0.5-0.5*** in the **Values** box and choose ***Green***. Double click the gray rectangle next to < -0.5 in the **Values** box and choose ***Yellow***. Double click the gray rectangle next to > 0.5 in the **Values** box and choose ***Blue***. Click **OK**.



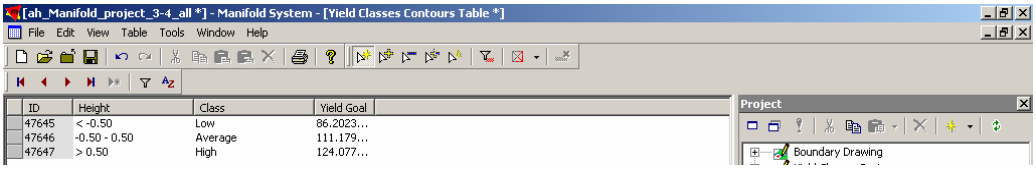
Following is the map of classes for nutrient management. These three classes can be used to set three different yield goal values.



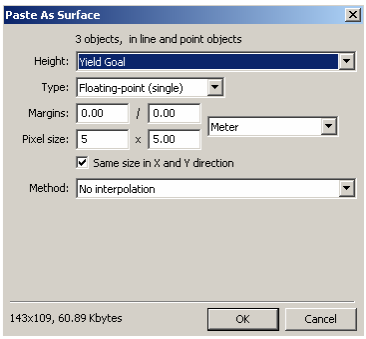
22. Click the ***Yield Goal*** tab at the bottom. From the **Surface** menu select **Transfer Heights**. In the popup **Transfer Heights** dialog box choose ***Yield Classes Contours*** for the **Target** box. Click **OK**.



23. Double click the ***Yield Classes Contours*** table component in the **Project** pane. Right click ***Height 2*** column header and choose **Rename**. In the popup **Rename** dialog box, type ***Yield Goal***. Click OK. *This new column shows the values of the expected yield in bushels per acre that corresponds to each of three classes.*

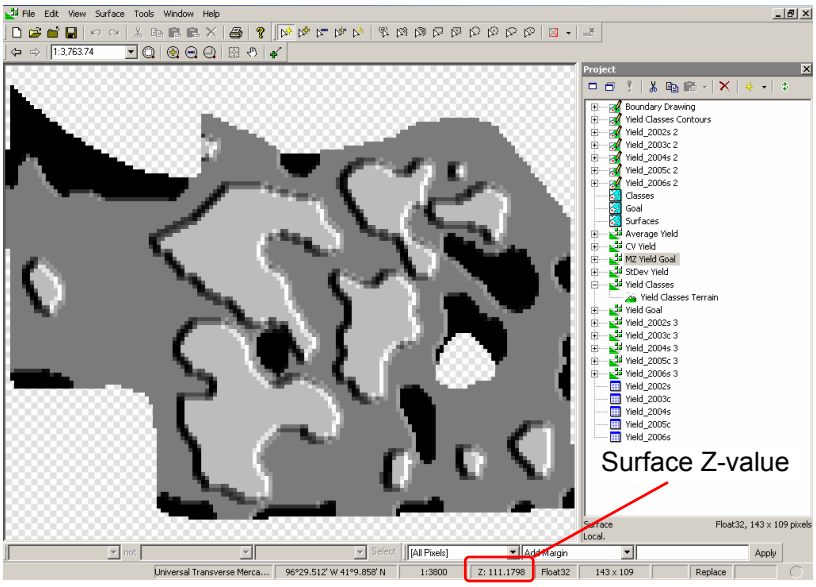


24. For further calculation, we need to convert this contour map back to a surface map. Right-click the ***Yield Classes Contours*** drawing component in the **Project** pane and choose **Copy**. Right click any empty location in the Project pane and select **Paste As-Surface**. In the popup **Paste As Surface** dialog box choose ***Yield Goal*** for the **Height** box. Set the **Pixel size** to ***5*** by ***5***. Accept ***No Interpolation*** for the **Method** box. Click **OK**.



25. Right click the ***Yield Classes Contours 2*** surface component and choose **Rename**. In the popup **Rename** dialog box type ***MZ Yield Goal***. Click **OK**.

26. Double click the ***MZ Yield Goal*** surface component in the **Project** pane. **Maximize** the map and click the **Zoom To Fit** icon. Place mouse pointer on the surface to observe the Z-values that correspond to the three discrete yield goals.



27. **Save As *Project 3-4.map***.